# ANNUAL ENVIRONMENTAL REPORT

## Year End December 2009

## Dunmore Landfill

Dunmore
County Kilkenny

**Waste Licence Register Number W0030-02**

**Kilkenny County Council**
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# 1. Introduction

Kilkenny County Council's Landfill Site at Dunmore received its first Waste Licence (30/1) from the Environmental Protection Agency on the 23rd November 1999. In March 2001 an application was made to review this Licence, to incorporate an enhanced entrance, better infrastructural features and a further four cells. The EPA granted the review of the licence in May 2002 register no. 30/2. The reporting period for this Annual Environmental Report is from 01/01/09 to the 31/12/09.

Records for gas production and waste quantities are based on the waste quantities entering the landfill over the weighbridge. All water balance calculations, site area etc. refer to the entire licensed boundary of the site incorporating cells 1-14 (area for potential leachate generation).

# 2. Waste Acceptance

## *2.1 Waste Activities*

The categories of waste listed below may be accepted at the landfill site: -

- Household refuse collected by refuse contractors in the functional areas of Kilkenny County Council and Kilkenny Borough Council. This practice has now ceased due to the completion of the landfill area. No refuse contractors have been accepted in the site since end of October.
- Commercial refuse (similar in character to household refuse) collected private refuse contractors in the functional areas of Kilkenny County Council and Kilkenny Borough Council. Restrictions on Commercial recyclable waste have been in force since September 2001 and will continue under the terms of the Waste Management (Packaging) Regulations and the terms of the Waste Licence. Since the end of October 2009 only smaller scale operators have been accepted to the site.
- Household refuse which is transported directly by householders to the landfill site

or brought to the C.A. site which is in turn is deposited to landfill, including green waste.

- Commercial refuse (similar in character to household refuse) which is transported directly to the landfill site. Restrictions on Commercial recyclable waste have been in force since September 2001 and will continue under the terms of the Waste Management (Packaging) Regulations and the terms of the Waste Licence.
- Household waste for recycling which is temporarily stored on site (Mixed Electrical Goods, Steel/Aluminium Cans, Clear/Green/Brown Glass, Mixed Paper, Cardboard, Plastic Packaging, Tetra pack, Gas Cylinders, Timber, Metal, Waste Oils, Household Hazardous Waste, Textiles, Lead Acid/Primary Batteries)
- Non-hazardous construction and demolition waste which is specifically required for the site and is accepted by agreement with Kilkenny County Council.
- Non-hazardous industrial waste. Restrictions on Industrial recyclable waste have been in force since September 2001.
- Litter, street sweepings and gully cleanings.
- Imported cover and road material in quantities as required

The total maximum amount of each waste that may be accepted is listed in the table below.

| **WASTE TYPE** | **MAX (PER ANNUM)** | **TOTAL 2009** |
|---|---|---|
| Household | 20,995 Note 1 | 10,178 |
| Commercial | 14,000 Note 1 | 4097 |
| Industrial Non-Hazardous Solids | 5,000 Note 1 | 1 |
| Treated Sewage Sludge | 1,000 Note 2 | 0 |
| Construction and Demolition Waste | 1,000 Note 3&4 | 16 |
| Green Waste for Composting | 1,500 Note 5 | 0 |
| **TOTAL FOR DISPOSAL** | **40,000** | **14,291** |

Note 1: - The tonnage of household waste, commercial waste and industrial non-hazardous solid waste may be increased with the prior agreement of the Agency provided that the total amount of these wastes accepted at the landfill for disposal does not exceed the combined total of 40,000 tonnes per annum.
Note 2: - Treated sewage sludge may only be accepted at the facility for recovery and in accordance with

Condition 5.7.1.
Note 3: - Construction & Demolition Waste shall not be disposed of at the facility but may be accepted for recovery for use as daily cover, in site construction works and landfill restoration. This quantity may be increased subject to agreement with the Agency.
Note 4: - A maximum of 5 tonnes per annum of construction waste containing asbestos may be disposed of in accordance with Condition 5.7.3.
Note 5: - Limited to 1,000 m3 at any time.

Dunmore Landfill Site accepts only non-hazardous waste, however, hazardous waste in small quantities may be present in domestic refuse and in commercial refuse, particularly in skips. Kilkenny County Council has provided a separate area for the collection of white goods, brown goods and a household hazardous waste container. Specialised companies (Indaver, KMK Metals Recycling Ltd, Irish Lamp Recycling Co. Ltd and Enva Ireland Ltd) remove all of this waste from site and dispose/recycle it in accordance the relevant legislation. Kilkenny County Council also provides a mobile Chemcar collection of household hazardous waste at various times through out the year at different locations around the county.

From September 2001 restrictions were put on the acceptance of all recyclable commercial and industrial waste, including white & brown goods, paper, cardboard, metal, timber, glass and cans.

The demand for recycling services and quantities of recyclable materials increased through out 2009. Kilkenny City and County have 43 Bring Site accepting glass, cans, newspapers and plastic bottles. It is hoped that the CAS and the Bring Sites will encourage recycling and reduce the amounts of domestic waste being landfilled. In addition to this over 8000 home compost units have been distributed throughout the county. It is hoped that this will result in a significant reduction in the amounts of kitchen green waste going for disposal.

Animal waste such as hide and skin trimmings and fish offal has been restricted from the site since the 30th November 2001, which is now policy at the site.

### *2.2 Recycling*

In October 2003 Kilkenny County Council opened a dedicated recycling facility. The materials accepted at the site include: -

- Mixed Paper
- Cardboard
- Glass (Brown, Green, Clear)
- Batteries (Primary, Lead Acid, fence batteries)
- White Goods
- Brown Goods
- Household Hazardous waste
- Waste Oils/filters
- Steel/Aluminium Cans
- Mixed Metal
- Timber
- Textiles
- Tetra Pack
- Plastics
- Reading Books

Since opening in 2003 there has been a significant increase in the quantities accepted for recycling at the facility. The quantities of recyclable material accepted at the C.A. site and the category breakdown can be found in Appendix A. Since opening an extra member of staff has been employed specifically to supervise the centre, with security systems to monitor activity. There is a nominal charge levied for using the centre to assist with the running cost.

From the 13th August 2005 Dunmore Civic Amenity Site accepts WEEE (Waste Electronic & Electrical Equipment) free of charge from householders under the Waste Management (waste Electrical and Electronic Equipment) Regulations 2005. Registered retailers are permitted to deliver the WEEE (collected from a like for like take back scheme) to the CA site by prior agreement.

### *2.3 Quantity and Composition*

The quantities of waste accepted at the landfill since July 1997 and the categorised breakdown can be found in Appendix A. The recyclable waste removed from the site i.e. white/brown goods, bottles (green, brown and clear), metal, timber, paper/cardboard, tetra and mixed plastic are also listed.

### *2.4 Capacity*

The remaining capacity (January 2010) at Dunmore was approximately 1500 tonnes, which is around 2 months capacity at current filling rates. It is expected that full capacity will be reached by mid March.

## 2.5 Area Occupied by the Waste

The area occupied by the waste at the end of 2009 is shown in the table below:-

| Cell Number | Area (sqm) | Area (Hectares) | Area (Acres) | Comment |
|---|---|---|---|---|
| 1 | 5304 | 0.53 | 1.31 | Full |
| 2 | 3546 | 0.35 | 0.865 | Full |
| 3 | 3142 | 0.31 | 0.766 | Full |
| 4 | 6169 | 0.62 | 1.532 | Full |
| 5 | 3872 | 0.39 | 0.964 | Full |
| 6 | 4888 | 0.49 | 1.211 | Full |
| 7 | 2921 | 0.29 | 0.717 | Full |
| 8 | 7464 | 0.75 | 1.853 | Full |
| 9 | 4360 | 0.44 | 1.087 | Full |
| 10 | 6163 | 0.62 | 1.532 | Full |
| 11 | 6500 | 0.65 | 1.61 | Full |
| 12 | 3050 | 0.31 | 0.75 | Full |
| 13 | 6170 | 0.62 | 1.52 | Full |
| 14 | 5390 | 0.54 | 1.33 | 7/8 Full |
| **Total** | **68939** | **6.9** | **17.03** | |

Filling is currently taking place in the remaining section of Cell 14. It is anticipated that filling to cell 14 will be completed in March 2010 and that capping to remainder of landfill area will commence in September 2010.

### *2.6 Deposition Methods*

Waste presented at Dunmore landfill for disposal is handled in the following ways: -

Household and commercial waste collected by private refuse contractors and Kilkenny Corporation is deposited at the active land filling face. The waste is then spread and compacted as soon as it becomes practical to do so, by the site staff. The acceptance of this waste from private refuse contractors has ceased since the end of October 2009.

Waste brought directly to the site by householders is placed by them in the container located in the recycling centre. When this container is full, it is weighed and transported to the active tipping face for disposal. All recyclables brought to the site are directed to the appropriate location and are placed in the appropriate receptacle for temporary storage on site. As soon as these receptacles are full, site staff arranges for the removal of the material to an authorised materials recycling centre. From the start of 2002 some white goods and brown goods have been reclassified in the European Waste Catalogue and these goods will be handled in accordance with this directive (EC) No. 2557/2001.

Small amounts of construction/demolition waste are accepted at the site. This waste is tipped away from the tip face. An assessment is carried out on the waste and is used for internal haul roads, inert cover material and strengthening the tipping face. Any recoverable metal is placed in the metal recycling skip. Any material unsuitable for these operations is landfilled, which would only be from a domestic source. A separate construction and demolition facility does not operate at present.

Christmas trees brought to Dunmore during January 2009 were shredded and used as capping on the site.

# 3. Environmental Monitoring

## *3.1 Report on Emissions*

### *3.1.1 Landfill Gas*

Landfill gas monitoring locations at Dunmore are set out in the following locations.

*Perimeter Gas Migration Monitoring Locations*

| Station | Easting | Northing |
|---|---|---|
| GM1 | 249524 | 160493 |
| GM2 | 249587 | 160435 |
| GM3 | 249804 | 160270 |
| GM4 | 249867 | 160441 |
| GM5 | 249765 | 160510 |
| GM7 | 249732 | 160623 |
| GM8 | 249845 | 159922 |
| GM9 | 249529 | 160616 |
| GM10 | 249900 | 160467 |
| GM11 | 249930 | 160497 |
| GM12 | 249930 | 160535 |
| GM13 | 249900 | 160568 |
| GM14 | 249879 | 160632 |
| GM15 | 249848 | 160668 |
| GM16 | 249820 | 160707 |
| GM17 | 249709 | 160660 |
| GM18 | 249671 | 160714 |
| GM19 | 249818 | 160545 |
| GM20 | 249754 | 160497 |
| GM21 | 249751 | 160443 |
| GM22 | 249764 | 160401 |
| GM23 | 249811 | 160374 |

*Vent Pipe Locations (harnessed gas wells)*

| Station | Easting | Northing |
|---|---|---|
| VP1 | 249785 | 160305 |
| VP2 | 249752 | 160329 |
| VP3 | 249771 | 160357 |
| VP4 | 249735 | 160378 |
| VP5 | 249718 | 160350 |
| VP6 | 249688 | 160376 |
| VP7 | 249704 | 160398 |
| VP8 | 249650 | 160395 |

| | | |
|---|---|---|
| VP9 | 249674 | 160427 |
| VP10 | 249696 | 160466 |
| VP11 | 249718 | 160496 |
| VP12 | 249682 | 160499 |
| VP13 | 249655 | 160465 |
| VP14 | 249637 | 160423 |
| VP15 | 249611 | 160445 |
| VP16 | 249607 | 160483 |
| VP17 | 249644 | 160503 |
| VP18 | 249508 | 160564 |
| VP19 | 249537 | 160593 |
| VP20 | 249565 | 160621 |
| VP21 | 249593 | 160649 |
| VP22 | 249623 | 160676 |
| VP23 | 249606 | 160546 |
| VP24 | 249591 | 160571 |
| VP25 | 249559 | 160586 |
| VP26 | 249566 | 160554 |
| VP27 | 249532 | 160563 |
| VP28 | 249540 | 160537 |
| VP29 | 249565 | 160516 |
| VP30 | 249832 | 160014 |
| VP31 | 249630 | 160664 |
| VP32 | 249884 | 160007 |
| VP33 | 249608 | 160611 |
| VP34 | 249918 | 160038 |
| VP35 | 249577 | 160592 |
| VP36 | 249953 | 160070 |
| VP37 | 249589 | 160528 |
| VP38 | 249647 | 160566 |
| VP39 | 249674 | 160565 |
| VP40 | 249685 | 160589 |
| VP41 | 249618 | 160562 |
| VP42 | 249673 | 160623 |
| VP43 | 249654 | 160604 |
| VP44 | 249628 | 160588 |
| VP45 | 249633 | 160622 |
| VP46 | 249582 | 160623 |
| VP47 | 249728 | 160577 |
| VP48 | 249758 | 160574 |
| VP49 | 249760 | 160543 |
| VP50 | 249787 | 160570 |
| VP51 | 249759 | 160600 |
| VP52 | 249809 | 160585 |
| VP53 | 249780 | 160615 |
| VP54 | 249808 | 160638 |

| | | |
|---|---|---|
| VP55 | 249814 | 160617 |
| VP56 | 249833 | 160616 |

Gas monitoring and migration results are submitted to the Agency biannually. Results for 2009 are available in Appendix B. All gas wells on the site are harnessed and the gas is burnt off thus reducing the landfills contribution to ozone depleting gases by 90%, and also reduces landfill gases odour.

*Gas Quantity Emissions from the Landfill*

The initial aerobic phase and the first transition stage only take a couple weeks. During these phases there is no gas produced as a result of degradation. In the second transition phase there is no longer oxygen intake to the site and the anaerobic phase begins. This results in methane production and will continue for up to two years. In this period of time the production of gas is not stable and the full annual production of gas is not reached. When gas production stabilizes in the methanogenic phase and total expected time until the end of methane production is approximately twenty years. The table below is an estimate based on the tonnages accepted since the weighbridge was installed (07/97) and since waste input (in tonnes) records were kept. The figures in the table below are based on an estimated gas production of 75 l/kg (which includes an assumption of 60% wet waste). A detailed discussion of landfill gas production since the site opened is contained in the EIS submitted as part of the licence review.

**Cells 8-14**

| Year | Annual Tonnage Waste | | Annual Gas Production Rate Methane (Mm3/yr) | Cumulative Methane Gas Production Rate (Mm3) | Annual Landfill Gas Production (Mm3/yr) |
|---|---|---|---|---|---|
| 1997 (6mths) | 12,793.65 | 0.02 | 0.02 | 0.02 | 0.04 |
| 1998 | 21,828.05 | 0.04 | 0.09 | 0.07 | 0.16 |
| 1999 | 27,853.72 | 0.05 | 0.18 | 0.24 | 0.33 |
| 2000 | 33,593.38 | 0.06 | 0.30 | 0.53 | 0.54 |
| 2001 | 29,805.96 | 0.06 | 0.42 | 0.95 | 0.76 |
| 2002 | 17,651.90 | 0.03 | 0.51 | 1.48 | 0.92 |
| 2003 | 17,259.53 | 0.03 | 0.57 | 2.05 | 1.04 |
| 2004 | 23,334.00 | 0.04 | 0.65 | 2.69 | 1.18 |
| 2005 | 19,266.00 | 0.04 | 0.73 | 3.42 | 1.32 |

| | | | | | |
|---|---|---|---|---|---|
| 2006 | 18,516.00 | 0.03 | 0.80 | 4.22 | 1.45 |
| 2007 | 22,267.00 | 0.04 | 0.87 | 5.09 | 1.59 |
| 2008 | 18239.94 | 0.03 | 0.95 | 6.46 | 1.73 |
| 2009 | 14,289.00 | 0.03 | 0.96 | 6.46 | 1.75 |

In November 2003 a temporary gas extraction and flare system was introduced at the site in cells 8-10. This resulted in a noticeable improvement in the air quality within the site, a reduction in odour problems and a reduction in measured exceedance levels adjacent to these cells. During 2004 a permanent gas extraction and enclosed flare system was installed. This system controls all gas venting and migrating from cells 1 to 13, the gas is drawn out of the cell and is burnt off. Since the installation of this system the landfill gases have been significantly reduced by 90%. This system was extended in 2008 to extract gas from cell13& 14.

### *3.1.2 Surface Water, Groundwater and Leachate*

***Surface Water:*** - Surface water is analysed quarterly and the results are submitted to the Agency. The monitoring locations are listed below: -

| Station | Easting | Northing |
|---|---|---|
| Stream A -Upstream | 249978 | 160617 |
| - Downstream | 249544 | 160503 |

Results of the surface water monitoring are available in Appendix C

***Groundwater:*** - Groundwater well quality is tested quarterly, and results are submitted to the Agency as set out in condition 9.1 and schedule F of the licence. The monitoring locations are listed on below: -

| Station | Easting | Northing |
|---|---|---|
| No. 3 | 250011 | 160551 |
| GW1 | 249675 | 160924 |
| No. 14 | 249547 | 160507 |
| GW2 | 249867 | 160440 |

| | | |
|---|---|---|
| GW3 | 249500 | 160511 |
| GW4 | 249562 | 160456 |
| MW1 | 249619 | 160383 |
| No.15 | 249454 | 159728 |
| No. 6 | 249488 | 160191 |

Results throughout the year have shown no adverse effects to the ground water as a result of landfilling in the area, and are listed in Appendix C.

***Leachate:*** - The composition of leachate is tested at leachate manholes and holding lagoon quarterly and results are submitted to the Agency as set out in condition 9.1 and schedule F of the licence. The results are listed in Appendix C. The monitoring locations are listed below: -

| **Monitoring Locations** | **Easting** | **Northing** |
|---|---|---|
| Holding Lagoon | 249566 | 160484 |
| Manhole 1 | 249649 | 160608 |
| Manhole 2 | 249600 | 160604 |
| Manhole 3 | 249521 | 160536 |
| Manhole 4 | 249526 | 160507 |
| Manhole 5 | 249566 | 160480 |

The volume of leachate produced and removed from the site is as follows: -

The water balance equation was calculated as follows: -

Amount of Leachate on Site = (effective rainfall * area cell 1-7 * % area not yet capped) + (effective rainfall * area cell 8-10 * % area not yet capped) + (effective rainfall * area cell 11-12* % area not yet capped) + (effective rainfall * area cell 13-14* % area not yet capped)–(leachate removed)–(primary absorption factor)–(degradation water usage2007)

Where: -

Effective Rainfall = Total Rainfall – Potential Evapotranspiration (Met Eireann Figures)

Primary absorption may be taken as 100 l/tonne for 10% of waste as the amount of dry materials is decreasing from domestic sources.

Volume required for degradation = 2mm per square meter

Amount of Leachate on Site = (3536.87) + (1065.91) + (6850.46) + (1131.87) – (13422.6) - (142.9) – (137.87)

Amount of Leachate on Site = -1118.27 $m^3$

The amount of leachate removed from site and frequency was in response to the amount of rainfall and potential evapo-transpiration at the site i.e. the rate of leachate production. More leachate was removed off site than was produced on site during 2009 as it was necessary to store some leachate on site in late 2008. This leachate was then tankered off site in early 2009. A second leachate lagoon was installed during 2003 which provides for a much greater storage capacity at the site.

During 2004 leachate recirculation tankers were installed in cells 8-10 to reduce the cost of leachate collection and disposal, enhance settlement with the aim of recovering air space, to encourage gas production and to promote early stabilisation. The leachate recirculation tanks locations are listed below.

**Leachate recirculation Tanks**

| Station | Easting | Northing |
|---|---|---|
| LR 1 | 249515 | 160572 |
| LR 2 | 249553 | 160605 |
| LR 3 | 249602 | 160643 |
| LR 4 | 249647 | 160670 |

### *3.1.3 Dust monitoring*

***Dust Monitoring:*** **-** Dust Monitoring takes place three times a year and the results are submitted to the Agency. The monitoring locations are listed below and results are shown in Appendix C: -

| Station | Easting | Northing |
|---|---|---|
| DG 1 | 249565 | 160453 |
| DG 2 | 249756 | 160467 |
| DG3 | 249700 | 160638 |

| | | |
|---|---|---|
| DG 4 | 249870 | 160671 |
| DG 5 | 249940 | 160588 |

### *3.1.4 Noise Monitoring*

***Noise Monitoring:*** **-** Noise Monitoring is analysed annually and the results are submitted to the Agency. The monitoring locations are listed below: -

| **Station** | **Easting** | **Northing** |
|---|---|---|
| NS 1 | 249725 | 160830 |
| NS 2 | 249852 | 160740 |
| NS 3 | 250006 | 160593 |
| NS 4 | 250003 | 160571 |
| N1 | 249803 | 160290 |
| N2 | 249489 | 160927 |
| NS 5 | 249981 | 160510 |
| Dunmore Cottage | 249442 | 160896 |

The locations of all sampling and monitoring points can be found in the attached drawing in Appendix D.

### *3.2 Interpretation of Environmental Monitoring*

***Gas:*** - Gas monitoring took place on the site at both gas well locations and migration points. The results from the wells indicted that approximately 2/3 of the gas in the vents was methane with the remaining 1/3 carbon dioxide. These are the normal levels that can be expected in a landfill of this age.

Results from the migration points around the site indicated a number of exceedances in the set trigger levels, which are given in Schedule C of the licence. An Assessment of Landfill Gas Measurements at Dunmore Landfill, Co. Kilkenny analysing the processes responsible for these exceedence levels was carried out in March 2006 and submitted to the agency in 2007. This report concluded that there is $CO_2$ naturally occurring in the Dunmore Area. To allow for this finding the Agency agreed to increase the tolerance of the $CO_2$ trigger level, from 1.5% v/v to 3% v/v, therefore any levels =>3% v/v would be treated as an incident and reportable to the Agency. During 2007, 24.38% of the monitoring migration analysis points had trigger levels = or > than 1.5%, 71.19% of these exceedences had values in the range of = or > 1.5% v/v & <3% v/v, and 28.81% of these exceedences were in the range of = or > 3% v/v. The number of exceedences in the gas migration monitoring points was less than that in 2008. There were no exceedences of methane at any of the migration locations during 2009.

***Ground/Surface Water:*** - Primary indicator parameters used to detect the presence of any leachate infiltration to groundwater are conductivity and chloride levels. The levels of chloride and conductivity are within acceptable levels and there is no noticeable increases in these levels since records began.

***Dust Monitoring***: - Dust monitoring was carried out at five different locations during the months of August, May and March. No exceedance of the permitted level of 350mg/m2/day, from Schedule C of the waste licence conditions, was recorded

***Noise Monitoring***:-Noise monitoring was carried out during February 2009. Six sensitive locations and two boundary locations were monitored during daytime landfill operations. Results indicated that the local noise environment was primarily impacted by passing traffic on the N77 Kilkenny-Durrow Road, and that the noise from the landfill was negligible.

### *3.3 Meteorological Monitoring*

### *Meteorological Report*

The following is a summary of the rainfall amounts and potential evapo-transpiration rates at Dunmore. The results were obtained from Met-Eireann.

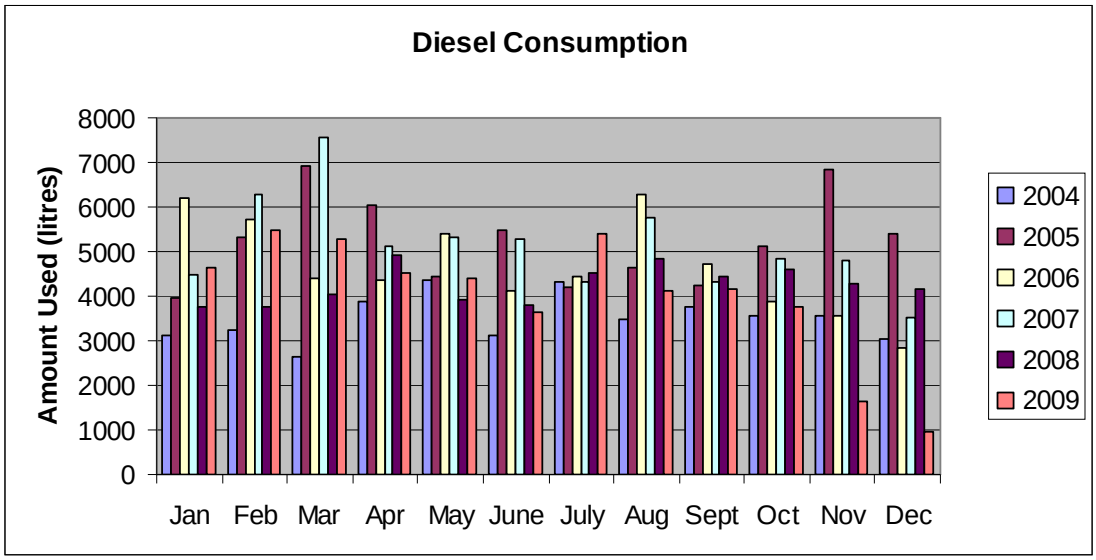
| Month | Rainfall (mm) | Potential Evapotrans. (mm) |
|---|---|---|
| January | 113.4 | 38 |
| February | 29.2 | 16.1 |
| March | 32.6 | 36.7 |
| April | 102.4 | 46.3 |
| May | 69 | 72.6 |
| June | 65 | 84.6 |
| July | 152.4 | 76.4 |
| August | 10.9 | 67.6 |
| September | 418 | 93.9 |
| October | 127.8 | 24.1 |
| November | 215.5 | 13.5 |
| December | 72.9 | 6.6 |
| **Total** | **1032.9** | **576.4** |

## 4. Site Infrastructure and Development

### *4.1 Resource and Energy Consumption*

The following raw materials are used as a result of the land filling process at Dunmore landfill facility:

**4.1.1 Diesel Fuel**: -The amount of fuel consumed per week at the landfill site averages at approximately 960 litres for the year 2009, by the loading shovel, tractor, excavator, and compactor. There was a small decrease in diesel consumption, by approx 60l/week, in 2009 compared to previous year. Below shows comparative fuel use for the last number of years.




**4.1.2 Electricity**: -. Electricity is used in the following buildings; weighbridge office, main offices and recycling centre office. It is also used to operate the weighbridge computer, pump, lights, heating and cooling appliances, CCTV cameras etc. In 2003 a new three phase supply was installed to meet the demands of the revised licence and supply the recycling centre, gas flare, pumps, SCADA system and extended office.

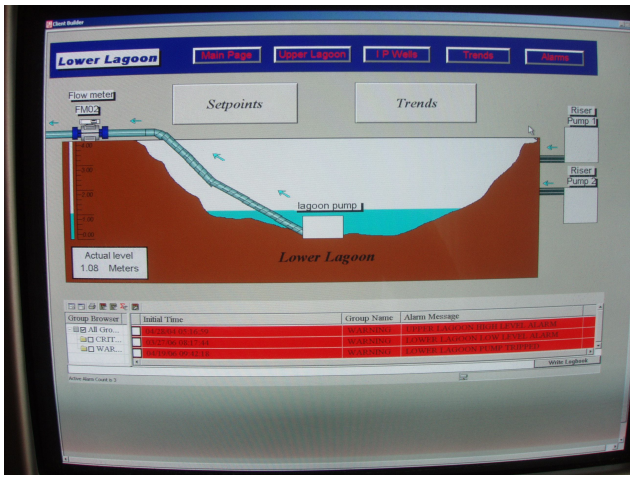
**4.1.3 Sprinkling Water**: - During periods of dry weather water is used to suppress dust on the site haul roads. Occasionally water maybe taken from the river Nore located adjacent to the site. The quantities of water used would vary but would not exceed 8,000 gallons per day during dry weather. The entrance and weighbridge area are watered down and cleaned using the road sweeper or a power washer and a 300 gallon reused oil tank as a water reservoir filled from the site water supply. Some sprinkling around the weighbridge is carried out using local groundwater sources.

### *4.2 SCADA System:-*

### 4.2.1 Leachate Monitoring

Supervisory Control and Data acquisition to facilitate monitoring and management of Leachate levels in the Leachate lagoons and new cells is in operation at the facility. This system allows for constant monitoring of all pumps, leachate levels in wells and lagoons, to ensure the levels in cells do not rise above 1m and that leachate level in

lagoons shall always maintain a minimum freeboard of 0.75m. Alarms will be raised should any of the levels be reached. (see below typical screen showing level in lower lagoon). The SCADA system was upgraded during 2008 to facilitate the control of the additional leachate pumps in Cells 13 & 14.




| |
|---|
| **Ambient temperature** |
| **Atmospheric Pressure** |
| **Carbon Dioxide** |
| **Flow** |
| **Methane** |
| **Oxygen** |
| **Pressure** |
| **Flare Temperature** |
| **Carbon Monoxide** |

### 4.2.2 Gas collection and flaring system

Collection and flaring of gas commenced August 2004. The flare operates 24hr a day 7 days a week at temperatures of approx $1020^0$C. SCADA system on site constantly monitors and records the flaring system. Data is down loaded on a monthly basis from the flare system to an excel spread the following parameters are recorded:

***Closed Flare System***

## *4.3 Development Works*

### 4.3.1. Development Works over the Reporting Period

Over the past year the following development works have been carried out at the facility:

- Installation and testing of liner cap on cells 4/7
- Horizontal gas collection pipes installed and connection of 2nd Stage of horizontal gas system to Flare.
- Completed grading, topsoiling, grass seeding and re-instatement of haul road at Cells 4/7
- Installed base and pipe work for gas vent No.55
- Completion of manholes and covers on wells in Cells 8,9,10,11 & 12.
- Connected 3 No. gas wells ( No's 53, 54, 55) to flare system from Cell 14
- Commenced excavation and concrete works at Civic Amenity Site for new packer skips.

### 4.3.2 Proposed Development Works

It is proposed to carry out the following developments at Dunmore in the year 2010.

- Closure of landfill
- Connection of final gas well within cell 14.
- Capping and rehabilitation works to remaining cells.
- Final topsoiling to unfinished areas within the site.
- Install further signage in Civic Amenity site.
- Improve layout and increase capacity at CAS.
- Review of traffic management measures on site.
- Additional landscaping around site offices and civic amenity site.

## 4.4 Tank and Pipeline Integrity Tests

In respect of Condition 5.12.2, an integrity test on the leachate-holding lagoon and pipeline outside the cells was carried out.

'Geomembrane Testing Services Limited', carried out an integrity test on the leachate holding lagoon which was submitted to the Agency on 2nd September 2003. Air pressure and high frequency spark tests were carried out over the lined area of the lagoon. It was found that 'the geomembrane liner was free of defects at the time of final inspection'. Lagoon structures were retested in 2007 with the final part of the test completed in early 2008. Upon completion of the integrity test on both leachate holding lagoons, results were forwarded to the Agency

## *4.5 Restoration Plan and Aftercare Plan*

The final ground level contours of the landfill are shown on Drawing No. 30-2-DWG03, contours map, while the restoration plan for the area is shown on Drawing No. 30-2-DWG02, Landscaping Plan. These are available in appendix F.

Phase I of the Restoration in Cells 1 – 7 was completed with a temporary cap after it

was filled between 1989 and 1998. Three acres of leased land has been seeded with grass and a small yard area is provided. The remaining six acres had been planted with native woodland species and fenced with a rabbit-proof fence. As part of the revised licence all seeded areas and trees were removed and a revised impermeable capping system commenced in 2003. 90% of this capping layer was completed in 2004 the remaining capping works to be completed in 2010 as part of phase III capping. The area will be restored as outlined previously with a mix of grass and planting.

Phase II of the Restoration Scheme comprises Cells 8 – 10. As part of the licence conditions and landfill directive partial capping of cells 8 -10 commenced in 2003. At the end of 2004 50% of this capping layer was completed. Completion of the remaining capping works to cells 8, 9, 10, 11 & 12 took place during 2008. Final capping will consist of a gas drainage layer, a bentonite enhance liner, an impermeable plastic layer, surface water drainage layer, subsoil and topsoil. The restored area will be a combination of seeded and planted areas. The final capping detail was submitted to the Agency for approval and is in accordance with details shown in the EPA Landfill Manual on Restoration and Aftercare.

Phase III of the Restoration Scheme comprises Cells 8 – 14. The remainder of the site will be capped progressively within 12 months of the final filling of cells to level. Final capping will consist of a gas drainage layer, a bentonite enhance liner, an impermeable plastic layer, surface water drainage layer, subsoil and topsoil. The restored area will be a combination of seeded and planted areas. The final capping detail was submitted to the Agency for approval and is in accordance with details shown in the EPA Landfill Manual on Restoration and Aftercare.

Prior to completion of the restoration, the gas pipework system shall be modified. Tree and shrub planting will be delayed until all remedial work on the gas system has been carried out and initial settlement has occurred. Areas subject to delays shall be restored on an interim basis and seeded with grass.

All leachate collection and control systems shall be maintained.

Upon completion of the landfill activities the following restoration/reinstatement works will be carried out: -

1. Removal of all litter screen fencing.
2. Weighbridge and offices area no longer required shall be topsoiled and seeded with grass, those required for the operation of the civic amenity site will be maintained as required.
3. Any litter from perimeter hedging, ditches and surrounding land shall be removed.
4. All boundary fences on the site shall be secured. Hedge rows will be retained and renewed as necessary.
5. All unsurfaced roadways with the exception of the access to the leachate lagoon and civic amenity site shall be removed.
6. Decommission and removal of services, e.g. telephone, ESB, no longer required on site.
7. Erect signage indicating that the landfilling facility is closed and directing users of the civic amenity facility to the correct locations.
8. The boundary at the access road (from the Bleech Road) will be secured, all unsurfaced roadway shall be removed apart from access to the lagoon.

In the long term and subject to Waste Licence conditions and monitoring results, any appurtenances no longer required for the monitoring or maintenance programmes shall be removed off site. The localised areas affected by these works will be restored to the condition of the surrounding ground.

The leased area of land (O'Neill's pit) will be returned to the owner for agricultural grazing use, all fence boundaries restored and its maintenance, apart from monitoring points and gas wells, will no longer be the responsibility of Kilkenny County Council.

The remaining areas of land subject to agreement with the agency will be woodland/grassland after the restoration and landscaping plan is complete and specialist forestry management firms under contract with Kilkenny County Council will manage these areas.

### *4.6 Site Survey*

The site topographical survey is completed at least once a year. This survey was submitted to the Agency previously under condition 8.8.1 (ref. LC-41-MG) and will be submitted annually thereafter. Last topographical (Revision I) survey was carried out in March 2009 and will be sent to the Agency.

## 5. Environmental Targets and Objectives

### *5.1 Objectives and Targets*

**Objective 1**

Ensure that all waste acceptance requirements are met

| | |
|---|---|
| **Target 1.1** | All waste accepted at the facility is within the criteria set out in Part I of the Waste Licence |
| **Target 1.2** | The amounts of each category of waste recovered and disposed if at the facility does not exceed that specified in Schedule A of the Waste Licence |
| **Target 1.3** | Any restriction on waste entering the facility shall be strictly enforced |
| **Target 1.4** | All waste accepted for recovery and disposal shall be done so within the opening hours specified in condition 1.6 |

**Objective 2**

Establish and Environmental Management System to fulfil the obligation of the Waste Licence.

**Target 2.1** The facility shall employ a suitably qualified facility manager as the person in charge and that this person or a nominated deputy shall be present at all times at the facility, this person will be in place from the grant date of the licence.

**Target 2.2** The facility manager and deputy shall complete the FAS Waste Management Training Program with 12 months of their appointment.

**Target 2.3** All personnel performing specially assigned tasks shall receive all appropriate instruction prior to carrying out that function

**Target 2.4** Submission of details of management structure for Dunmore Landfill Facility by the end of August 2002, which will be reviewed annually or as required.

**Target 2.5** Preparation and submission of an Environmental Management Program (EMP) to the Environmental Protection Agency by the end of November 2002, which will be reviewed annually in November and submitted to the Agency or as required.

**Target 2.6** Preparation and submission of an Environmental Management System (EMS) to the Environmental Protection Agency by the end of November 2002, which will be reviewed annually in November and submitted to the Agency or as required.

**Target 2.7** Establish awareness and training procedures for personnel at Dunmore Landfill Facility which will form part of the EMS

**Target 2.8** Submission to the EPA of a communications program as part of the EMS

**Target 2.9** Preparation and submission of a corrective action procedure, which will be submitted to the Agency as part of the EMS

**Target 2.10** First Annual Environment Report (AER) of Waste Licence 30-2 submitted to Agency by the end of January 2003.

**Target 2.11** Review of AER by the end of March annually thereafter

**Objective 3**

Provision of required infrastructure at the facility with the agreement of the agency

**Target 3.1** An updated site notice board will be provided at the new facility entrance by end June 2002. The new Waste Licence reference number will be provided, contacted details including revised telephone numbers and location of all environmental monitoring information

**Target 3.2** Security fencing and security measures will be provided as part of the provision of the new access by May 2003

**Target 3.3** A new access will be provided from the N77 by April 2003. Detailed SEW will be submitted on the project will be submitted to the Agency, when the safety audit on the alignment has been approved by the NRA.

**Target 3.4** Facility roads and hardstanding areas will be provided at the new access by April 2003, which will be designed to ensure safe access and movement within the site. All areas will be provided with appropriate surface water drainage systems.

**Target 3.5** New facility offices, will be provided, which will incorporate telephones and an electronic communication facility by April 2003. Offices shall be fitted with gas monitoring equipment, in accordance with 'Protection of New Buildings and Occupants from Landfill Gas.

**Target 3.6** A Waste Inspection and Quarantine Area will be provided by May 2003, subject to Agreement with the Agency. Drainage from these areas will go directly to the leachate lagoon.

**Target 3.7** The present weighbridge at the facility will be relocated or a

new weighbridge will be provided at the new facility entrance, subject to agreement with the Agency, by May 2003. This weighbridge will not be made operational until approval is given by Legal Metrology Services.

**Target 3.8** A wheel cleaning as set out in the EIS area will be provided at the facility entrance by May 2003, subject to agreement with the Agency.

**Target 3.9** As part of the development of the new offices, a wastewater treatment plant will be provide at the new facility offices by May 2003, subject to agreement with the Agency. The discharge from this unit will go directly to the new leachate lagoon.

**Target 3.10** A revised tank and drum storage area will be provided by April 2003, to ensure any spillage that may occur is contained.

**Target 3.11** Four new cells will be provided (cell 11-14), between 2002 and 2005 and will be constructed to that specified in condition 3.13, subject to agreement with the Agency.

**Target 3.12** A new larger leachate lagoon shall be construction to the specified standard to provide sufficient capacity for storage by May 2003, subject to agreement with the Agency.

**Target 3.13** A new gas management system is in place, analysis and written procedure on the system will be prepared and submitted to the agency by 2006.

**Target 3.14** A SCADA system or equivalent will be installed at the facility by April 2003, where the hardware and software will be incorporated into the new facility offices, subject to the Agencies agreement.

**Target 3.15** A full surface water management system will be incorporated as infrastructure and capping is provided, subject to the Agencies agreement. Surface water from the extension will be diverted to the surface water stream once the capping system is

provided.

**Target 3.16** All new infrastructure provided will have regard to the ground water in the area which is monitored on a monthly basis.

**Target 3.17** A construction and demolition storage area will be provided by April 2003 as part of the revised access, subject to the agreement of the Agency.

**Target 3.18** The civic amenity site will be provided by May 2003 and will be maintained to the highest environmental standards. It is anticipated that this area in conjunction with other County Council initiatives will increase recovery rates in the County.

**Target 3.19** A household hazardous waste facility will be provided at the new civic waste facility. This facility will be widely advertised and will raise awareness of the need to source segregate household hazardous waste.

**Target 3.20** A proposal on the provision of compost facilities will be completed by May 2003 and submitted to the Agency. Composting/shredding facilities will increase recovery rates for green waste in the County.

**Target 3.21** A revised proposal for the provision of berms at the facility will be submitted to the Agency by January 2003. All revision made will be as a result of consultation with adjacent properties.

**Target 3.22** All monitoring points required to meet the conditions of the Waste Licence will be provided as infrastructure develops, subject to the Agencies agreement.

**Target 3.23** The landfill gas management system shall be extended to extract gas from the new cells as they develop, subject to agreement with the agency.

**Target 3.24** The leachate extraction system shall be extended as the cells develop, subject to agreement with the Agency.

**Target 3.23** A storage and shredding area for Christmas Trees shall be

provided and shredded trees to be reused as landfill cover

**Objective 4**

Establishment of a detailed plan for the restoration and aftercare of the facility

**Target 4.1** A full revised restoration and aftercare plan will be submitted to the Agency by May 2003, which will incorporate a proposal for treatment of cells 1-7

**Target 4.2** Capping at the facility will commence in May 2003 in accordance with condition 4.3, subject to agreement with the Agency and will continue on a phased basis as the facility develops.

**Target 4.3** Assessment of the capping adequacy of cells 1-7 will commence in February 2003. A proposal for the capping and collection of gas from cells 1-7 will be submitted to the Agency by May 2003. All works on this area will be completed by May 2004.

**Target 4.4** All material excavated for the purpose of the development of infrastructure will be reused with the facility boundary and will be stored appropriately until required.

**Target 4.5** Proposals for the Phase II extension of capping of cells 10 & 11 will be submitted to the agency, it is proposed that works on this capping will be complete by October 2006.

**Target 4.6** Proposals for the Phase III capping of cells 7, 8, 9, 10, 11 & 12 will be submitted to the agency, it is proposed that works on this capping will be complete by end of 2009.

**Objective 5**

The facility shall be operated to ensure there are no adverse environmental effects as a result of the operation of the facility.

**Target 5.1** Waste shall not be disposed of in any part of the facility until approval is sought and granted by the Agency

**Target 5.2** A procedure for the acceptance of waste at the facility has been submitted and approved by the Agency and shall be updated annually thereafter.

**Target 5.3** All waste shall be covered appropriately at the end of each day

**Target 5.4** A full leachate management plan will be drawn up which shall include procedures for monitoring leachate levels, removal of leachate by tanker and control procedures to ensure that leachate levels remain within parameters set out in condition 5.11. This plan will form part of the AER and will be revised as necessary.

**Target 5.5** Written records of maintenance of all monitoring and emission equipment. Maintenance of these systems will take place as recommended by the manufacturer

**Target 5.6** All lagoons structures at the site will be independently tested every three years.

**Target 5.7** The wheel wash at the site entrance shall be maintained and cleaned as required.

**Objective 6**

Control of emissions at the facility

**Target 6.1** Any emission exceeding trigger levels or unauthorised emission will be notified to the Agency.

**Target 6.2** Monitoring of the landfill gas flare will commence once the installation of the flare is complete. All emission values shall comply with the terms of the Waste Licence.

**Target 6.3** Flare unit efficiency shall be tested once it is installed and once every three years.

**Objective 7**

Continuing minimisation of Environmental Nuisances associated with Dunmore Landfill Facility.

**Target 7.1** That any potential nuisance resulting from the operation of the facility will be minimised and any methods that may eliminate nuisance will be implemented. Ongoing community consultation and inspections at the facility will ensure nuisance is minimised. Full compliance with the requirements set out in Condition 7 of the Waste Licence will continue.

**Objective 8**

Continuation of Environmental Monitoring at the facility

**Target 8.1** All environmental monitoring at the facility as specified in Schedule D of the Waste Licence shall commence by 10th July, 2002.

**Target 8.2** An initial topographical survey of cells 1-10 and all areas to be developed as part of the revised licence to be completed by June 2002, and two more survey to be completed by January 2003 and May 2003, to map development of the site. A topographical survey shall be completed by January each year thereafter.

**Target 8.3** A drawing of all monitoring locations shall be submitted to the Agency by August 2002. Any changes to the location of monitoring locations will be immediately updated on this drawing and will be communicated to the Agency.

**Target 8.4** A stability assessment of the site will be completed by November 2002 and annually thereafter and submitted to the Agency.

**Target 8.5** A revised weekly nuisance monitoring system will be introduced at the site and implemented by January 2003; all records will be held at the site.

**Objective 9**

Contingency measures shall be put in place in the event of an incident or emergency

at the site

**Target 9.1** An Emergency response procedure will be developed and submitted to the Agency by November 2002 and submitted to the Agency. The procedure will be revised as necessary.

**Target 9.2** An adequate supply of absorbent booms and material will be provided and maintained at the site.

**Target 9.3** All waste oil storage containers shall be bunded.

**Objective 10**

Records shall be maintained and available for inspection at all reasonable times

**Target 10.1** All records for the site shall be available at the facility office for inspection

**Target 10.2** Ongoing maintenance of waste records as per Condition 10.2 of the Waste Licence.

**Target 10.3** A procedure shall be developed to log all waste leaving the civic amenity site once the project has been completed.

**Target 10.4** A complaints book shall be kept at the facility office and any complaint shall be logged as per condition 10.4

**Target 10.5** A record of all leachate leaving the facility shall be kept in accordance with condition 10.5

**Target 10.6** A record shall be kept of the program for the control of vermin and flies as per condition 10.7

**Target 10.7** A record of bird control activities shall be kept and regular bird counts made.

**Target 10.8** A written record shall be kept of the type of daily cover that is used on the site as per condition 10.9

**Target 10.9** Long term environmental monitoring to continue a set out in the table over: -

| Report Title | Report Submission |
|---|---|
| Environmental Management System Updates | Annually in November |
| Annual Environmental Report (AER) | Annually at the end of March |
| Bund, tank and container integrity assessment | Every three years in September |
| Monitoring of landfill gas | Quarterly up to December 2004 biannually there after |
| Monitoring of Surface Water Quality | Quarterly |
| Monitoring Ground Water Quality | Quarterly |
| Monitoring of Leachate | Quarterly |
| Meteorological Monitoring | Annually |
| Dust Monitoring | Three times a year |
| Noise Monitoring | Annually |
| Site Topographic Survey | Annually |

**Objective 11**

To submit all relevant reports and notifications to the Agency in the timeframes specified

**Target 11.1** Any incident at the site shall be notified in accordance with the corrective action procedure

**Target 11.2** A new contract will be entered into for the recovery/disposal white goods/brown goods by end May 2003

**Target 11.3** Waste recovery reports shall be submitted to the Agency by November 2002 as outlined in condition 11.3

**Target 11.4** A report on the achievement of the final profile at the site shall be submitted by November 2002

**Target 11.5** An operations procedure shall be developed for operation in adverse wind conditions and submitted to the agency by November 2002.

**Target 11.6** A report on procedure to control vermin and flies shall be submitted to the Agency by November 2002

**Target 11.7** The first AER of the License will be submitted by May 2003

**Target 11.8** A conditioning plan in accordance with Council Directive 1991/31/EC shall be submitted to the Agency by 16th July 2002

**Objective 12**

To operate the landfill to compliment relevant legislation and the Landfill Directive

**Target 12.1** All packaging waste as defined in SI No. 61 of 2003 will be restricted from the landfill

**Target 12.2** All contractors using the site shall be in full compliance with SI No. 402 of 2001

**Target 12.3** Whole used tyres shall be restricted from the site from 1st of June 2003, in compliance with Council Directive 1991/31/EC. Shredded tyres will be restricted from 1st June 2006.

**Target 12.4** The landfill site will be operated with regard to the South East Waste Management and any measures necessary to meet the terms and targets of the plan shall be implemented. This will include the acceptance of waste from outside the Kilkenny area from the partners in the South East Region

**Objective 13**

To provide infrastructure to reduce visual impact and minimise nuisance

**Target 13.1** Continuation of odour modelling and testing at the site and local properties. Odour survey monitoring shall be sent to the agency at the end of each month. Recommendations will be implemented.

**Target 13.2** Provision of extensive planting and renewal of hedgerows. Berms will be placed in locations in order to minimise visual impact.

**Target 13.3** The road access and roadway along the front of the site will be maintained and cleaned in order to minimise visual nuisance at the entrance to the facility.

**Objective 14**

To reduce the quantity of recycling and biodegradable materials going to landfill.

**Target 14.1** To achieve a 50% reduction by commercial establishments.

**Target 14.2** To set up a communication procedure and reporting

mechanism between landfill and enforcement officers regarding offenders.

**Target 14.3** Provide awareness to companies of restricted landfill materials.

**Objective 15**
To achieve closure of the landfill facility to an environmentally satisfactory standard and comply fully with relevant legislation and the Landfill Directive.

**Target 15.1;** The continued acceptance of acceptable waste in the landfill for such time as the required quantities are received to enable final contours be reached.
**Target 15.2;** The notification of all customers that the landfill section at Dunmore will cease to operate from the advised date.
**Target 15.3;** The expansion of the CAS to ensure continued availability of refuse disposal facility to householders and small business customers.
**Target 15.4;** Increased signage and road markings at the CAS to ensure ease of access and use for the expected increase in customers anticipated as a direct result of the landfill closure.
**Target 15.**5; To maintain the existing gas and leachate management system to ensure full compliance with the conditions of our license.
**Target 15.**6; To advertise, appoint a contractor and complete the final capping of the landfill within 2010.
**Target 15.**7; To maintain the nuisance montiroing system in place in relation to vermin, noise and litter control.
**Target 15.**8; To investigate the viability of a C&D waste facility within the site.
**Target 15.**9; To assess the cost structure of the CAS to examine if the facility can be self funding.

Details of the status of the objectives and targets can be found in Appendix G.

# 6. Procedures

## *6.1 Waste Acceptance Procedure*

Municipal Waste defined as household waste as well as commercial and other waste which, because with nature or composition, is similar to household waste is accepted at Dunmore Landfill. Municipal Waste accepted at Dunmore Landfill Site will be subject to municipal waste characterisation surveys on a regular basis, at least once per annum.

Since the commencement of landfill operations at Dunmore a regular client base has been established of waste producers and waste contractors depositing waste at Dunmore Landfill. The waste producer and/or waste contractor have established with Kilkenny County Council if their waste is acceptable at the site. Any new waste producer or waste contractor wishing to dispose of waste at Dunmore Landfill Site is obliged to inform Kilkenny County Council of their operation. Similarly if the existing clientele have any reason to believe that the waste previously accepted has changed this information is brought to the attention of Kilkenny County Council. A correct and adequate description of the waste is sought and a determination whether the waste is acceptable or not is provided. If the waste is unacceptable at the Landfill Site then the waste producer/contractor is advised to find an alternative method of recovery or disposal and under the Waste Management Act, inform Kilkenny County Council of the alternative used.

When waste arrives at the Landfill the weighbridge operator notes the haulier/waste contractor and the vehicle registration number. The weighbridge operator determines the origin of the waste and the class of waste and inspects the covering of the waste. The weighbridge operator then confirms the type of waste by visual inspection. If the waste is acceptable the waste is directed to the tipping area where it is discharged from the vehicle. After discharge at the tipping area the compactor or loader operator inspects the waste. If the waste is acceptable the compactor operator proceeds to dispose and compact the waste in the active cell.

If the weighbridge operator determines that the waste is not acceptable, the site supervisor is informed. The site supervisor will then inspect the waste load. If the supervisor considers the waste acceptable the waste may be deposited in the active cell or if he/she requires to inspect the load it will be discharged on the active tipping area where it will be inspected and checked. The tipping area thus serves as an inspection area also. If the supervisor determines that the load is acceptable after inspection it is disposed of in the active cell. If the supervisor determines that the load is not acceptable the load will be directed to the waste quarantine area.

Once the site supervisor determines that a load prior to discharge from the vehicle is not acceptable or if a load is quarantined the site engineer is informed. The site engineer together with the site supervisor will discuss the waste load with the waste producer/contractor. Any further information as may be required or checks including analysis of the waste load will be undertaken. A decision on what action to be taken shall then be made and recorded. If it is determined at this stage that the load is acceptable it will be disposed of within the active. If the load is not acceptable the waste contractor/producer will be obliged to remove the load from the site and take it for an alternative recovery operation or to a disposal facility where the waste is accepted. Under section 18&34 of the Waste Management Act, Kilkenny County Council requires the Waste Contractor to record where all of the waste collected is disposed/recovered and such reports as required will be submitted to Kilkenny County Council.

A flow chart outlining the details of the procedure is outlined in Appendix H.

### *Emergency Response Procedure*

Following an assessment of risk at the site in Dunmore, as part of our ongoing safety audits, procedures were put in place to deal with any emergency that may arise at the site.

The main risks identified at the site are explosion, fire, oil/leachate spillage and injury to persons.

During the end of 2004 a gas extraction and enclosed flare system was installed on site. This system extracts gases present in the cells and treats the gas on site by flaring thus significantly reducing its accumulation on site, its migration into the atmosphere and minimises the risk to human health. Field balancing of the wells are regularly carried out to ensure each well in all areas of the site are not being over or under pumped which would effect the combustion of the gas at the flare stage, and to ensure concentrations of landfill methane gas being transmitted are not within the explosive range of 5-15%. It is not permissible to set a fire or smoke at Dunmore, but with the nature of the gases present there remains a risk of fire on the active site. Also there is a quantity of diesel stored at the site. This tank will be secured in a fire proof vault. Again there is a slight risk of fire at this area. If a fire is identified at the site and it is safe to do so, the fire would be covered with inert material. If it is considered that the fire is unsafe and out of control, the fire service would be contacted immediately. Any fire at the site is immediately reported to the Engineer in charge and the site will be fully inspected.

The possibility of fire on one of the site vehicles or site offices was also identified as a potential risk. All site vehicles and site offices have been fitted with a fire extinguisher. In the case of a fire being detected in either, the fire extinguishers shall be used initially to control the fire. If the fire is unsafe or out of control the fire the fire brigade will be called. In the event of fire on any of the vehicles the vehicle owner/Machinery Yard Engineer shall be contacted immediately.

Site staff have received instruction in the use of this equipment and there is regular servicing of any fire control equipment on the site.

The storage of fuel on site, the presence of methane gas and other containers that may be on site from time to time, may pose a potential risk of explosion at the site. If there is an explosion on the site, all personnel on the site should be evacuated immediately. The fire service and the Engineer in charge are to be called immediately. A full investigation of the site is to be carried out to establish the cause of the explosion. Any resultant fire shall be brought under control as described above. The site may not be re-opened until clearance has been received from the Chief Fire Officer and the Engineer in charge.

Any fire or explosion on the site would be considered an incident and a full report will be made to the EPA as per condition 11.2.

Any spillage of leachate at the site is regarded as an incident under the terms of the waste licence. The source of any spillage is to be identified immediately and the course of action to be taken will be decided on or booms stored on the site. Any spillage would be contained by a clay bund. If necessary any watercourses in the area should be dammed to prevent any reception of leachate to surface water supply. A vacuum or leachate tanker will take the excess spilled leachate away. The surface/ground water should be sampled to assess the impact of the spill. Monitoring controls would then be put in place to ensure that levels do not breach the bunds. Extra leachate tankers will be employed to remove the excess leachate produced (a number of companies are available to provide this service); until monitoring results show that they are unnecessary. If there is any spillage of leachate, the Engineer in charge, is to be notified. An incident report will be prepared by the Engineer and sent to the EPA. In the event of any incident which relates to the discharges to surface water, the Southern Regional Fishery Board will be notified as soon as practicable and in any case not later than 10:00am on the following working day after such an

incident.

Oil spillage at the site will be contained with oil sorbant material. This sorbant when cleaned up will be stored in secure storage containers, supplied by the fire service, pending collection by an authorised waste facility. If any oil spillage occurs on site, the Engineer in charge should be notified.

All staff on site has been issued with personal protective equipment. All footwear is to SP3 standard (pierce proof, steel toed), hi-visibility clothing, gas masks and ear protection. Anti-bacterial wipes and bio guard wipes (which include protection from leptosporosis and other viruses) are provided on site. A number of first aid kits are available on site and they are regularly checked to ensure they are fully stocked. Some site staff have completed manual handling and first aid course and further courses are planned for the remainder. A full round of injections will be administered to the staff of Dunmore including Hepatitis A&B, Tetanus and Polio as required. All visitors to the site must report to the site offices and are restricted to certain areas within the site.

In the event of injury to any person, a member of the site staff will apply first aid. If it is necessary an ambulance will be called and the injured person will be taken to hospital. Any injury must be reported to Safety Co-ordinator and the Safety Officer to record the incident. The Safety Officer will then notify the HSA as required.

A summary chart of the procedures to be followed is shown on the following page. This chart along with all relevant phone numbers are posted in the site offices and all site staff has been made aware of this.

**Emergency Response Procedure**

| Emergency | Response | Notify |
|---|---|---|
| **Explosion** | 1. Call-out Fire Brigade<br>2. Evacuate Site | Engineer in Charge<br>Chief Fire Officer<br>EPA |
| **Fire-Vehicle** | 1. Control with Vehicle or site fire extinguishers.<br>2. If unsafe or out of control, call out Fire Brigade | Machinery Yard Engineer<br>Vehicle Owner<br>Engineer in Charge |
| **Fire-Site** | 1. Cover with Inert Material.<br>2. If unsafe, or out of control evacuate site and call-out Fire Brigade. | Engineer in charge.<br>EPA |
| **Oil Spillage** | Contain with oil sorbent material | Engineer in charge.<br>EPA<br>Southern Regional Fishery Board |
| **Leachate Spillage** | 1. Contain with clay bunds, Dam watercourses, if necessary.<br>2. Suction up spillage with Vacuum tanker or leachate tanker | Engineer in charge.<br>EPA<br>Southern Regional Fishery Board |
| **Injury to Persons** | 1. Call Ambulance<br>2. Apply First Aid | Engineer in charge. |

**Emergency Response Numbers: -**

| | |
|---|---|
| **Gardai Station**<br>**Dominic St**<br>**Kilkenny.** | **(056) 7722222** |
| **Fire Station**<br>**Gaol Rd**<br>**Kilkenny.** | **(056) 7794400** |
| **Ambulance** | **(056) 7751133** |
| **Environmental Protection Agency – OEE** | **(053) 9160600**<br>**LoCall 1890 335599** |
| **Southern Regional Fisheries Board** | **(052) 80055** |

# 7. Nuisance

## *7.1 Nuisance Control*

The following measures are employed at Dunmore to control nuisance: -

**7.1.1 Bird Control**: - 'Bird Control Ireland' (BCI) have been employed since 2000 to regulate and monitor the bird control on site. A number of different techniques for controlling birds are used and specific non-native species of bird that come into the area are targeted. The methods employed are acoustic scarers, visual scarecrows such as helekite, eagle kites and falcon flights. Personnel visit the site weekly and provide a detailed monthly report of the bird populations observed on site. Instructions are left on a white board in the weighbridge for daily actions to be performed by site staff. A daily log sheet of on site activities is complete by site personnel and reviewed by both the facility manager and BCI to ensure the program remains successful.

During 2004 a marine signal pistol was purchased and is being used on the site to scare the birds. A number of staff on site have been trained in correct use of bird scaring pistol. A new acoustic scarer has recently been purchased for the site, which has a larger range of distress calls than on the previous machine. The distress calls added are designed to target the observed non native species that have tried to make raids on the site. Sample data logs and End of Year report are available in Appendix I.

**7.1.2 Vermin Control**: - 'Pestkill-Pest Control Services' visit the site on a regular basis, to place bait for vermin control at the site. There are 49 no. specific and labelled locations at and surrounding the site where bait is placed in custom made boxes. Pestkill inspects these monitoring points monthly to see if the bait was taken or rodent activity if any are noted and bait re-stock if necessary. The bait points are moved or the number shall be increased should it be deemed necessary by 'Pestkill'. Monthly record sheets of the findings at the site are logged and kept on site. There is also a monthly meeting between the vermin control company and the facility manager to discuss findings and any improvements to be made.

In April 2002, 'Pestkill' installed bait boxes in three adjoining properties to ensure that any vermin attracted by the Landfill to these properties would be controlled. Monthly inspections of these points are also made; notes of any bait take are made and restocked if necessary.

It is considered that adequate covering of the waste is also a necessary measure that is carried out. This will ensure that the food supply for vermin is kept at a minimum and therefore is a control measure for vermin.

**7.1.3 Fly Control**: - 'Pestkill-Pest Control Services' is under contract to spray the face of the landfill and machinery during the late Spring, Summer and early Autumn, and at other times if necessary.

It is considered that good site practice should eliminate the need for spraying. These measures include good compaction and mixing of the waste with inert clay. This leads to flies on the waste and their larva being compacted and buried with the waste, which in turn leads to the life cycle being stopped. When this is complete the active face of the landfill is covered with inert clay material as soon as is practical.

The use of Hessian material has discontinued as this has lead producing an environment suitable for the propagation of flies. Once the site has reached its agreed height the site is covered with appropriate soil cover and a permanent cap will be in place within twelve months of this final agreed height being reached.

# 8. Incidents and Complaints

## 8.1 Incident Reports

The following incidents took place at Dunmore during the reporting period. Details of the incidents are as follows: -

**Gas Migration**: - Under condition 6.3.1 of the licence, results showing a Methane level greater than or equal to 1 v/v or a $CO_2$ value greater than or equal to 1.5 v/v, is regarded as an exceedance. An Assessment of Landfill Gas Measurements at Dunmore Landfill, Co. Kilkenny analysing the processes responsible for these exceedence levels was carried out and submitted to the agency at the end of 2004. This report concluded that there is $CO_2$ is naturally occurring in the Dunmore Area. To allow for this finding the Agency agreed to increase the tolerance of the $CO_2$ trigger level, from 1.5% v/v to 3% v/v, therefore any levels =>3% v/v would be treated as an incident and reportable to the Agency. For the purpose of this report I have included both ranges of $CO_2$ from between 1.5 % to <3% v/v (Italic text) There were no recorded exceedances of =>3% v/v.

| | *1* | *2* | *3* | *4* | *5* | *7* | *8* | *9* | *10* | *11* | *12* | *13* | *14* | *15* | *16* | *17* | *18* | *19* | *20* | *21* | *22* | *23* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Jan* | | | | | *1.7* | | | | | | | | | | | | | | | | | |
| *Feb* | | | | | | | | | | | | | | | | | | | | | | |
| *Mar* | | *1.5* | | *1.5* | | | | | | | | | | | | | *1.5* | | | | | |
| *Apr* | | | | | | | | | *1.6* | | | | | | | | | *1.5* | | | | |
| *May* | | | | | | | | | | | | | | | | | | | | | | |
| *Jun* | | *1.9* | | | | | | | *1.6* | *1.7* | *1.8* | | | | | | | | | | | |
| *Jul* | *1.5* | *1.9* | | | *2.0* | | | | *2.4* | *2.0* | *1.6* | | | | | *1.6* | *2.0* | *1.8* | | *1.6* | | 1.5 |
| *Aug* | | *2.4* | | | | | | | *1.9* | *2.1* | *1.6* | | | | | *2.1* | | *1.8* | *1.5* | *1.8* | | |
| *Sep* | | *2.3* | | | | | | | *2.5* | *2.2* | | | *1.5* | | | | *1.9* | | | | | |
| *Oct* | | *2.5* | | | | | | | *2.5* | *2.1* | | | *1.5* | | | *2.9* | *2.4* | *2.2* | *1.6* | *1.6* | | |
| *Nov* | | *2.3* | | *1.6* | *1.9* | | | | *2.2* | *1.7* | *2.4* | | *2.2* | | *1.5* | *2.3* | *2.1* | *2.3* | | | | |
| *Dec* | | *2.4* | | | | | | | *2.3* | *1.7* | *2.1* | | *2.4* | | *1.6* | *2.6* | *2.1* | *2.1* | | | | |

# 9. Staffing

## *9.1 Staffing Structure*

Kilkenny County Council own and manage the landfill site at Dunmore. The County Council with Philip O'Neill as Director of Service and Simon Walton as Senior Engineer are presently appointed as the project supervisors for design and construction phase.

The Environment Section manages the facility on behalf of Kilkenny County Council with Carol McCarty BA BAI, MIEI, as Senior Executive Engineer of the Section.

On site John Bolger is caretaker at the site. The operatives at the site also include three drivers (Compactor, Traxcavator and Leachate Tanker), weighbridge operator, C.A. operator and a general operative.

The site is open Monday – Friday, 8.00 to 4.30 and on Saturday from 8.00 to 12.00. The phone numbers at the site are 056-7761999 and 056 7767848. Any queries or complaints may be made to the site or to the Environment Section in County Hall (056-7794470). A flow chart outlining the management structure is attached in Appendix J.

### *9.2 Monitoring and Sampling*

The monitoring and sampling at Dunmore is carried out by the staff of the Environment Section of Kilkenny County Council, personnel from the Environmental Protection Agency, Regional Inspectorate, Seville Lodge, Callan Road, Kilkenny and personnel from environmental consultants Fehily, Timoney & Co. The list of all duties required and the relevant personnel are listed below: -

**Interpretation of Results: -**

***Simon Walton***, Senior Engineer
Environment Section Kilkenny Co. Co. January 2007 – Present
*Landfill Duties* Senior Engineer Environment

***Carol McCarthy*** BA BAI MIEI, Senior Executive Engineer,
Completed FAS Waste December 2001,
Environment Section Kilkenny Co. Co. August 1990 – August 1994 and October 2001 – Present,
Environment Section Laois County Council Sept. 1996 – June 1997
*Landfill Duties* Head of Environment Section

***Maeve Good*** BA BAI MIEI, Assistant Engineer,
Completed FAS Waste Management Certificate Feb 2005
Environment Section Kilkenny Co. Co. October 2004 - Present
*Landfill Duties* Deputy Facility Manager

***Water Sampling (Condition 8.1 Schedule D.5)***: **-**

***Michael Daly*** NCEA Diploma in Environmental Protection, Technician,
Diploma in Environment Protection
Environment Section Kilkenny Co. Co. Nov. 1982 – Present
*Landfill Duties* Water/Leachate and Dust Monitoring/Noise Monitoring

Water Sampling at the site is carried out by Jean Smith and Jim McGarry of the Environmental Protection Agency, Regional Inspectorate, Seville Lodge, Callan Road, Kilkenny. Quarterly sampling is carried out on all parameters listed in accordance with Condition 9.1 and Schedule F.4 of the Licence

***Gas Monitoring (Condition 8.1 and Schedule D.2): -***

***Carol McCarthy*** BA BAI MIEI, Senior Executive Engineer,
Completed FAS Waste December 2001,
Environment Section Kilkenny Co. Co. August 1990 – August 1994 and October 2001 – Present,
Environment Section Laois County Council Sept. 1996 – June 1997
*Landfill Duties* Head of Environment Section

***Noise Monitoring (Condition 8.1 Schedule D.4): -***

***Michael Daly*** NCEA Diploma in Environmental Protection, Technician,
Diploma in Environment Protection
Environment Section Kilkenny Co. Co. Nov. 1982 – Present
*Landfill Duties* Water/Leachate and Dust Monitoring/Noise Monitoring

***Fehily Timoney & Co., Core Hse., Pouladuff Rd., Cork.***

Director for Kilkenny Area Mr. Gerry O'Sullivan BE CEng
*Landfill Duties* Consulting Engineers/Noise Monitoring

***Dust Monitoring (Condition 8.1 Schedule D.3): -***

***Michael Daly*** NCEA Diploma in Environmental Protection, Technician,
Diploma in Environment Protection
Environment Section Kilkenny Co. Co. Nov. 1982 – Present
*Landfill Duties* Water/Leachate/Noise and Dust Monitoring

***Meteorological Monitoring (Condition 8.1 Schedule D.6): -***

Meteorological Monitoring is carried out by Met Eireann at the Oakpark Meteorological Station, Carlow. Results are submitted to Kilkenny County Council on a monthly basis.

# 10. Financial Provision

## *10.1 Financial Provision for the Site*

The aggregate of the amount of charges imposed by Kilkenny County Council in respect of the disposal of waste at Dunmore Landfill (W0030-02) during 2009 was not less then the amount that would meet the total of the following costs:

(a) costs incurred in acquisition and development of the facility,
(b) costs of operating the facility and
(c) costs of restoration.

# 11. Public Information

## *11.1 Procedure for Public Consultation*

Dunmore Landfill is established since 1989 and good communication has developed between the site staff and the local community. The site staff in a spirit of good neighbourliness promptly deals with any issues arising locally.

During the development of proposals for an extension to the landfill site at Dunmore, intensive consultation has taken place especially with the immediate neighbours of the site and with other local residents. This consultation process commenced in November 2000 and was ongoing during the development stage. Arising out of these consultations, Kilkenny County Council had set up a Community Liaison Group.

The group comprises of seven members of the local community representing the different areas in the vicinity on the landfill, two local elected representatives, Senior Executive Engineer and the facility manager. As the landfill is now due for closure the Community Liaison Group will be convened to ascertain the appropriate community projects to benefit from this.

In addition to the above, the Kilkenny Area Committee of the County Council, comprising elected members of the Kilkenny Electoral Area are briefed on the developments at Dunmore.

The full Council are briefed on all waste management issues on a regular basis including developments at Dunmore, pricing structure, staff changes etc.

The Strategic Policy Committee on Environment (SPC 3), which comprises of council officials elected representatives and community representatives are briefed on developments at the landfill site and policy decisions are drafted as a result of the meetings.

All environmental monitoring results are held in the Dunmore Landfill, Dunmore, Co. Kilkenny and any member of the public is free to inspect them at any time during normal office hours (08:00 to 16:30 hours). Arrangements can be made to view the information at an alternative location by prior arrangement.

There is a fax and phone located at the site where queries can be made during opening hours i.e. 08:00 to 16:30, or a message can be left on the answering machine and if required will be contacted as soon as the message is received.

### *11.2 Complaints*

A complaints register is located on site and any complaint regarding the operation of the facility is recorded and the action taken to address the complaint/observation. No complaints were received during 2009.

## 12. Compliance

### *12.1 Summary of Compliance*

A summary of compliance under licence as part of our objectives and targets in Appendix G.

# Appendix A

Waste Quantities

&

Recycling Rates

**DUNMORE LANDFILL 2009**

007 Local authority, 008 Domestic brought by house holders, 009 Domestic (contractors)
010 Litter & street sweepings, 011 Commercial, 012 Industrial , 013 Construction & demolition.
014 Sewage sludge , 015 Agricultural , 017 Asbestos waste

| | CATEGORIES | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MONTHS | Local 00 | House 0 | Contract | Street 0 | Commer | Industri | Construc | Sewage | Agricult | Asbestos | Clay | Roads | Stone | Gravel | Filt. Gra | Sand | Topsoil | WEEE | Check |
| **January** | 34.32 | 389.38 | 565.44 | 60.2 | 342.26 | 0.14 | 0.64 | | | | 1,976.18 | 113.78 | 314.32 | 114.36 | | 21.46 | | | |
| February | 25.38 | 296.08 | 450.58 | 109.46 | 352.94 | | 0.12 | | | | 3,838 | 8.58 | | 420.02 | | 110.4 | | | |
| March | 18.46 | 385.76 | 429.88 | 39.44 | 346.08 | 0.16 | 0.00 | 0 | 0 | 0 | 869.64 | 47.84 | 42.66 | 193.64 | | 105.4 | | | |
| April | 29.70 | 460.34 | 345.72 | 163.76 | 483.48 | 0.26 | 0.1 | 0 | 0 | 0 | 2,993.36 | 208.16 | 9.42 | 571.26 | | 149.62 | | | |
| May | 27.36 | 399.40 | 412.74 | 115.98 | 361.60 | 0 | 0.36 | 0 | 0 | 0 | 953.24 | 380.10 | 70.88 | 68.00 | | 22.56 | | | |
| June | 31.82 | 348.94 | 589.80 | 122.74 | 353.76 | 0 | 5.04 | | | | 771.12 | 1098.26 | 230.46 | 0 | | 0 | | | |
| July | 25.32 | 437.50 | 602.24 | 179.58 | 391.52 | 0 | 1.26 | 0 | | | 1003.1 | 271.88 | 39.22 | 0 | 0 | 0 | | | |
| August | 32.4 | 341.08 | 490.44 | 70.5 | 330.30 | 0 | 3.48 | 0 | 0 | 0 | 384.84 | 32.20 | 0.00 | 18.14 | 0.00 | | | | |
| Septembe | 26.38 | 264.62 | 486.60 | 52.88 | 347.64 | 0.18 | 1.36 | | | 0 | 932.94 | 75.7 | | 39.10 | | | | 0.68 | |
| October | 26.30 | 241.66 | 413.82 | 107.30 | 389.08 | 0 | 1.82 | 0 | 0 | 0 | 729.56 | 263.62 | 72.76 | 104.98 | 0 | 0 | | 0.28 | |
| Novembe | 1.8 | 182.28 | 0.16 | 100.22 | 207.14 | 0 | 0.38 | 0 | 0 | 0 | 182.02 | 32.30 | | 17.02 | | | | 0.62 | |
| Decembe | 3.66 | 168.22 | 0.00 | 48.14 | 185.94 | 0 | 1.00 | 0 | 0 | 0 | 86.52 | 4.88 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 4.34 | |
| Decembe | 0.2 | 17.18 | 0.00 | 4.28 | 4.42 | 0 | 0 | 0 | 0 | 0 | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.40 | |
| **TOTAL** | **283.1** | **3932.4** | **4787.4** | **1174.5** | **4096.2** | **0.74** | **15.56** | **0** | **0** | **0** | **14721** | **2537.3** | **779.72** | **1546.5** | **0** | **409.44** | **0** | **6.32** | **0** |
| % | 2% | 28% | 34% | 8% | 29% | 0% | 0% | 0% | 0% | 0% | | | | | | | | | |

| TOTAL |
| --- |
| 1392.38 |
| 1234.56 |
| 1219.78 |
| 1483.36 |
| 1317.44 |
| 1452.10 |
| 1637.42 |
| 1268.20 |
| 1179.66 |
| 1179.98 |
| 491.98 |
| 406.96 |
| 26.08 |
| **14290** |
| |

## Recycling Rates 2009

| | Cardboard | Paper | Plastic | Timber | Metal | Fridges | Batteries | Textiles | Hazardous | Flourescent tubes | Glass | white & brown | tetra | Oil | Oil filters | Tyres | **Total per month** | **Total WEEE** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jan | 5.22 | 18.4 | 8.42 | 2.3 | 14.64 | 0.4 | 1.32 | 3.78 | 1.5 | 0 | 13.9 | 27.02 | 1.2 | 0.8 | 0 | 0 | 98.9 | 27.42 |
| Feb | 4.24 | 17.98 | 6.42 | 0 | 16.74 | 0.94 | 1.62 | 4.78 | 0 | 0 | 8.9 | 17.44 | 0.5 | 0.52 | 0 | 0 | 80.08 | 18.38 |
| Mar | 2.7 | 20.92 | 4.84 | 4.26 | 13.02 | 1.06 | 0.5 | 3 | 1.32 | 0.04 | 7.94 | 31.42 | 0.48 | 0 | 0 | 0 | 91.5 | 32.48 |
| Apr | 4.24 | 21.9 | 7.14 | 3.24 | 19.06 | 0 | 0.52 | 4.7 | 2.08 | 0 | 9.3 | 14.56 | 0.96 | 0 | 0 | 0 | 87.7 | 14.56 |
| May | 3.92 | 25.1 | 8.9 | 1.72 | 24.28 | 1.64 | 1.72 | 2.94 | 0 | 0 | 8.36 | 28.08 | 0.98 | 0 | 0 | 0 | 107.64 | 29.72 |
| Jun | 3.28 | 18.52 | 7.5 | 4.36 | 16.32 | 0 | 0 | 3.56 | 2.06 | 0.08 | 8.6 | 20.96 | 0.94 | 0.76 | 0 | 0 | 86.94 | 20.96 |
| Jul | 5.34 | 21.68 | 5.2 | 2.14 | 15.88 | 1.58 | 1.78 | 5.74 | 1.48 | 0 | 5.54 | 17.88 | 1.08 | 0 | 0 | 0 | 85.32 | 19.46 |
| Aug | 4.92 | 18 | 9.84 | 3.76 | 21.82 | 1.22 | 1 | 4.84 | 1.84 | 0 | 13.7 | 28.36 | 0.66 | 0 | 0 | 0 | 109.96 | 29.58 |
| Sep | 3.2 | 25.18 | 6.78 | 1.62 | 15.72 | 0 | 2.48 | 2.94 | 2.16 | 0 | 8.5 | 18.56 | 0.44 | 1 | 0 | 0 | 88.58 | 18.56 |
| Oct | 4.52 | 17.06 | 5.62 | 2.04 | 14.2 | 0.42 | 0.78 | 3.68 | 1.7 | 0 | 6.52 | 23.8 | 1.02 | 0.1 | 0 | 0 | 81.46 | 24.22 |
| Nov | 4.08 | 24.8 | 5.96 | 2.14 | 4.66 | 0 | 0 | 3.36 | 0 | 0 | 7.04 | 21.62 | 1.4 | 0 | 0 | 0 | 75.06 | 21.62 |
| Dec | 2.02 | 19.02 | 8.24 | 4.84 | 10.74 | 0.8 | 1.54 | 2.06 | 0 | 0.1 | 9.94 | 10.9 | 1.06 | 0 | 0 | 0 | 71.26 | 11.7 |
| **Subtotal** | **47.68** | **248.56** | **84.86** | **32.42** | **187.08** | **8.06** | **13.26** | **45.38** | **14.14** | **0.22** | **108.24** | **260.6** | **10.72** | **3.18** | **0** | **0** | **1064.4** | 268.66 |

# Appendix B

Gas Monitoring

&

Gas Migration

| Site Name: | | Site Address: | | | | |
|---|---|---|---|---|---|---|
| Dunmore Landfill Site | | Dunmore, | | | | |
| Operator: | | Co. Kilkenny | | | | |
| Kilkenny County Council | | National Grid Reference: 160572N 249519E | | | | |
| Site Status: | | Date: 28/01/09 | | Time: 10:30 | | |
| Active | | | | | | |
| Instrument Used: | | Date of Calibration: May'08 | | | | |
| Infra Red Gas Analyser - GA 94 | | Next Calibration Due: May'10 | | | | |
| Monitoring Personnel: | | Weather: | | Barometric Pressure (mb) : | | |
| Alan Ratigan | | dry | | 1002 | | |

## RESULTS

| Sample Station Number | Borehole/ Spike/ Other | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | Comments |
|---|---|---|---|---|---|---|
| VP1 | Cell No. 1 Vent | 600mm | 41.00 | 25.40 | 0.60 | New gas well |
| VP2 | Cell No. 1 Vent | 600mm | 24.40 | 19.20 | 4.40 | New gas well |
| VP3 | Cell No. 1 Vent | 600mm | 15.70 | 19.10 | 1.40 | New gas well |
| VP4 | Cell No. 3 Vent | 600mm | 19.20 | 15.00 | 7.90 | New gas well |
| VP5 | Cell No. 2 Vent | 600mm | 28.00 | 19.70 | 3.00 | New gas well |
| VP6 | Cell No. 2 Vent | 600mm | 41.60 | 27.00 | 1.40 | New gas well |
| VP7 | Cell No. 3 Vent | 600mm | 57.50 | 28.00 | 2.20 | New gas well |
| VP8 | Cell No. 7 Vent | 600mm | 29.20 | 21.10 | 3.30 | New gas well |
| VP9 | Cell No. 7 Vent | 600mm | 24.50 | 19.20 | 6.10 | New gas well |
| VP10 | Cell No. 6 Vent | 600mm | 13.30 | 18.30 | 3.00 | New gas well |
| VP11 | Cell No. 6 Vent | 600mm | 46.20 | 25.30 | 0.90 | New gas well |
| VP12 | Cell No. 5 Vent | 600mm | 54.10 | 26.90 | 0.20 | New gas well |
| VP13 | Cell No. 5 Vent | 600mm | 34.80 | 22.70 | 2.40 | New gas well |
| VP14 | Cell No. 7 Vent | 600mm | 36.50 | 23.40 | 3.90 | New gas well |
| VP15 | Cell No. 7 Vent | 600mm | | | | Disconnected due to capping work |
| VP16 | Cell No. 4 Vent | 600mm | | | | Disconnected due to capping work |
| VP17 | Cell No. 4 Vent | 600mm | 7.40 | 5.40 | 14.60 | New gas well |
| VP18 | Cell No. 10 Vent | 600mm | 38.90 | 25.40 | 5.20 | New gas well |
| VP19 | Cell No. 10 Vent | 600mm | 53.30 | 27.80 | 2.90 | New gas well |
| VP20 | Cell No. 10 Vent | 600mm | 51.40 | 30.70 | 3.50 | New gas well |
| VP21 | Cell No. 9 Vent | 600mm | 52.10 | 27.90 | 3.60 | New gas well |
| VP22 | Cell No. 8 Vent | 600mm | 53.50 | 27.90 | 3.70 | New gas well |
| VP23 | Cell No. 11 Vent | 600mm | 41.70 | 26.10 | 1.20 | New gas well |
| VP24 | Cell No. 11 Vent | 600mm | 26.10 | 22.20 | 1.50 | New gas well |
| VP25 | Cell No. 11 Vent | 600mm | 62.30 | 34.40 | 0.10 | New gas well |
| VP26 | Cell No. 11 Vent | 600mm | 47.40 | 26.70 | 0.80 | New gas well |
| VP27 | Cell No. 11 Vent | 600mm | 64.20 | 31.70 | 0.30 | New gas well |
| VP28 | Cell No. 11 Vent | 600mm | 45.10 | 26.80 | 2.20 | New gas well |
| VP29 | Cell No. 11 Vent | 600mm | 63.00 | 36.60 | 0.00 | New gas well |
| VP30 | Cell No. 8 Vent | 600mm | 52.00 | 30.90 | 0.60 | New gas well |
| VP31 | Cell No. 8 Vent | 600mm | 60.20 | 33.30 | 0.00 | New gas well |

| | | | | | | |
|---|---|---|---|---|---|---|
| **VP32** | Cell No. 9 Vent | 600mm | 54.40 | 30.00 | 0.50 | New gas well |
| **VP33** | Cell No9 Vent | 600mm | 63.30 | 35.50 | 0.00 | New gas well |
| **VP34** | Cell No10 Vent | 600mm | 13.90 | 5.40 | 16.60 | New gas well |
| **VP35** | Cell No. 10 Vent | 600mm | 63.10 | 35.90 | 0.30 | New gas well |
| **VP36** | Cell No. 10 Vent | 600mm | 49.30 | 30.80 | 1.10 | New gas well |
| **VP37** | Cell No. 11 Vent | 600mm | 58.10 | 32.70 | 0.40 | New gas well |
| **VP38** | Cell No. 12 Vent | 600mm | 44.80 | 30.10 | 0.30 | New gas well |
| **VP39** | Cell No. 12 Vent | 600mm | 48.50 | 32.90 | 0.00 | New gas well |
| **VP40** | Cell No. 12 Vent | 600mm | 48.70 | 32.70 | 0.00 | New gas well |
| **VP41** | Cell No. 12 Vent | 600mm | 24.50 | 22.30 | 1.40 | New gas well |
| **VP42** | Cell No. 8 Vent | 600mm | 61.40 | 36.20 | 0.50 | New gas well |
| **VP43** | Cell No. 8 Vent | 600mm | 62.60 | 32.60 | 0.00 | New gas well |
| **VP44** | Cell No. 9 Vent | 600mm | 60.30 | 29.30 | 0.30 | New gas well |
| **VP45** | Cell No. 9 Vent | 600mm | 61.60 | 34.40 | 0.00 | New gas well |
| **VP46** | Cell No. 9 Vent | 600mm | 41.50 | 27.00 | 1.20 | New gas well |
| **VP47** | Cell No. 13 Vent | 600mm | 23.10 | 25.20 | 0.40 | New gas well |
| **VP48** | Cell No. 13 Vent | 600mm | 40.80 | 32.00 | 0.10 | New gas well |
| **VP49** | Cell No. 13 Vent | 600mm | 63.80 | 33.70 | 0.60 | New gas well |
| **VP50** | Cell No. 13 Vent | 600mm | 21.90 | 19.50 | 7.20 | New gas well |
| **VP51** | Cell No. 13 Vent | 600mm | 12.30 | 18.50 | 1.20 | New gas well |

| Site Name: Dunmore Landfill Site | | | | Site Address: Dunmore, Co. Kilkenny | | |
|---|---|---|---|---|---|---|
| Operator: Kilkenny County Council | | | | National Grid Reference: 160572N 249519E | | |
| Site Status: Active | | | | Date: 27/02/09 | | Time: 13:57 |
| Instrument Used: Infra Red Gas Analyser - GA 94 | | | | Date of Calibration: May'08 Next Calibration Due: May'10 | | |
| Monitoring Personnel: Alan Ratigan | | | | Weather: dry | | Barometric Pressure (mb) : 1010 |
| **RESULTS** | | | | | | |
| **Sample Station Number** | **Borehole/ Spike/ Other** | **Survey Depth** | **$CH_4$ % v/v** | **$CO_2$ % v/v** | **$O_2$ % v/v** | **Comments** |
| **VP1** | Cell No. 1 Vent | 600mm | 54.60 | 26.70 | 0.90 | New gas well |
| **VP2** | Cell No. 1 Vent | 600mm | 41.10 | 20.20 | 2.20 | New gas well |
| **VP3** | Cell No. 1 Vent | 600mm | 42.70 | 25.30 | 0.40 | New gas well |
| **VP4** | Cell No. 3 Vent | 600mm | 66.30 | 26.70 | 0.60 | New gas well |
| **VP5** | Cell No. 2 Vent | 600mm | 44.40 | 23.20 | 1.10 | New gas well |
| **VP6** | Cell No. 2 Vent | 600mm | 50.50 | 25.50 | 1.20 | New gas well |
| **VP7** | Cell No. 3 Vent | 600mm | 51.50 | 25.10 | 3.30 | New gas well |
| **VP8** | Cell No. 7 Vent | 600mm | 21.00 | 10.60 | 12.00 | New gas well |
| **VP9** | Cell No. 7 Vent | 600mm | 40.70 | 22.20 | 3.40 | New gas well |
| **VP10** | Cell No. 6 Vent | 600mm | 28.60 | 17.50 | 4.50 | New gas well |
| **VP11** | Cell No. 6 Vent | 600mm | 49.10 | 25.50 | 0.50 | New gas well |
| **VP12** | Cell No. 5 Vent | 600mm | 50.50 | 26.00 | 0.60 | New gas well |
| **VP13** | Cell No. 5 Vent | 600mm | 61.40 | 28.50 | 0.90 | New gas well |
| **VP14** | Cell No. 7 Vent | 600mm | 25.70 | 16.80 | 7.40 | New gas well |
| **VP15** | Cell No. 7 Vent | 600mm | 13.00 | 7.30 | 16.10 | New gas well |
| **VP16** | Cell No. 4 Vent | 600mm | 41.10 | 24.90 | 5.00 | New gas well |
| **VP17** | Cell No. 4 Vent | 600mm | 52.30 | 27.00 | 0.90 | New gas well |
| **VP18** | Cell No. 10 Vent | 600mm | 50.90 | 29.70 | 1.70 | New gas well |
| **VP19** | Cell No. 10 Vent | 600mm | 31.60 | 21.90 | 5.00 | New gas well |
| **VP20** | Cell No. 10 Vent | 600mm | 44.50 | 25.20 | 3.30 | New gas well |
| **VP21** | Cell No. 9 Vent | 600mm | 46.40 | 26.70 | 0.90 | New gas well |
| **VP22** | Cell No. 8 Vent | 600mm | 45.80 | 27.30 | 2.10 | New gas well |
| **VP23** | Cell No. 11 Vent | 600mm | 55.80 | 28.50 | 0.50 | New gas well |
| **VP24** | Cell No. 11 Vent | 600mm | 74.40 | 24.00 | 0.10 | New gas well |
| **VP25** | Cell No. 11 Vent | 600mm | 63.60 | 34.10 | 0.10 | New gas well |
| **VP26** | Cell No. 11 Vent | 600mm | 34.50 | 23.50 | 1.70 | New gas well |
| **VP27** | Cell No. 11 Vent | 600mm | 66.20 | 31.10 | 0.00 | New gas well |
| **VP28** | Cell No. 11 Vent | 600mm | 30.60 | 25.60 | 0.00 | New gas well |
| **VP29** | Cell No. 11 Vent | 600mm | 59.40 | 34.20 | 0.20 | New gas well |
| **VP30** | Cell No. 8 Vent | 600mm | 44.90 | 24.70 | 5.10 | New gas well |
| **VP31** | Cell No. 8 Vent | 600mm | 39.70 | 25.90 | 2.90 | New gas well |

| | | | | | | |
|---|---|---|---|---|---|---|
| **VP32** | Cell No. 9 Vent | 600mm | 67.40 | 30.50 | 0.20 | New gas well |
| **VP33** | Cell No9 Vent | 600mm | 31.40 | 17.90 | 9.10 | New gas well |
| **VP34** | Cell No10 Vent | 600mm | 33.80 | 22.70 | 5.30 | New gas well |
| **VP35** | Cell No. 10 Vent | 600mm | 60.20 | 32.90 | 1.00 | New gas well |
| **VP36** | Cell No. 10 Vent | 600mm | 61.50 | 33.10 | 0.10 | New gas well |
| **VP37** | Cell No. 11 Vent | 600mm | 42.30 | 29.40 | 0.00 | New gas well |
| **VP38** | Cell No. 12 Vent | 600mm | 26.30 | 25.40 | 1.20 | New gas well |
| **VP39** | Cell No. 12 Vent | 600mm | 69.60 | 29.50 | 0.40 | New gas well |
| **VP40** | Cell No. 12 Vent | 600mm | 26.10 | 19.00 | 6.50 | New gas well |
| **VP41** | Cell No. 12 Vent | 600mm | 13.00 | 16.80 | 3.50 | New gas well |
| **VP42** | Cell No. 8 Vent | 600mm | 62.50 | 35.70 | 0.20 | New gas well |
| **VP43** | Cell No. 8 Vent | 600mm | 57.70 | 30.30 | 0.50 | New gas well |
| **VP44** | Cell No. 9 Vent | 600mm | 31.70 | 22.90 | 1.20 | New gas well |
| **VP45** | Cell No. 9 Vent | 600mm | 47.20 | 31.20 | 0.80 | New gas well |
| **VP46** | Cell No. 9 Vent | 600mm | 56.60 | 24.40 | 0.80 | New gas well |
| **VP47** | Cell No. 13 Vent | 600mm | 23.50 | 25.60 | 0.50 | New gas well |
| **VP48** | Cell No. 13 Vent | 600mm | 45.10 | 32.60 | 0.50 | New gas well |
| **VP49** | Cell No. 13 Vent | 600mm | 61.90 | 30.90 | 2.20 | New gas well |
| **VP50** | Cell No. 13 Vent | 600mm | 23.00 | 20.00 | 6.00 | New gas well |
| **VP51** | Cell No. 13 Vent | 600mm | 10.20 | 18.90 | 1.20 | New gas well |
| **VP52** | Cell No. 14 Vent | 600mm | 29.00 | 26.70 | 0.60 | New gas well |

| Site Name: | | Site Address: | | | | |
|---|---|---|---|---|---|---|
| Dunmore Landfill Site | | Dunmore, | | | | |
| Operator: | | Co. Kilkenny | | | | |
| Kilkenny County Council | | National Grid Reference: 160572N 249519E | | | | |
| Site Status: | | Date: 06/04/09 | | Time: 12:27 | | |
| Active | | | | | | |
| Instrument Used: | | Date of Calibration: Mar'09 | | | | |
| Infra Red Gas Analyser - GA 94 | | Next Calibration Due: Sep'09 | | | | |
| Monitoring Personnel: | | Weather: | | Barometric Pressure (mb) : | | |
| Alan Ratigan | | dry | | 993 | | |

## RESULTS

| Sample Station Number | Borehole/ Spike/ Other | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | Comments |
|---|---|---|---|---|---|---|
| VP1 | Cell No. 1 Vent | 600mm | 46.80 | 25.80 | 0.50 | New gas well |
| VP2 | Cell No. 1 Vent | 600mm | 49.90 | 23.60 | 0.50 | New gas well |
| VP3 | Cell No. 1 Vent | 600mm | 52.50 | 27.00 | 0.30 | New gas well |
| VP4 | Cell No. 3 Vent | 600mm | 62.80 | 27.50 | 1.80 | New gas well |
| VP5 | Cell No. 2 Vent | 600mm | 60.80 | 27.00 | 0.60 | New gas well |
| VP6 | Cell No. 2 Vent | 600mm | 68.20 | 29.40 | 0.30 | New gas well |
| VP7 | Cell No. 3 Vent | 600mm | 48.20 | 23.60 | 4.80 | New gas well |
| VP8 | Cell No. 7 Vent | 600mm | 30.00 | 14.10 | 10.20 | New gas well |
| VP9 | Cell No. 7 Vent | 600mm | 64.80 | 28.30 | 0.30 | New gas well |
| VP10 | Cell No. 6 Vent | 600mm | 59.10 | 24.30 | 0.00 | New gas well |
| VP11 | Cell No. 6 Vent | 600mm | 54.30 | 26.70 | 0.10 | New gas well |
| VP12 | Cell No. 5 Vent | 600mm | 52.70 | 26.20 | 0.60 | New gas well |
| VP13 | Cell No. 5 Vent | 600mm | 25.00 | 15.60 | 6.70 | New gas well |
| VP14 | Cell No. 7 Vent | 600mm | 57.20 | 25.00 | 3.20 | New gas well |
| VP15 | Cell No. 7 Vent | 600mm | 22.50 | 10.50 | 12.80 | New gas well |
| VP16 | Cell No. 4 Vent | 600mm | 37.00 | 20.00 | 5.80 | New gas well |
| VP17 | Cell No. 4 Vent | 600mm | 54.50 | 27.30 | 0.90 | New gas well |
| VP18 | Cell No. 10 Vent | 600mm | 63.80 | 34.30 | 0.40 | New gas well |
| VP19 | Cell No. 10 Vent | 600mm | 61.20 | 34.40 | 0.30 | New gas well |
| VP20 | Cell No. 10 Vent | 600mm | 52.50 | 31.50 | 2.90 | New gas well |
| VP21 | Cell No. 9 Vent | 600mm | 60.20 | 31.50 | 1.50 | New gas well |
| VP22 | Cell No. 8 Vent | 600mm | 58.80 | 29.10 | 2.10 | New gas well |
| VP23 | Cell No. 11 Vent | 600mm | 59.40 | 29.40 | 0.20 | New gas well |
| VP24 | Cell No. 11 Vent | 600mm | 75.60 | 24.20 | 0.00 | New gas well |
| VP25 | Cell No. 11 Vent | 600mm | 64.30 | 34.90 | 0.00 | New gas well |
| VP26 | Cell No. 11 Vent | 600mm | 50.40 | 27.70 | 0.50 | New gas well |
| VP27 | Cell No. 11 Vent | 600mm | 66.70 | 32.70 | 0.00 | New gas well |
| VP28 | Cell No. 11 Vent | 600mm | 39.10 | 26.90 | 0.00 | New gas well |
| VP29 | Cell No. 11 Vent | 600mm | 62.60 | 35.60 | 0.00 | New gas well |
| VP30 | Cell No. 8 Vent | 600mm | 65.20 | 33.80 | 0.00 | New gas well |
| VP31 | Cell No. 8 Vent | 600mm | 64.00 | 33.20 | 0.00 | New gas well |

| | | | | | | |
|---|---|---|---|---|---|---|
| **VP32** | Cell No. 9 Vent | 600mm | 67.20 | 31.20 | 0.00 | New gas well |
| **VP33** | Cell No9 Vent | 600mm | 64.10 | 34.10 | 0.00 | New gas well |
| **VP34** | Cell No10 Vent | 600mm | 27.00 | 16.70 | 8.40 | New gas well |
| **VP35** | Cell No. 10 Vent | 600mm | 61.00 | 33.90 | 0.00 | New gas well |
| **VP36** | Cell No. 10 Vent | 600mm | 59.10 | 32.80 | 0.30 | New gas well |
| **VP37** | Cell No. 11 Vent | 600mm | 54.20 | 32.90 | 0.00 | New gas well |
| **VP38** | Cell No. 12 Vent | 600mm | 30.50 | 20.70 | 5.40 | New gas well |
| **VP39** | Cell No. 12 Vent | 600mm | 71.00 | 29.90 | 0.20 | New gas well |
| **VP40** | Cell No. 12 Vent | 600mm | 41.40 | 30.10 | 0.50 | New gas well |
| **VP41** | Cell No. 12 Vent | 600mm | 62.30 | 36.70 | 0.60 | New gas well |
| **VP42** | Cell No. 8 Vent | 600mm | 26.40 | 21.00 | 2.40 | New gas well |
| **VP43** | Cell No. 8 Vent | 600mm | 62.10 | 32.40 | 0.60 | New gas well |
| **VP44** | Cell No. 9 Vent | 600mm | 57.10 | 28.20 | 0.00 | New gas well |
| **VP45** | Cell No. 9 Vent | 600mm | 64.20 | 34.80 | 0.00 | New gas well |
| **VP46** | Cell No. 9 Vent | 600mm | 64.30 | 33.50 | 0.30 | New gas well |
| **VP47** | Cell No. 13 Vent | 600mm | 33.30 | 28.90 | 0.00 | New gas well |
| **VP48** | Cell No. 13 Vent | 600mm | 50.80 | 34.70 | 0.10 | New gas well |
| **VP49** | Cell No. 13 Vent | 600mm | 19.80 | 17.40 | 5.70 | New gas well |
| **VP50** | Cell No. 13 Vent | 600mm | 21.50 | 24.30 | 0.20 | New gas well |
| **VP51** | Cell No. 13 Vent | 600mm | 48.70 | 34.00 | 0.00 | New gas well |
| **VP52** | Cell No. 14 Vent | 600mm | 21.10 | 24.70 | 0.00 | New gas well |

| Site Name: Dunmore Landfill Site | | | | Site Address: Dunmore, Co. Kilkenny | | |
|---|---|---|---|---|---|---|
| Operator: Kilkenny County Council | | | | National Grid Reference: 160572N 249519E | | |
| Site Status: Active | | | | Date: 28/04/09 | | Time: 12:27 |
| Instrument Used: Infra Red Gas Analyser - GA 94 | | | | Date of Calibration: Mar'09 Next Calibration Due: Sep'09 | | |
| Monitoring Personnel: Alan Ratigan | | | | Weather: dry | | Barometric Pressure (mb) : 997 |
| **RESULTS** | | | | | | |
| **Sample Station Number** | **Borehole/ Spike/ Other** | **Survey Depth** | **$CH_4$ % v/v** | **$CO_2$ % v/v** | **$O_2$ % v/v** | **Comments** |
| **VP1** | Cell No. 1 Vent | 600mm | 27.50 | 21.70 | 3.90 | New gas well |
| **VP2** | Cell No. 1 Vent | 600mm | 50.50 | 21.80 | 0.80 | New gas well |
| **VP3** | Cell No. 1 Vent | 600mm | 60.40 | 28.20 | 0.40 | New gas well |
| **VP4** | Cell No. 3 Vent | 600mm | 39.00 | 25.00 | 1.50 | New gas well |
| **VP5** | Cell No. 2 Vent | 600mm | 64.60 | 26.90 | 0.90 | New gas well |
| **VP6** | Cell No. 2 Vent | 600mm | 51.50 | 27.40 | 0.50 | New gas well |
| **VP7** | Cell No. 3 Vent | 600mm | 43.50 | 22.40 | 5.70 | New gas well |
| **VP8** | Cell No. 7 Vent | 600mm | 14.80 | 7.90 | 14.10 | New gas well |
| **VP9** | Cell No. 7 Vent | 600mm | 61.60 | 27.40 | 1.20 | New gas well |
| **VP10** | Cell No. 6 Vent | 600mm | 61.60 | 25.20 | 0.50 | New gas well |
| **VP11** | Cell No. 6 Vent | 600mm | 52.90 | 26.50 | 0.10 | New gas well |
| **VP12** | Cell No. 5 Vent | 600mm | 49.30 | 25.10 | 1.10 | New gas well |
| **VP13** | Cell No. 5 Vent | 600mm | 22.80 | 22.70 | 3.40 | New gas well |
| **VP14** | Cell No. 7 Vent | 600mm | 60.10 | 29.30 | 0.60 | New gas well |
| **VP15** | Cell No. 7 Vent | 600mm | 45.90 | 25.30 | 3.90 | New gas well |
| **VP16** | Cell No. 4 Vent | 600mm | 37.20 | 22.20 | 6.00 | New gas well |
| **VP17** | Cell No. 4 Vent | 600mm | 14.50 | 15.10 | 10.10 | New gas well |
| **VP18** | Cell No. 10 Vent | 600mm | 35.10 | 23.20 | 6.40 | New gas well |
| **VP19** | Cell No. 10 Vent | 600mm | 9.60 | 8.50 | 13.90 | New gas well |
| **VP20** | Cell No. 10 Vent | 600mm | 36.40 | 22.10 | 8.70 | New gas well |
| **VP21** | Cell No. 9 Vent | 600mm | 39.70 | 24.50 | 7.50 | New gas well |
| **VP22** | Cell No. 8 Vent | 600mm | 46.90 | 27.40 | 3.90 | New gas well |
| **VP23** | Cell No. 11 Vent | 600mm | 46.40 | 28.70 | 0.30 | New gas well |
| **VP24** | Cell No. 11 Vent | 600mm | 72.60 | 23.90 | 0.50 | New gas well |
| **VP25** | Cell No. 11 Vent | 600mm | 64.90 | 34.70 | 0.00 | New gas well |
| **VP26** | Cell No. 11 Vent | 600mm | 30.30 | 23.30 | 1.60 | New gas well |
| **VP27** | Cell No. 11 Vent | 600mm | 66.30 | 32.80 | 0.10 | New gas well |
| **VP28** | Cell No. 11 Vent | 600mm | 24.70 | 23.90 | 0.10 | New gas well |
| **VP29** | Cell No. 11 Vent | 600mm | 46.00 | 33.50 | 0.20 | New gas well |
| **VP30** | Cell No. 8 Vent | 600mm | 63.40 | 36.20 | 0.00 | New gas well |
| **VP31** | Cell No. 8 Vent | 600mm | 62.00 | 33.60 | 0.00 | New gas well |

| | | | | | | |
|---|---|---|---|---|---|---|
| **VP32** | Cell No. 9 Vent | 600mm | 68.80 | 30.80 | 0.00 | New gas well |
| **VP33** | Cell No9 Vent | 600mm | 63.00 | 33.80 | 0.00 | New gas well |
| **VP34** | Cell No10 Vent | 600mm | 52.80 | 31.60 | 0.90 | New gas well |
| **VP35** | Cell No. 10 Vent | 600mm | 65.10 | 34.50 | 0.20 | New gas well |
| **VP36** | Cell No. 10 Vent | 600mm | 65.30 | 35.10 | 0.60 | New gas well |
| **VP37** | Cell No. 11 Vent | 600mm | 35.30 | 28.30 | 0.00 | New gas well |
| **VP38** | Cell No. 12 Vent | 600mm | 33.90 | 26.60 | 0.80 | New gas well |
| **VP39** | Cell No. 12 Vent | 600mm | 35.30 | 27.60 | 0.00 | New gas well |
| **VP40** | Cell No. 12 Vent | 600mm | 66.50 | 32.30 | 0.00 | New gas well |
| **VP41** | Cell No. 12 Vent | 600mm | 5.60 | 12.10 | 6.60 | New gas well |
| **VP42** | Cell No. 8 Vent | 600mm | 51.70 | 30.80 | 0.20 | New gas well |
| **VP43** | Cell No. 8 Vent | 600mm | 38.20 | 28.00 | 3.30 | New gas well |
| **VP44** | Cell No. 9 Vent | 600mm | 54.00 | 31.20 | 0.40 | New gas well |
| **VP45** | Cell No. 9 Vent | 600mm | 22.60 | 21.80 | 0.80 | New gas well |
| **VP46** | Cell No. 9 Vent | 600mm | 52.90 | 31.40 | 0.30 | New gas well |
| **VP47** | Cell No. 13 Vent | 600mm | 19.20 | 25.30 | 0.50 | New gas well |
| **VP48** | Cell No. 13 Vent | 600mm | 48.80 | 33.90 | 0.20 | New gas well |
| **VP49** | Cell No. 13 Vent | 600mm | 24.40 | 17.80 | 7.20 | New gas well |
| **VP50** | Cell No. 13 Vent | 600mm | 19.20 | 23.40 | 0.20 | New gas well |
| **VP51** | Cell No. 13 Vent | 600mm | 29.00 | 27.80 | 0.30 | New gas well |
| **VP52** | Cell No. 14 Vent | 600mm | | | | New gas well |

| Site Name: | | Site Address: | | | | |
|---|---|---|---|---|---|---|
| Dunmore Landfill Site | | Dunmore, | | | | |
| Operator: | | Co. Kilkenny | | | | |
| Kilkenny County Council | | National Grid Reference: 160572N 249519E | | | | |
| Site Status: | | Date: 03/06/09 | | Time: 12:24 | | |
| Active | | | | | | |
| Instrument Used: | | Date of Calibration: Mar'09 | | | | |
| Infra Red Gas Analyser - GA 94 | | Next Calibration Due: Sep'09 | | | | |
| Monitoring Personnel: | | Weather: | | Barometric Pressure (mb) : | | |
| Alan Ratigan | | dry | | 1017 | | |

## RESULTS

| Sample Station Number | Borehole/ Spike/ Other | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | Comments |
|---|---|---|---|---|---|---|
| VP1 | Cell No. 1 Vent | 600mm | 49.60 | 26.70 | 0.80 | New gas well |
| VP2 | Cell No. 1 Vent | 600mm | 67.20 | 24.10 | 0.20 | New gas well |
| VP3 | Cell No. 1 Vent | 600mm | 67.20 | 27.90 | 0.00 | New gas well |
| VP4 | Cell No. 3 Vent | 600mm | 69.60 | 27.50 | 0.00 | New gas well |
| VP5 | Cell No. 2 Vent | 600mm | 62.90 | 28.50 | 0.20 | New gas well |
| VP6 | Cell No. 2 Vent | 600mm | 67.10 | 30.40 | 0.00 | New gas well |
| VP7 | Cell No. 3 Vent | 600mm | 57.90 | 27.70 | 1.90 | New gas well |
| VP8 | Cell No. 7 Vent | 600mm | 39.20 | 18.20 | 6.70 | New gas well |
| VP9 | Cell No. 7 Vent | 600mm | 63.80 | 29.10 | 0.00 | New gas well |
| VP10 | Cell No. 6 Vent | 600mm | 51.00 | 22.40 | 3.00 | New gas well |
| VP11 | Cell No. 6 Vent | 600mm | 51.00 | 27.30 | 0.00 | New gas well |
| VP12 | Cell No. 5 Vent | 600mm | 49.30 | 26.40 | 0.60 | New gas well |
| VP13 | Cell No. 5 Vent | 600mm | 20.70 | 10.70 | 13.20 | New gas well |
| VP14 | Cell No. 7 Vent | 600mm | 32.70 | 23.60 | 3.20 | New gas well |
| VP15 | Cell No. 7 Vent | 600mm | 62.40 | 33.10 | 0.00 | New gas well |
| VP16 | Cell No. 4 Vent | 600mm | 54.40 | 29.30 | 0.30 | New gas well |
| VP17 | Cell No. 4 Vent | 600mm | 51.50 | 30.40 | 0.00 | New gas well |
| VP18 | Cell No. 10 Vent | 600mm | 39.30 | 29.50 | 3.50 | New gas well |
| VP19 | Cell No. 10 Vent | 600mm | 14.90 | 9.20 | 13.40 | New gas well |
| VP20 | Cell No. 10 Vent | 600mm | 41.70 | 25.10 | 6.20 | New gas well |
| VP21 | Cell No. 9 Vent | 600mm | 31.30 | 15.00 | 9.30 | New gas well |
| VP22 | Cell No. 8 Vent | 600mm | 34.70 | 20.30 | 8.30 | New gas well |
| VP23 | Cell No. 11 Vent | 600mm | 49.50 | 30.10 | 0.20 | New gas well |
| VP24 | Cell No. 11 Vent | 600mm | 66.80 | 24.70 | 0.00 | New gas well |
| VP25 | Cell No. 11 Vent | 600mm | 59.80 | 32.40 | 0.10 | New gas well |
| VP26 | Cell No. 11 Vent | 600mm | 46.70 | 28.30 | 0.00 | New gas well |
| VP27 | Cell No. 11 Vent | 600mm | 60.90 | 32.20 | 0.00 | New gas well |
| VP28 | Cell No. 11 Vent | 600mm | 35.00 | 25.50 | 0.00 | New gas well |
| VP29 | Cell No. 11 Vent | 600mm | 61.00 | 43.00 | 0.00 | New gas well |
| VP30 | Cell No. 8 Vent | 600mm | 51.20 | 30.90 | 0.40 | New gas well |
| VP31 | Cell No. 8 Vent | 600mm | 62.50 | 35.40 | 0.90 | New gas well |

| | | | | | | |
|---|---|---|---|---|---|---|
| **VP32** | Cell No. 9 Vent | 600mm | 60.50 | 32.00 | 0.20 | New gas well |
| **VP33** | Cell No9 Vent | 600mm | 63.40 | 34.60 | 0.00 | New gas well |
| **VP34** | Cell No10 Vent | 600mm | 20.90 | 20.40 | 1.90 | New gas well |
| **VP35** | Cell No. 10 Vent | 600mm | 61.60 | 32.90 | 0.30 | New gas well |
| **VP36** | Cell No. 10 Vent | 600mm | 49.40 | 29.70 | 0.30 | New gas well |
| **VP37** | Cell No. 11 Vent | 600mm | 53.10 | 32.80 | 0.00 | New gas well |
| **VP38** | Cell No. 12 Vent | 600mm | 37.90 | 25.00 | 1.80 | New gas well |
| **VP39** | Cell No. 12 Vent | 600mm | 55.50 | 28.90 | 0.30 | New gas well |
| **VP40** | Cell No. 12 Vent | 600mm | 40.50 | 28.90 | 0.60 | New gas well |
| **VP41** | Cell No. 12 Vent | 600mm | 16.60 | 20.50 | 1.00 | New gas well |
| **VP42** | Cell No. 8 Vent | 600mm | 62.70 | 36.00 | 0.00 | New gas well |
| **VP43** | Cell No. 8 Vent | 600mm | 54.40 | 30.30 | 0.00 | New gas well |
| **VP44** | Cell No. 9 Vent | 600mm | 44.30 | 27.10 | 0.20 | New gas well |
| **VP45** | Cell No. 9 Vent | 600mm | 40.50 | 28.50 | 1.60 | New gas well |
| **VP46** | Cell No. 9 Vent | 600mm | 44.00 | 27.10 | 0.50 | New gas well |
| **VP47** | Cell No. 13 Vent | 600mm | 33.30 | 27.50 | 0.60 | New gas well |
| **VP48** | Cell No. 13 Vent | 600mm | 40.60 | 30.50 | 0.10 | New gas well |
| **VP49** | Cell No. 13 Vent | 600mm | 16.70 | 14.50 | 8.30 | New gas well |
| **VP50** | Cell No. 13 Vent | 600mm | 18.80 | 23.40 | 0.10 | New gas well |
| **VP51** | Cell No. 13 Vent | 600mm | 33.10 | 32.00 | 0.30 | New gas well |
| **VP52** | Cell No. 14 Vent | 600mm | 52.90 | 44.20 | 0.00 | New gas well |
| **HOR1** | Cell No. 14 Vent | 600mm | 31.40 | 21.40 | 6.70 | New gas well |
| **HOR2** | Cell No. 14 Vent | 600mm | 23.30 | 23.30 | 6.30 | New gas well |

| Site Name: | | Site Address: | | | | |
|---|---|---|---|---|---|---|
| Dunmore Landfill Site | | Dunmore, | | | | |
| Operator: | | Co. Kilkenny | | | | |
| Kilkenny County Council | | National Grid Reference: 160572N 249519E | | | | |
| Site Status: | | Date: 02/07/09 | | Time: 16:01 | | |
| Active | | | | | | |
| Instrument Used: | | Date of Calibration: Mar'09 | | | | |
| Infra Red Gas Analyser - GA 94 | | Next Calibration Due: Sep'09 | | | | |
| Monitoring Personnel: | | Weather: | | Barometric Pressure (mb) : | | |
| Alan Ratigan | | dry | | 1010 | | |

## RESULTS

| Sample Station Number | Borehole/ Spike/ Other | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | Comments |
|---|---|---|---|---|---|---|
| VP1 | Cell No. 1 Vent | 600mm | 45.30 | 27.40 | 0.40 | New gas well |
| VP2 | Cell No. 1 Vent | 600mm | 53.30 | 25.60 | 0.30 | New gas well |
| VP3 | Cell No. 1 Vent | 600mm | 48.20 | 29.50 | 0.30 | New gas well |
| VP4 | Cell No. 3 Vent | 600mm | 59.80 | 29.60 | 0.30 | New gas well |
| VP5 | Cell No. 2 Vent | 600mm | 58.00 | 29.70 | 0.30 | New gas well |
| VP6 | Cell No. 2 Vent | 600mm | 65.20 | 31.80 | 0.20 | New gas well |
| VP7 | Cell No. 3 Vent | 600mm | 59.70 | 29.50 | 1.40 | New gas well |
| VP8 | Cell No. 7 Vent | 600mm | 42.00 | 22.80 | 4.30 | New gas well |
| VP9 | Cell No. 7 Vent | 600mm | 59.60 | 29.20 | 1.20 | New gas well |
| VP10 | Cell No. 6 Vent | 600mm | 46.80 | 22.20 | 3.80 | New gas well |
| VP11 | Cell No. 6 Vent | 600mm | 56.50 | 28.70 | 0.00 | New gas well |
| VP12 | Cell No. 5 Vent | 600mm | 55.90 | 28.40 | 0.10 | New gas well |
| VP13 | Cell No. 5 Vent | 600mm | 64.10 | 33.60 | 0.00 | New gas well |
| VP14 | Cell No. 7 Vent | 600mm | 60.10 | 27.80 | 1.30 | New gas well |
| VP15 | Cell No. 7 Vent | 600mm | 59.00 | 33.20 | 0.10 | New gas well |
| VP16 | Cell No. 4 Vent | 600mm | 52.00 | 30.30 | 0.50 | New gas well |
| VP17 | Cell No. 4 Vent | 600mm | 60.60 | 34.20 | 0.00 | New gas well |
| VP18 | Cell No. 10 Vent | 600mm | 57.20 | 37.60 | 0.00 | New gas well |
| VP19 | Cell No. 10 Vent | 600mm | 38.30 | 27.10 | 2.30 | New gas well |
| VP20 | Cell No. 10 Vent | 600mm | 51.60 | 30.70 | 2.60 | New gas well |
| VP21 | Cell No. 9 Vent | 600mm | 50.80 | 30.60 | 3.50 | New gas well |
| VP22 | Cell No. 8 Vent | 600mm | 56.50 | 32.20 | 1.50 | New gas well |
| VP23 | Cell No. 11 Vent | 600mm | 63.30 | 32.20 | 0.20 | New gas well |
| VP24 | Cell No. 11 Vent | 600mm | 74.30 | 23.70 | 0.10 | New gas well |
| VP25 | Cell No. 11 Vent | 600mm | 64.10 | 33.50 | 0.00 | New gas well |
| VP26 | Cell No. 11 Vent | 600mm | 63.80 | 30.20 | 0.00 | New gas well |
| VP27 | Cell No. 11 Vent | 600mm | 63.80 | 33.80 | 0.00 | New gas well |
| VP28 | Cell No. 11 Vent | 600mm | 63.90 | 33.20 | 0.70 | New gas well |
| VP29 | Cell No. 11 Vent | 600mm | 63.20 | 32.80 | 0.00 | New gas well |
| VP30 | Cell No. 8 Vent | 600mm | 67.40 | 29.10 | 1.00 | New gas well |
| VP31 | Cell No. 8 Vent | 600mm | 60.80 | 35.60 | 0.00 | New gas well |

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|---|---|---|---|---|---|---|
| **VP32** | Cell No. 9 Vent | 600mm | 65.70 | 30.80 | 0.10 | New gas well |
| **VP33** | Cell No9 Vent | 600mm | 68.10 | 29.80 | 0.00 | New gas well |
| **VP34** | Cell No10 Vent | 600mm | 20.20 | 8.30 | 13.60 | New gas well |
| **VP35** | Cell No. 10 Vent | 600mm | 60.20 | 32.20 | 0.30 | New gas well |
| **VP36** | Cell No. 10 Vent | 600mm | 59.20 | 32.10 | 0.40 | New gas well |
| **VP37** | Cell No. 11 Vent | 600mm | 72.60 | 23.30 | 1.20 | New gas well |
| **VP38** | Cell No. 12 Vent | 600mm | 66.00 | 30.40 | 0.00 | New gas well |
| **VP39** | Cell No. 12 Vent | 600mm | 55.60 | 25.10 | 0.90 | New gas well |
| **VP40** | Cell No. 12 Vent | 600mm | 63.80 | 31.80 | 0.00 | New gas well |
| **VP41** | Cell No. 12 Vent | 600mm | 62.10 | 35.80 | 0.00 | New gas well |
| **VP42** | Cell No. 8 Vent | 600mm | 61.20 | 29.80 | 0.00 | New gas well |
| **VP43** | Cell No. 8 Vent | 600mm | 64.90 | 32.20 | 0.00 | New gas well |
| **VP44** | Cell No. 9 Vent | 600mm | 67.10 | 29.90 | 0.00 | New gas well |
| **VP45** | Cell No. 9 Vent | 600mm | 67.60 | 30.00 | 0.00 | New gas well |
| **VP46** | Cell No. 9 Vent | 600mm | 57.90 | 33.20 | 0.00 | New gas well |
| **VP47** | Cell No. 13 Vent | 600mm | 59.80 | 34.70 | 0.00 | New gas well |
| **VP48** | Cell No. 13 Vent | 600mm | 40.30 | 30.80 | 0.00 | New gas well |
| **VP49** | Cell No. 13 Vent | 600mm | 18.60 | 17.60 | 5.40 | New gas well |
| **VP50** | Cell No. 13 Vent | 600mm | 23.30 | 24.70 | 0.00 | New gas well |
| **VP51** | Cell No. 13 Vent | 600mm | 52.30 | 34.00 | 0.10 | New gas well |
| **VP52** | Cell No. 14 Vent | 600mm | 40.80 | 32.40 | 0.00 | New gas well |
| **HOR1** | Cell No. 14 Vent | 600mm | 38.60 | 28.40 | 2.50 | New gas well |
| **HOR2** | Cell No. 14 Vent | 600mm | 26.90 | 25.40 | 4.90 | New gas well |

| Site Name: Dunmore Landfill Site | Site Address: Dunmore, Co. Kilkenny | |
|---|---|---|
| Operator: Kilkenny County Council | National Grid Reference: 160572N 249519E | |
| Site Status: Active | Date: 13/08/09 | Time: 12:05 |
| Instrument Used: Infra Red Gas Analyser - GA 94 | Date of Calibration: Mar'09<br>Next Calibration Due: Sep'09 | |
| Monitoring Personnel: Alan Ratigan | Weather: dry | Barometric Pressure (mb) : 1017 |

## RESULTS

| Sample Station Number | Borehole/ Spike/ Other | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | Comments |
|---|---|---|---|---|---|---|
| VP1 | Cell No. 1 Vent | 600mm | 29.70 | 23.40 | 3.10 | New gas well |
| VP2 | Cell No. 1 Vent | 600mm | 39.30 | 22.70 | 2.30 | New gas well |
| VP3 | Cell No. 1 Vent | 600mm | 26.30 | 23.90 | 0.50 | New gas well |
| VP4 | Cell No. 3 Vent | 600mm | 38.40 | 25.60 | 1.40 | New gas well |
| VP5 | Cell No. 2 Vent | 600mm | 42.20 | 26.30 | 0.40 | New gas well |
| VP6 | Cell No. 2 Vent | 600mm | 51.30 | 30.10 | 0.90 | New gas well |
| VP7 | Cell No. 3 Vent | 600mm | 53.30 | 29.50 | 2.20 | New gas well |
| VP8 | Cell No. 7 Vent | 600mm | 27.70 | 18.90 | 6.10 | New gas well |
| VP9 | Cell No. 7 Vent | 600mm | 41.40 | 24.90 | 2.10 | New gas well |
| VP10 | Cell No. 6 Vent | 600mm | 29.20 | 19.20 | 3.00 | New gas well |
| VP11 | Cell No. 6 Vent | 600mm | 46.80 | 29.60 | 0.00 | New gas well |
| VP12 | Cell No. 5 Vent | 600mm | 46.00 | 28.90 | 0.40 | New gas well |
| VP13 | Cell No. 5 Vent | 600mm | 12.00 | 8.10 | 14.50 | New gas well |
| VP14 | Cell No. 7 Vent | 600mm | 47.80 | 30.50 | 0.40 | New gas well |
| VP15 | Cell No. 7 Vent | 600mm | 35.30 | 26.50 | 1.00 | New gas well |
| VP16 | Cell No. 4 Vent | 600mm | 20.40 | 16.60 | 7.80 | New gas well |
| VP17 | Cell No. 4 Vent | 600mm | 31.80 | 26.70 | 0.40 | New gas well |
| VP18 | Cell No. 10 Vent | 600mm | 32.50 | 25.80 | 2.10 | New gas well |
| VP19 | Cell No. 10 Vent | 600mm | 51.30 | 29.00 | 2.40 | New gas well |
| VP20 | Cell No. 10 Vent | 600mm | 21.90 | 19.40 | 5.50 | New gas well |

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|---|---|---|---|---|---|---|
| **VP21** | Cell No. 9 Vent | 600mm | 35.10 | 28.00 | 0.40 | New gas well |
| **VP22** | Cell No. 8 Vent | 600mm | 41.40 | 30.60 | 0.40 | New gas well |
| **VP23** | Cell No. 11 Vent | 600mm | 40.20 | 26.50 | 1.80 | New gas well |
| **VP24** | Cell No. 11 Vent | 600mm | 68.70 | 24.20 | 0.20 | New gas well |
| **VP25** | Cell No. 11 Vent | 600mm | 56.50 | 30.50 | 1.80 | New gas well |
| **VP26** | Cell No. 11 Vent | 600mm | 42.20 | 26.70 | 0.00 | New gas well |
| **VP27** | Cell No. 11 Vent | 600mm | 60.90 | 33.50 | 0.00 | New gas well |
| **VP28** | Cell No. 11 Vent | 600mm | 25.60 | 23.40 | 0.00 | New gas well |
| **VP29** | Cell No. 11 Vent | 600mm | 60.40 | 36.20 | 0.00 | New gas well |
| **VP30** | Cell No. 8 Vent | 600mm | 58.90 | 31.50 | 0.10 | New gas well |
| **VP31** | Cell No. 8 Vent | 600mm | 32.20 | 26.70 | 0.30 | New gas well |
| **VP32** | Cell No. 9 Vent | 600mm | 47.60 | 28.10 | 0.70 | New gas well |
| **VP33** | Cell No9 Vent | 600mm | 61.40 | 35.80 | 0.00 | New gas well |
| **VP34** | Cell No10 Vent | 600mm | | | | disconnected |
| **VP35** | Cell No. 10 Vent | 600mm | 39.50 | 28.20 | 1.30 | New gas well |
| **VP36** | Cell No. 10 Vent | 600mm | 61.10 | 36.00 | 0.00 | New gas well |
| **VP37** | Cell No. 11 Vent | 600mm | 51.40 | 33.40 | 0.00 | New gas well |
| **VP38** | Cell No. 12 Vent | 600mm | 34.40 | 25.00 | 0.90 | New gas well |
| **VP39** | Cell No. 12 Vent | 600mm | 44.50 | 24.60 | 2.10 | New gas well |
| **VP40** | Cell No. 12 Vent | 600mm | 31.30 | 25.90 | 0.70 | New gas well |
| **VP41** | Cell No. 12 Vent | 600mm | 17.80 | 19.60 | 1.50 | New gas well |
| **VP42** | Cell No. 8 Vent | 600mm | 61.80 | 35.70 | 0.00 | New gas well |
| **VP43** | Cell No. 8 Vent | 600mm | 60.60 | 31.80 | 0.00 | New gas well |
| **VP44** | Cell No. 9 Vent | 600mm | 38.10 | 25.90 | 0.30 | New gas well |
| **VP45** | Cell No. 9 Vent | 600mm | 23.40 | 15.80 | 8.30 | New gas well |
| **VP46** | Cell No. 9 Vent | 600mm | 32.10 | 26.70 | 0.50 | New gas well |
| **VP47** | Cell No. 13 Vent | 600mm | 47.70 | 33.30 | 0.00 | New gas well |

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|---|---|---|---|---|---|---|
| **VP48** | Cell No. 13 Vent | 600mm | 31.40 | 26.70 | 0.50 | New gas well |
| **VP49** | Cell No. 13 Vent | 600mm | 13.80 | 12.00 | 10.30 | New gas well |
| **VP50** | Cell No. 13 Vent | 600mm | 17.50 | 21.20 | 0.90 | New gas well |
| **VP51** | Cell No. 13 Vent | 600mm | 24.90 | 25.70 | 0.00 | New gas well |
| **VP52** | Cell No. 14 Vent | 600mm | 53.10 | 36.10 | 0.00 | New gas well |
| **HOR1** | Cell No. 14 Vent | 600mm | 37.40 | 25.80 | 4.90 | New gas well |
| **HOR2** | Cell No. 14 Vent | 600mm | 28.50 | 22.80 | 5.80 | New gas well |

| Site Name: Dunmore Landfill Site | Site Address: Dunmore, Co. Kilkenny | |
|---|---|---|
| Operator: Kilkenny County Council | National Grid Reference: 160572N 249519E | |
| Site Status: Active | Date: 02/09/09 | Time: 15:43 |
| Instrument Used: Infra Red Gas Analyser - GA 94 | Date of Calibration: May'08<br>Next Calibration Due: May'10 | |
| Monitoring Personnel: Alan Ratigan | Weather: dry | Barometric Pressure (mb) : 988 |

## RESULTS

| Sample Station Number | Borehole/ Spike/ Other | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | Comments |
|---|---|---|---|---|---|---|
| VP1 | Cell No. 1 Vent | 600mm | 32.80 | 25.50 | 2.20 | New gas well |
| VP2 | Cell No. 1 Vent | 600mm | 47.50 | 24.00 | 1.30 | New gas well |
| VP3 | Cell No. 1 Vent | 600mm | 36.20 | 26.50 | 0.90 | New gas well |
| VP4 | Cell No. 3 Vent | 600mm | 39.40 | 26.30 | 1.50 | New gas well |
| VP5 | Cell No. 2 Vent | 600mm | 46.10 | 26.40 | 0.90 | New gas well |
| VP6 | Cell No. 2 Vent | 600mm | 45.80 | 29.60 | 1.00 | New gas well |
| VP7 | Cell No. 3 Vent | 600mm | 53.80 | 30.50 | 2.30 | New gas well |
| VP8 | Cell No. 7 Vent | 600mm | 23.80 | 15.40 | 9.40 | New gas well |
| VP9 | Cell No. 7 Vent | 600mm | 44.70 | 25.80 | 2.50 | New gas well |
| VP10 | Cell No. 6 Vent | 600mm | 25.30 | 17.00 | 3.30 | New gas well |
| VP11 | Cell No. 6 Vent | 600mm | 46.40 | 29.10 | 0.30 | New gas well |
| VP12 | Cell No. 5 Vent | 600mm | 45.80 | 28.70 | 0.40 | New gas well |
| VP13 | Cell No. 5 Vent | 600mm | 35.30 | 24.00 | 4.40 | New gas well |
| VP14 | Cell No. 7 Vent | 600mm | 50.90 | 30.60 | 0.80 | New gas well |
| VP15 | Cell No. 7 Vent | 600mm | 35.70 | 25.90 | 0.60 | New gas well |
| VP16 | Cell No. 4 Vent | 600mm | 41.50 | 28.40 | 0.70 | New gas well |
| VP17 | Cell No. 4 Vent | 600mm | 29.50 | 26.30 | 0.70 | New gas well |
| VP18 | Cell No. 10 Vent | 600mm | 8.20 | 7.70 | 14.70 | |
| VP19 | Cell No. 10 Vent | 600mm | 49.90 | 29.50 | 1.30 | New gas well |
| VP20 | Cell No. 10 Vent | 600mm | 19.60 | 16.50 | 3.90 | New gas well |

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|---|---|---|---|---|---|---|
| **VP21** | Cell No. 9 Vent | 600mm | 34.50 | 16.30 | 0.10 | New gas well |
| **VP22** | Cell No. 8 Vent | 600mm | 35.20 | 17.30 | 0.00 | New gas well |
| **VP23** | Cell No. 11 Vent | 600mm | 45.70 | 29.40 | 0.50 | New gas well |
| **VP24** | Cell No. 11 Vent | 600mm | 74.40 | 25.20 | 0.10 | New gas well |
| **VP25** | Cell No. 11 Vent | 600mm | 46.50 | 27.50 | 0.00 | New gas well |
| **VP26** | Cell No. 11 Vent | 600mm | 65.40 | 34.00 | 0.20 | New gas well |
| **VP27** | Cell No. 11 Vent | 600mm | 64.20 | 34.40 | 0.00 | New gas well |
| **VP28** | Cell No. 11 Vent | 600mm | 24.80 | 23.80 | 0.00 | New gas well |
| **VP29** | Cell No. 11 Vent | 600mm | 61.50 | 37.20 | 0.00 | New gas well |
| **VP30** | Cell No. 8 Vent | 600mm | 60.10 | 31.80 | 0.90 | New gas well |
| **VP31** | Cell No. 8 Vent | 600mm | 62.60 | 33.30 | 0.00 | New gas well |
| **VP32** | Cell No. 9 Vent | 600mm | 59.50 | 34.50 | 0.60 | New gas well |
| **VP33** | Cell No9 Vent | 600mm | 63.50 | 36.60 | 0.00 | New gas well |
| **VP34** | Cell No10 Vent | 600mm | 30.10 | 22.60 | 0.00 | New gas well |
| **VP35** | Cell No. 10 Vent | 600mm | 37.00 | 22.10 | 0.90 | New gas well |
| **VP36** | Cell No. 10 Vent | 600mm | 61.60 | 34.80 | 0.10 | New gas well |
| **VP37** | Cell No. 11 Vent | 600mm | 51.50 | 33.90 | 0.00 | New gas well |
| **VP38** | Cell No. 12 Vent | 600mm | 30.00 | 24.20 | 0.90 | New gas well |
| **VP39** | Cell No. 12 Vent | 600mm | 42.30 | 25.20 | 1.50 | New gas well |
| **VP40** | Cell No. 12 Vent | 600mm | 30.10 | 25.20 | 0.50 | New gas well |
| **VP41** | Cell No. 12 Vent | 600mm | 21.70 | 18.90 | 2.10 | New gas well |
| **VP42** | Cell No. 12 Vent | 600mm | 59.60 | 34.40 | 1.20 | New gas well |
| **VP43** | Cell No. 12 Vent | 600mm | 59.30 | 31.90 | 0.00 | New gas well |
| **VP44** | Cell No. 12 Vent | 600mm | 40.10 | 25.70 | 0.00 | New gas well |
| **VP45** | Cell No. 12 Vent | 600mm | 30.00 | 18.90 | 1.00 | New gas well |
| **VP46** | Cell No. 12 Vent | 600mm | 34.10 | 19.20 | 0.00 | New gas well |
| **VP47** | Cell No. 13 Vent | 600mm | 48.60 | 33.00 | 0.10 | New gas well |

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|---|---|---|---|---|---|---|
| **VP48** | Cell No. 13 Vent | 600mm | 32.30 | 25.00 | 2.70 | New gas well |
| **VP49** | Cell No. 13 Vent | 600mm | 48.90 | 30.70 | 0.90 | New gas well |
| **VP50** | Cell No. 13 Vent | 600mm | 45.80 | 32.40 | 0.00 | New gas well |
| **VP51** | Cell No. 13 Vent | 600mm | 32.60 | 27.70 | 0.30 | New gas well |
| **VP52** | Cell No. 14 Vent | 600mm | 57.10 | 36.90 | 0.00 | New gas well |

| Site Name: Dunmore Landfill Site | Site Address: Dunmore, Co. Kilkenny | |
|---|---|---|
| Operator: Kilkenny County Council | National Grid Reference: 160572N 249519E | |
| Site Status: Active | Date: 01/10/09 | Time: 11:55 |
| Instrument Used: Infra Red Gas Analyser - GA 94 | Date of Calibration: Mar'09<br>Next Calibration Due: Sept'09 | |
| Monitoring Personnel: Alan Ratigan | Weather: dry | Barometric Pressure (mb) : 1005 |

## RESULTS

| Sample Station Number | Borehole/ Spike/ Other | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | Comments |
|---|---|---|---|---|---|---|
| VP1 | Cell No. 1 Vent | 600mm | 43.50 | 27.50 | 2.30 | New gas well |
| VP2 | Cell No. 1 Vent | 600mm | 61.70 | 25.50 | 1.10 | New gas well |
| VP3 | Cell No. 1 Vent | 600mm | 60.80 | 31.40 | 0.70 | New gas well |
| VP4 | Cell No. 3 Vent | 600mm | 57.40 | 30.30 | 0.90 | New gas well |
| VP5 | Cell No. 2 Vent | 600mm | 62.60 | 29.00 | 1.00 | New gas well |
| VP6 | Cell No. 2 Vent | 600mm | 45.40 | 26.90 | 3.30 | New gas well |
| VP7 | Cell No. 3 Vent | 600mm | 45.00 | 23.70 | 5.50 | New gas well |
| VP8 | Cell No. 7 Vent | 600mm | 37.90 | 21.00 | 6.60 | New gas well |
| VP9 | Cell No. 7 Vent | 600mm | 53.10 | 25.20 | 3.50 | New gas well |
| VP10 | Cell No. 6 Vent | 600mm | 50.10 | 23.90 | 3.70 | New gas well |
| VP11 | Cell No. 6 Vent | 600mm | 63.80 | 30.70 | 0.20 | New gas well |
| VP12 | Cell No. 5 Vent | 600mm | 60.90 | 29.70 | 0.80 | New gas well |
| VP13 | Cell No. 5 Vent | 600mm | 51.80 | 29.40 | 3.20 | New gas well |
| VP14 | Cell No. 7 Vent | 600mm | 60.40 | 33.50 | 0.70 | New gas well |
| VP15 | Cell No. 7 Vent | 600mm | 55.70 | 31.30 | 0.80 | New gas well |
| VP16 | Cell No. 4 Vent | 600mm | 50.70 | 32.40 | 1.40 | New gas well |
| VP17 | Cell No. 4 Vent | 600mm | 55.60 | 33.70 | 1.50 | New gas well |
| VP18 | Cell No. 10 Vent | 600mm | 38.10 | 21.70 | 7.40 | |
| VP19 | Cell No. 10 Vent | 600mm | 51.90 | 29.30 | 2.30 | New gas well |
| VP20 | Cell No. 10 Vent | 600mm | 29.60 | 22.60 | 3.20 | New gas well |

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|---|---|---|---|---|---|---|
| **VP21** | Cell No. 9 Vent | 600mm | 47.50 | 31.70 | 0.10 | New gas well |
| **VP22** | Cell No. 8 Vent | 600mm | 43.10 | 30.50 | 0.00 | New gas well |
| **VP23** | Cell No. 11 Vent | 600mm | 60.00 | 29.50 | 1.10 | New gas well |
| **VP24** | Cell No. 11 Vent | 600mm | 74.90 | 24.60 | 0.00 | New gas well |
| **VP25** | Cell No. 11 Vent | 600mm | 64.30 | 33.60 | 0.00 | New gas well |
| **VP26** | Cell No. 11 Vent | 600mm | 64.90 | 28.70 | 0.00 | New gas well |
| **VP27** | Cell No. 11 Vent | 600mm | 58.80 | 30.90 | 0.40 | New gas well |
| **VP28** | Cell No. 11 Vent | 600mm | 66.80 | 27.90 | 0.00 | New gas well |
| **VP29** | Cell No. 11 Vent | 600mm | 62.00 | 36.80 | 0.40 | New gas well |
| **VP30** | Cell No. 8 Vent | 600mm | 62.90 | 31.70 | 1.10 | New gas well |
| **VP31** | Cell No. 8 Vent | 600mm | 41.60 | 20.30 | 6.80 | New gas well |
| **VP32** | Cell No. 9 Vent | 600mm | 49.80 | 32.90 | 1.70 | New gas well |
| **VP33** | Cell No9 Vent | 600mm | 63.20 | 36.10 | 0.30 | New gas well |
| **VP34** | Cell No10 Vent | 600mm | 49.40 | 30.10 | 0.00 | New gas well |
| **VP35** | Cell No. 10 Vent | 600mm | 56.10 | 30.40 | 2.10 | New gas well |
| **VP36** | Cell No. 10 Vent | 600mm | 61.50 | 32.90 | 0.60 | New gas well |
| **VP37** | Cell No. 11 Vent | 600mm | 64.50 | 31.00 | 0.00 | New gas well |
| **VP38** | Cell No. 12 Vent | 600mm | 58.30 | 27.10 | 1.50 | New gas well |
| **VP39** | Cell No. 12 Vent | 600mm | 57.30 | 23.90 | 3.40 | New gas well |
| **VP40** | Cell No. 12 Vent | 600mm | 30.20 | 24.30 | 2.90 | New gas well |
| **VP41** | Cell No. 12 Vent | 600mm | 37.10 | 27.30 | 0.00 | New gas well |
| **VP42** | Cell No. 12 Vent | 600mm | 59.60 | 34.40 | 1.10 | New gas well |
| **VP43** | Cell No. 12 Vent | 600mm | 64.90 | 32.80 | 0.40 | New gas well |
| **VP44** | Cell No. 12 Vent | 600mm | 47.50 | 29.60 | 0.50 | New gas well |
| **VP45** | Cell No. 12 Vent | 600mm | 19.80 | 14.90 | 9.10 | New gas well |
| **VP46** | Cell No. 12 Vent | 600mm | 46.60 | 29.90 | 0.30 | New gas well |
| **VP47** | Cell No. 13 Vent | 600mm | 32.80 | 26.60 | 1.60 | New gas well |

| | | | | | | |
|---|---|---|---|---|---|---|
| **VP48** | Cell No. 13 Vent | 600mm | 28.40 | 22.80 | 3.70 | New gas well |
| **VP49** | Cell No. 13 Vent | 600mm | 19.70 | 14.80 | 9.20 | New gas well |
| **VP50** | Cell No. 13 Vent | 600mm | 25.70 | 23.70 | 1.20 | New gas well |
| **VP51** | Cell No. 13 Vent | 600mm | 23.30 | 24.40 | 0.50 | New gas well |
| **VP52** | Cell No. 14 Vent | 600mm | 43.30 | 32.20 | 0.10 | New gas well |

| Site Name: Dunmore Landfill Site | Site Address: Dunmore, Co. Kilkenny | |
|---|---|---|
| Operator: Kilkenny County Council | National Grid Reference: 160572N 249519E | |
| Site Status: Active | Date: 28/10/09 | Time: 10:14 |
| Instrument Used: Infra Red Gas Analyser - GA 94 | Date of Calibration: Mar'09<br>Next Calibration Due: Sept'09 | |
| Monitoring Personnel: Alan Ratigan | Weather: dry | Barometric Pressure (mb) : 1008 |

## RESULTS

| Sample Station Number | Borehole/ Spike/ Other | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | Comments |
|---|---|---|---|---|---|---|
| VP1 | Cell No. 1 Vent | 600mm | 17.30 | 17.70 | 6.50 | New gas well |
| VP2 | Cell No. 1 Vent | 600mm | 32.50 | 21.10 | 3.60 | New gas well |
| VP3 | Cell No. 1 Vent | 600mm | 18.10 | 21.10 | 4.10 | New gas well |
| VP4 | Cell No. 3 Vent | 600mm | 33.30 | 25.80 | 2.40 | New gas well |
| VP5 | Cell No. 2 Vent | 600mm | 16.10 | 21.00 | 2.70 | New gas well |
| VP6 | Cell No. 2 Vent | 600mm | 31.80 | 23.20 | 4.50 | New gas well |
| VP7 | Cell No. 3 Vent | 600mm | 48.70 | 27.80 | 3.40 | New gas well |
| VP8 | Cell No. 7 Vent | 600mm | 21.10 | 18.20 | 6.80 | New gas well |
| VP9 | Cell No. 7 Vent | 600mm | 26.70 | 20.60 | 5.40 | New gas well |
| VP10 | Cell No. 6 Vent | 600mm | 19.00 | 16.90 | 7.30 | New gas well |
| VP11 | Cell No. 6 Vent | 600mm | 48.30 | 29.00 | 0.60 | New gas well |
| VP12 | Cell No. 5 Vent | 600mm | 49.10 | 29.10 | 0.60 | New gas well |
| VP13 | Cell No. 5 Vent | 600mm | 20.40 | 21.30 | 3.50 | New gas well |
| VP14 | Cell No. 7 Vent | 600mm | 40.20 | 28.30 | 1.00 | New gas well |
| VP15 | Cell No. 7 Vent | 600mm | 22.60 | 23.20 | 1.60 | New gas well |
| VP16 | Cell No. 4 Vent | 600mm | 27.50 | 23.90 | 2.50 | New gas well |
| VP17 | Cell No. 4 Vent | 600mm | 16.90 | 24.30 | 1.40 | New gas well |
| VP18 | Cell No. 10 Vent | 600mm | 54.90 | 30.00 | 0.90 | |
| VP19 | Cell No. 10 Vent | 600mm | 61.70 | 30.10 | 1.20 | New gas well |
| VP20 | Cell No. 10 Vent | 600mm | 29.70 | 25.40 | 3.60 | New gas well |

| | | | | | | |
|---|---|---|---|---|---|---|
| **VP21** | Cell No. 9 Vent | 600mm | 58.90 | 34.00 | 0.10 | New gas well |
| **VP22** | Cell No. 8 Vent | 600mm | 47.40 | 32.10 | 0.00 | New gas well |
| **VP23** | Cell No. 11 Vent | 600mm | 52.30 | 32.00 | 0.60 | New gas well |
| **VP24** | Cell No. 11 Vent | 600mm | 74.30 | 24.90 | 0.00 | New gas well |
| **VP25** | Cell No. 11 Vent | 600mm | 64.80 | 33.90 | 0.00 | New gas well |
| **VP26** | Cell No. 11 Vent | 600mm | 42.10 | 27.10 | 0.00 | New gas well |
| **VP27** | Cell No. 11 Vent | 600mm | 65.10 | 34.20 | 0.00 | New gas well |
| **VP28** | Cell No. 11 Vent | 600mm | 28.80 | 25.30 | 0.00 | New gas well |
| **VP29** | Cell No. 11 Vent | 600mm | 62.00 | 37.30 | 0.00 | New gas well |
| **VP30** | Cell No. 8 Vent | 600mm | 61.50 | 32.70 | 0.30 | New gas well |
| **VP31** | Cell No. 8 Vent | 600mm | 50.20 | 33.00 | 1.50 | New gas well |
| **VP32** | Cell No. 9 Vent | 600mm | 67.40 | 30.30 | 0.00 | New gas well |
| **VP33** | Cell No9 Vent | 600mm | 62.40 | 36.00 | 0.10 | New gas well |
| **VP34** | Cell No10 Vent | 600mm | 32.80 | 21.20 | 5.60 | New gas well |
| **VP35** | Cell No. 10 Vent | 600mm | 46.90 | 31.40 | 0.60 | New gas well |
| **VP36** | Cell No. 10 Vent | 600mm | 64.20 | 33.70 | 0.20 | New gas well |
| **VP37** | Cell No. 11 Vent | 600mm | 54.50 | 35.50 | 0.00 | New gas well |
| **VP38** | Cell No. 12 Vent | 600mm | 25.20 | 22.50 | 1.80 | New gas well |
| **VP39** | Cell No. 12 Vent | 600mm | 58.50 | 25.00 | 2.60 | New gas well |
| **VP40** | Cell No. 12 Vent | 600mm | 20.30 | 20.20 | 2.60 | New gas well |
| **VP41** | Cell No. 12 Vent | 600mm | 14.00 | 15.10 | 7.40 | New gas well |
| **VP42** | Cell No. 12 Vent | 600mm | 60.40 | 31.30 | 0.30 | New gas well |
| **VP43** | Cell No. 12 Vent | 600mm | 61.70 | 35.40 | 0.00 | New gas well |
| **VP44** | Cell No. 12 Vent | 600mm | 31.90 | 24.90 | 0.10 | New gas well |
| **VP45** | Cell No. 12 Vent | 600mm | 21.70 | 14.60 | 10.10 | New gas well |
| **VP46** | Cell No. 12 Vent | 600mm | 42.40 | 30.60 | 0.00 | New gas well |
| **VP47** | Cell No. 13 Vent | 600mm | 61.90 | 36.80 | 0.00 | New gas well |

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|---|---|---|---|---|---|---|
| **VP48** | Cell No. 13 Vent | 600mm | 59.60 | 35.20 | 0.60 | New gas well |
| **VP49** | Cell No. 13 Vent | 600mm | 14.70 | 13.60 | 8.40 | New gas well |
| **VP50** | Cell No. 13 Vent | 600mm | 47.50 | 31.80 | 0.60 | New gas well |
| **VP51** | Cell No. 13 Vent | 600mm | 20.40 | 21.30 | 2.10 | New gas well |
| **VP52** | Cell No. 14 Vent | 600mm | 47.20 | 32.70 | 0.70 | New gas well |
| **VP53** | Cell No. 14 Vent | 600mm | 38.80 | 28.60 | 3.30 | New gas well |
| **VP55** | Cell No. 14 Vent | 600mm | 31.30 | 24.10 | 6.50 | New gas well |
| **HOR1** | Cell No. 14 Vent | 600mm | 21.10 | 17.10 | 7.80 | New gas well |
| **HOR2** | Cell No. 14 Vent | 600mm | 45.20 | 32.00 | 1.20 | New gas well |

| Site Name: Dunmore Landfill Site | Site Address: Dunmore, Co. Kilkenny | |
|---|---|---|
| Operator: Kilkenny County Council | National Grid Reference: 160572N 249519E | |
| Site Status: Active | Date: 03/12/09 | Time: 10:42 |
| Instrument Used: Infra Red Gas Analyser - GA 94 | Date of Calibration: Mar'09<br>Next Calibration Due: Sept'09 | |
| Monitoring Personnel: Alan Ratigan | Weather: dry | Barometric Pressure (mb) : 995 |

## RESULTS

| Sample Station Number | Borehole/ Spike/ Other | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | Comments |
|---|---|---|---|---|---|---|
| VP1 | Cell No. 1 Vent | 600mm | 25.60 | 22.30 | 4.20 | New gas well |
| VP2 | Cell No. 1 Vent | 600mm | 45.50 | 22.30 | 2.10 | New gas well |
| VP3 | Cell No. 1 Vent | 600mm | 18.10 | 20.20 | 5.20 | New gas well |
| VP4 | Cell No. 3 Vent | 600mm | 23.90 | 21.20 | 3.10 | New gas well |
| VP5 | Cell No. 2 Vent | 600mm | 39.90 | 25.20 | 1.80 | New gas well |
| VP6 | Cell No. 2 Vent | 600mm | 39.60 | 24.60 | 4.30 | New gas well |
| VP7 | Cell No. 3 Vent | 600mm | 59.20 | 30.30 | 2.10 | New gas well |
| VP8 | Cell No. 7 Vent | 600mm | 22.90 | 16.50 | 8.60 | New gas well |
| VP9 | Cell No. 7 Vent | 600mm | 34.30 | 26.50 | 1.60 | New gas well |
| VP10 | Cell No. 6 Vent | 600mm | 22.00 | 17.30 | 5.70 | New gas well |
| VP11 | Cell No. 6 Vent | 600mm | 52.40 | 29.90 | 0.40 | New gas well |
| VP12 | Cell No. 5 Vent | 600mm | 53.60 | 30.20 | 0.20 | New gas well |
| VP13 | Cell No. 5 Vent | 600mm | 24.40 | 20.00 | 4.90 | New gas well |
| VP14 | Cell No. 7 Vent | 600mm | 45.40 | 27.90 | 1.50 | New gas well |
| VP15 | Cell No. 7 Vent | 600mm | 38.10 | 25.60 | 1.90 | New gas well |
| VP16 | Cell No. 4 Vent | 600mm | 31.00 | 24.20 | 2.90 | New gas well |
| VP17 | Cell No. 4 Vent | 600mm | 32.30 | 26.30 | 2.80 | New gas well |
| VP18 | Cell No. 10 Vent | 600mm | 59.50 | 33.90 | 1.00 | |
| VP19 | Cell No. 10 Vent | 600mm | 35.00 | 25.90 | 2.80 | New gas well |
| VP20 | Cell No. 10 Vent | 600mm | 33.40 | 28.90 | 0.30 | New gas well |

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|---|---|---|---|---|---|---|
| **VP21** | Cell No. 9 Vent | 600mm | 58.90 | 32.80 | 0.00 | New gas well |
| **VP22** | Cell No. 8 Vent | 600mm | 45.90 | 30.80 | 0.40 | New gas well |
| **VP23** | Cell No. 11 Vent | 600mm | 45.00 | 26.60 | 1.80 | New gas well |
| **VP24** | Cell No. 11 Vent | 600mm | 74.40 | 24.70 | 0.30 | New gas well |
| **VP25** | Cell No. 11 Vent | 600mm | 64.50 | 34.60 | 0.00 | New gas well |
| **VP26** | Cell No. 11 Vent | 600mm | 40.30 | 26.10 | 0.10 | New gas well |
| **VP27** | Cell No. 11 Vent | 600mm | 65.80 | 33.60 | 0.00 | New gas well |
| **VP28** | Cell No. 11 Vent | 600mm | 29.40 | 25.00 | 0.00 | New gas well |
| **VP29** | Cell No. 11 Vent | 600mm | 61.40 | 36.90 | 0.00 | New gas well |
| **VP30** | Cell No. 8 Vent | 600mm | 46.90 | 31.30 | 0.10 | New gas well |
| **VP31** | Cell No. 8 Vent | 600mm | 39.40 | 28.90 | 0.30 | New gas well |
| **VP32** | Cell No. 9 Vent | 600mm | 68.50 | 30.40 | 0.00 | New gas well |
| **VP33** | Cell No9 Vent | 600mm | 63.20 | 36.30 | 0.40 | New gas well |
| **VP34** | Cell No10 Vent | 600mm | 17.50 | 14.10 | 8.90 | New gas well |
| **VP35** | Cell No. 10 Vent | 600mm | 59.40 | 32.80 | 0.90 | New gas well |
| **VP36** | Cell No. 10 Vent | 600mm | 56.60 | 33.00 | 0.80 | New gas well |
| **VP37** | Cell No. 11 Vent | 600mm | 52.70 | 33.90 | 0.00 | New gas well |
| **VP38** | Cell No. 12 Vent | 600mm | 54.60 | 24.50 | 3.90 | New gas well |
| **VP39** | Cell No. 12 Vent | 600mm | 55.10 | 24.50 | 3.50 | New gas well |
| **VP40** | Cell No. 12 Vent | 600mm | 7.00 | 9.90 | 11.30 | New gas well |
| **VP41** | Cell No. 12 Vent | 600mm | 19.70 | 20.00 | 3.00 | New gas well |
| **VP42** | Cell No. 12 Vent | 600mm | 59.50 | 35.00 | 0.90 | New gas well |
| **VP43** | Cell No. 12 Vent | 600mm | 60.30 | 31.50 | 0.00 | New gas well |
| **VP44** | Cell No. 12 Vent | 600mm | 30.50 | 23.80 | 0.60 | New gas well |
| **VP45** | Cell No. 12 Vent | 600mm | 25.20 | 15.70 | 9.30 | New gas well |
| **VP46** | Cell No. 12 Vent | 600mm | 32.70 | 26.80 | 0.30 | New gas well |
| **VP47** | Cell No. 13 Vent | 600mm | 32.30 | 23.60 | 5.90 | New gas well |

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|---|---|---|---|---|---|---|
| **VP48** | Cell No. 13 Vent | 600mm | 60.80 | 35.50 | 0.90 | New gas well |
| **VP49** | Cell No. 13 Vent | 600mm | 18.80 | 17.60 | 5.10 | New gas well |
| **VP50** | Cell No. 13 Vent | 600mm | 43.00 | 31.30 | 0.10 | New gas well |
| **VP51** | Cell No. 13 Vent | 600mm | 29.40 | 24.40 | 3.00 | New gas well |
| **VP52** | Cell No. 14 Vent | 600mm | 42.90 | 32.10 | 0.00 | New gas well |
| **VP53** | Cell No. 14 Vent | 600mm | 35.40 | 27.80 | 3.00 | New gas well |
| **VP55** | Cell No. 14 Vent | 600mm | 61.40 | 39.60 | 0.10 | New gas well |
| **VP56** | Cell No. 14 Vent | 600mm | 61.10 | 41.00 | 0.00 | New gas well |
| **HOR1** | Cell No. 14 Vent | 600mm | 9.80 | 7.70 | 13.80 | New gas well |
| **HOR2** | Cell No. 14 Vent | 600mm | | | | New gas well |

| Site Name: Dunmore Landfill Site | Site Address: Dunmore, Co. Kilkenny | |
|---|---|---|
| Operator: Kilkenny County Council | National Grid Reference: 160572N 249519E | |
| Site Status: Active | Date: 05/01/10 | Time: 09:00 |
| Instrument Used: Infra Red Gas Analyser - GA 94 | Date of Calibration: Mar'09<br>Next Calibration Due: Sept'09 | |
| Monitoring Personnel: Alan Rhatigan | Weather: dry | Barometric Pressure (mb) : 997 |

## RESULTS

| Sample Station Number | Borehole/ Spike/ Other | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | Comments |
|---|---|---|---|---|---|---|
| VP1 | Cell No. 1 Vent | 600mm | 51.00 | 27.60 | 1.20 | New gas well |
| VP2 | Cell No. 1 Vent | 600mm | 58.70 | 24.00 | 1.80 | New gas well |
| VP3 | Cell No. 1 Vent | 600mm | 42.20 | 21.60 | 0.90 | New gas well |
| VP4 | Cell No. 3 Vent | 600mm | 36.40 | 23.10 | 1.80 | New gas well |
| VP5 | Cell No. 2 Vent | 600mm | 52.20 | 23.90 | 0.60 | New gas well |
| VP6 | Cell No. 2 Vent | 600mm | 55.00 | 32.50 | 1.90 | New gas well |
| VP7 | Cell No. 3 Vent | 600mm | 20.90 | 13.20 | 11.90 | New gas well |
| VP8 | Cell No. 7 Vent | 600mm | 16.30 | 11.50 | 10.60 | New gas well |
| VP9 | Cell No. 7 Vent | 600mm | 32.00 | 18.30 | 3.90 | New gas well |
| VP10 | Cell No. 6 Vent | 600mm | 19.40 | 14.50 | 7.90 | New gas well |
| VP11 | Cell No. 6 Vent | 600mm | 45.10 | 27.60 | 0.50 | New gas well |
| VP12 | Cell No. 5 Vent | 600mm | 47.90 | 28.90 | 0.10 | New gas well |
| VP13 | Cell No. 5 Vent | 600mm | 35.50 | 23.10 | 3.30 | New gas well |
| VP14 | Cell No. 7 Vent | 600mm | 34.40 | 23.60 | 2.40 | New gas well |
| VP15 | Cell No. 7 Vent | 600mm | 27.50 | 21.90 | 3.30 | New gas well |
| VP16 | Cell No. 4 Vent | 600mm | 28.50 | 19.70 | 5.40 | New gas well |
| VP17 | Cell No. 4 Vent | 600mm | 9.30 | 18.10 | 3.30 | New gas well |
| VP18 | Cell No. 10 Vent | 600mm | 31.40 | 17.20 | 7.70 | |
| VP19 | Cell No. 10 Vent | 600mm | 42.20 | 22.30 | 5.50 | New gas well |
| VP20 | Cell No. 10 Vent | 600mm | 17.30 | 19.00 | 3.90 | New gas well |

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|---|---|---|---|---|---|---|
| **VP21** | Cell No. 9 Vent | 600mm | 53.30 | 32.00 | 0.30 | New gas well |
| **VP22** | Cell No. 8 Vent | 600mm | 39.60 | 28.10 | 1.40 | New gas well |
| **VP23** | Cell No. 11 Vent | 600mm | 35.50 | 22.70 | 2.10 | New gas well |
| **VP24** | Cell No. 11 Vent | 600mm | 67.40 | 23.20 | 0.10 | New gas well |
| **VP25** | Cell No. 11 Vent | 600mm | 63.80 | 34.70 | 0.00 | New gas well |
| **VP26** | Cell No. 11 Vent | 600mm | 40.20 | 27.00 | 0.40 | New gas well |
| **VP27** | Cell No. 11 Vent | 600mm | 53.90 | 30.50 | 0.00 | New gas well |
| **VP28** | Cell No. 11 Vent | 600mm | 41.30 | 27.60 | 0.00 | New gas well |
| **VP29** | Cell No. 11 Vent | 600mm | 42.30 | 29.60 | 0.32 | New gas well |
| **VP30** | Cell No. 8 Vent | 600mm | 20.00 | 18.80 | 4.50 | New gas well |
| **VP31** | Cell No. 8 Vent | 600mm | 21.80 | 17.50 | 5.90 | New gas well |
| **VP32** | Cell No. 9 Vent | 600mm | 53.30 | 32.10 | 0.40 | New gas well |
| **VP33** | Cell No9 Vent | 600mm | 61.20 | 33.00 | 0.20 | New gas well |
| **VP34** | Cell No10 Vent | 600mm | 31.60 | 18.10 | 4.30 | New gas well |
| **VP35** | Cell No. 10 Vent | 600mm | 54.60 | 30.30 | 2.30 | New gas well |
| **VP36** | Cell No. 10 Vent | 600mm | 52.50 | 32.50 | 0.30 | New gas well |
| **VP37** | Cell No. 11 Vent | 600mm | 41.90 | 27.40 | 0.00 | New gas well |
| **VP38** | Cell No. 12 Vent | 600mm | 40.20 | 26.40 | 0.00 | New gas well |
| **VP39** | Cell No. 12 Vent | 600mm | 51.10 | 24.00 | 4.50 | New gas well |
| **VP40** | Cell No. 12 Vent | 600mm | 33.40 | 15.30 | 6.30 | New gas well |
| **VP41** | Cell No. 12 Vent | 600mm | 26.00 | 19.60 | 3.60 | New gas well |
| **VP42** | Cell No. 12 Vent | 600mm | 53.60 | 33.10 | 2.50 | New gas well |
| **VP43** | Cell No. 12 Vent | 600mm | 43.90 | 24.90 | 0.40 | New gas well |
| **VP44** | Cell No. 12 Vent | 600mm | 13.70 | 13.20 | 6.50 | New gas well |
| **VP45** | Cell No. 12 Vent | 600mm | 19.60 | 18.10 | 6.60 | New gas well |
| **VP46** | Cell No. 12 Vent | 600mm | 29.50 | 23.20 | 1.80 | New gas well |
| **VP47** | Cell No. 13 Vent | 600mm | 49.60 | 24.40 | 2.90 | New gas well |

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|---|---|---|---|---|---|---|
| **VP48** | Cell No. 13 Vent | 600mm | 47.60 | 21.90 | 3.40 | New gas well |
| **VP49** | Cell No. 13 Vent | 600mm | 36.70 | 17.60 | 4.20 | New gas well |
| **VP50** | Cell No. 13 Vent | 600mm | 62.60 | 34.40 | 0.60 | New gas well |
| **VP51** | Cell No. 13 Vent | 600mm | 62.00 | 34.50 | 1.40 | New gas well |
| **VP52** | Cell No. 14 Vent | 600mm | 57.10 | 37.60 | 2.80 | New gas well |
| **VP53** | Cell No. 14 Vent | 600mm | 58.30 | 38.60 | 0.40 | New gas well |
| **VP55** | Cell No. 14 Vent | 600mm | 46.30 | 22.50 | 1.80 | New gas well |
| **VP56** | Cell No. 14 Vent | 600mm | 49.80 | 33.10 | 1.80 | New gas well |
| **HOR1** | Cell No. 14 Vent | 600mm | 30.60 | 10.50 | 2.60 | New gas well |
| **HOR2** | Cell No. 14 Vent | 600mm | 51.10 | 33.50 | 3.80 | New gas well |

# LANDFILL GAS MIGRATION MONITORING FORM

| | | |
|---|---|---|
| **Site Name:** Dunmore Landfill Site | **Site Address:** Dunmore, Co. Kilkenny | |
| **Operator:** Kilkenny County Council | **National Grid Reference:** 160572N 249519E | |
| **Site Status:** Active | **Date:** 28/01/09 | **Time:** 10:21 |
| **Instrument Used:** Infra red Gas Analyser - GA 94 | **Date Of Calibration:** May '08<br>**Next Calibration Due:** May'10 | |
| **Monitoring Personnel:** Alan Ratigan | **Weather:** Dry | **Barometric Pressure (mb):** 1002 |

## RESULTS

| Sample Station Number | Borehole/ Spike/ Other | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | Comments |
|---|---|---|---|---|---|---|
| **GM1** | Spike | 600mm | 0.00 | 0.30 | 20.70 | |
| **GM2** | Spike | 600mm | 0.00 | 0.10 | 21.00 | |
| **GM3** | Spike | 600mm | 0.00 | 0.90 | 20.10 | |
| **GM4** | Spike | 600mm | 0.00 | 0.20 | 20.60 | |
| **GM5** | Spike | 600mm | 0.00 | **1.70** | 9.50 | |
| **GM7** | Spike | 600mm | 0.00 | 0.00 | 20.90 | |
| **GM8** | Spike | 600mm | 0.00 | 0.80 | 19.60 | |
| **GM9** | Spike | 600mm | 0.00 | 1.20 | 18.90 | |
| **GM10** | Spike | 600mm | 0.00 | 0.90 | 19.5 | |
| **GM11** | Spike | 600mm | 0.00 | 0.70 | 19.8 | |
| **GM12** | Spike | 600mm | 0.00 | 0.40 | 20.1 | |
| **GM13** | Spike | 600mm | 0.00 | 0.20 | 20.6 | |
| **GM14** | Spike | 600mm | 0.00 | 0.70 | 20.70 | |
| **GM15** | Spike | 600mm | 0.00 | 0.10 | 21.00 | |
| **GM16** | Spike | 600mm | 0.00 | 0.10 | 20.90 | |
| **GM17** | Spike | 600mm | 0.00 | 1.00 | 20.40 | |
| **GM18** | Spike | 600mm | 0.00 | 0.60 | 20.60 | |
| **GM19** | Spike | 600mm | 0.00 | 0.70 | 16.70 | |
| **GM20** | Spike | 600mm | 0.00 | 0.50 | 18.80 | |
| **GM21** | Spike | 600mm | 0.00 | 0.30 | 20.50 | |
| **GM22** | Spike | 600mm | 0.00 | 0.90 | 20.00 | |
| **GM23** | Spike | 600mm | 0.00 | 0.90 | 19.80 | |

# LANDFILL GAS MIGRATION MONITORING FORM

| | | |
|---|---|---|
| **Site Name:** Dunmore Landfill Site | **Site Address:** Dunmore, Co. Kilkenny | |
| **Operator:** Kilkenny County Council | **National Grid Reference:** 160572N 249519E | |
| **Site Status:** Active | **Date:** 02/03/09 | **Time:** 13:37 |
| **Instrument Used:** Infra red Gas Analyser - GA 94 | **Date Of Calibration:** May '08<br>**Next Calibration Due:** May'10 | |
| **Monitoring Personnel:** Alan Ratigan | **Weather:** Dry | **Barometric Pressure (mb):** 1005 |

## RESULTS

| Sample Station Number | Borehole/ Spike/ Other | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | Comments |
|---|---|---|---|---|---|---|
| **GM1** | Spike | 600mm | 0.00 | 0.90 | 19.70 | |
| **GM2** | Spike | 600mm | 0.00 | 0.60 | 20.20 | |
| **GM3** | Spike | 600mm | 0.00 | 0.70 | 20.60 | |
| **GM4** | Spike | 600mm | 0.00 | 0.10 | 20.70 | |
| **GM5** | Spike | 600mm | 0.00 | 1.40 | 18.70 | |
| **GM7** | Spike | 600mm | 0.00 | 0.60 | 20.40 | |
| **GM8** | Spike | 600mm | 0.00 | 1.10 | 19.30 | |
| **GM9** | Spike | 600mm | 0.00 | 1.10 | 19.20 | |
| **GM10** | Spike | 600mm | 0.00 | 1.30 | 18.7 | |
| **GM11** | Spike | 600mm | 0.00 | 0.70 | 19.6 | |
| **GM12** | Spike | 600mm | 0.00 | 0.60 | 20.1 | |
| **GM13** | Spike | 600mm | 0.00 | 0.50 | 19.9 | |
| **GM14** | Spike | 600mm | 0.00 | 0.60 | 20.50 | |
| **GM15** | Spike | 600mm | 0.00 | 0.20 | 20.70 | |
| **GM16** | Spike | 600mm | 0.00 | 0.00 | 21.10 | |
| **GM17** | Spike | 600mm | 0.00 | 0.50 | 20.60 | |
| **GM18** | Spike | 600mm | 0.00 | **1.50** | 18.80 | |
| **GM19** | Spike | 600mm | 0.00 | 1.20 | 18.70 | |
| **GM20** | Spike | 600mm | 0.00 | 0.80 | 19.10 | |
| **GM21** | Spike | 600mm | 0.00 | 0.90 | 17.20 | |
| **GM22** | Spike | 600mm | 0.00 | 0.90 | 19.40 | |
| **GM23** | Spike | 600mm | 0.00 | 0.90 | 19.80 | |

# LANDFILL GAS MIGRATION MONITORING FORM

| | | |
|---|---|---|
| **Site Name:** Dunmore Landfill Site | **Site Address:** Dunmore, Co. Kilkenny | |
| **Operator:** Kilkenny County Council | **National Grid Reference:** 160572N 249519E | |
| **Site Status:** Active | **Date:** 06/04/09 | **Time:** 09:23 |
| **Instrument Used:** Infra red Gas Analyser - GA 94 | **Date Of Calibration:** Mar '09<br>**Next Calibration Due:** Sep'09 | |
| **Monitoring Personnel:** Alan Ratigan | **Weather:** Dry | **Barometric Pressure (mb):** 992 |

## RESULTS

| Sample Station Number | Borehole/ Spike/ Other | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | Comments |
|---|---|---|---|---|---|---|
| GM1 | Spike | 600mm | 0.00 | 0.90 | 19.40 | |
| GM2 | Spike | 600mm | 0.00 | **1.50** | 19.00 | |
| GM3 | Spike | 600mm | 0.00 | 0.60 | 20.20 | |
| GM4 | Spike | 600mm | 0.00 | **1.50** | 19.60 | |
| GM5 | Spike | 600mm | 0.00 | 1.20 | 14.10 | |
| GM7 | Spike | 600mm | 0.00 | 0.00 | 20.80 | |
| GM8 | Spike | 600mm | 0.00 | 0.70 | 20.20 | |
| GM9 | Spike | 600mm | 0.00 | 0.10 | 20.90 | |
| GM10 | Spike | 600mm | 0.00 | 1.40 | 19.90 | |
| GM11 | Spike | 600mm | 0.00 | 0.10 | 20.80 | |
| GM12 | Spike | 600mm | 0.00 | 1.20 | 18.60 | |
| GM13 | Spike | 600mm | 0.00 | 0.30 | 20.60 | |
| GM14 | Spike | 600mm | 0.00 | 1.00 | 20.20 | |
| GM15 | Spike | 600mm | 0.00 | 0.40 | 20.80 | |
| GM16 | Spike | 600mm | 0.00 | 0.20 | 20.70 | |
| GM17 | Spike | 600mm | 0.00 | 1.10 | 19.90 | |
| GM18 | Spike | 600mm | 0.00 | 1.30 | 19.50 | |
| GM19 | Spike | 600mm | 0.00 | 0.90 | 16.30 | |
| GM20 | Spike | 600mm | 0.00 | 0.60 | 20.10 | |
| GM21 | Spike | 600mm | 0.00 | 0.30 | 20.70 | |
| GM22 | Spike | 600mm | 0.00 | 1.00 | 19.60 | |
| GM23 | Spike | 600mm | 0.00 | 0.80 | 20.00 | |

# LANDFILL GAS MIGRATION MONITORING FORM

| | | |
|---|---|---|
| **Site Name:** Dunmore Landfill Site | **Site Address:** Dunmore, Co. Kilkenny | |
| **Operator:** Kilkenny County Council | **National Grid Reference:** 160572N 249519E | |
| **Site Status:** Active | **Date:** 28/04/09 | **Time:** 11:58 |
| **Instrument Used:** Infra red Gas Analyser - GA 94 | **Date Of Calibration:** Mar '09<br>**Next Calibration Due:** Sep'09 | |
| **Monitoring Personnel:** Alan Ratigan | **Weather:** Dry | **Barometric Pressure (mb):** 995 |

## RESULTS

| Sample Station Number | Borehole/ Spike/ Other | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | Comments |
|---|---|---|---|---|---|---|
| **GM1** | Spike | 600mm | 0.00 | | | |
| **GM2** | Spike | 600mm | 0.00 | 1.40 | 18.30 | |
| **GM3** | Spike | 600mm | 0.00 | 0.50 | 19.50 | |
| **GM4** | Spike | 600mm | 0.00 | 1.30 | 18.90 | |
| **GM5** | Spike | 600mm | 0.00 | 1.30 | 13.30 | |
| **GM7** | Spike | 600mm | 0.00 | 0.50 | 20.20 | |
| **GM8** | Spike | 600mm | 0.00 | 0.60 | 20.10 | |
| **GM9** | Spike | 600mm | 0.00 | 1.40 | 18.90 | |
| **GM10** | Spike | 600mm | 0.00 | **1.60** | 17.10 | |
| **GM11** | Spike | 600mm | 0.00 | 0.60 | 19.30 | |
| **GM12** | Spike | 600mm | 0.00 | 0.70 | 19.80 | |
| **GM13** | Spike | 600mm | 0.00 | 0.90 | 19.70 | |
| **GM14** | Spike | 600mm | 0.00 | 1.00 | 20.00 | |
| **GM15** | Spike | 600mm | 0.00 | 0.30 | 20.30 | |
| **GM16** | Spike | 600mm | 0.00 | 0.00 | 20.70 | |
| **GM17** | Spike | 600mm | 0.00 | 1.20 | 19.80 | |
| **GM18** | Spike | 600mm | 0.00 | 1.20 | 20.10 | |
| **GM19** | Spike | 600mm | 0.00 | **1.50** | 8.70 | |
| **GM20** | Spike | 600mm | 0.00 | 1.20 | 18.20 | |
| **GM21** | Spike | 600mm | 0.00 | 1.20 | 17.50 | |
| **GM22** | Spike | 600mm | 0.00 | 0.80 | 19.50 | |
| **GM23** | Spike | 600mm | 0.00 | 1.00 | 19.20 | |

# LANDFILL GAS MIGRATION MONITORING FORM

| | | |
|---|---|---|
| **Site Name:** Dunmore Landfill Site | **Site Address:** Dunmore, Co. Kilkenny | |
| **Operator:** Kilkenny County Council | **National Grid Reference:** 160572N 249519E | |
| **Site Status:** Active | **Date:** 03/06/09 | **Time:** 08:45 |
| **Instrument Used:** Infra red Gas Analyser - GA 94 | **Date Of Calibration:** Mar '09<br>**Next Calibration Due:** Sep'09 | |
| **Monitoring Personnel:** Alan Ratigan | **Weather:** Dry | **Barometric Pressure (mb):** 1017 |

## RESULTS

| Sample Station Number | Borehole/ Spike/ Other | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | Comments |
|---|---|---|---|---|---|---|
| **GM1** | Spike | 600mm | 0.00 | 0.60 | 18.10 | |
| **GM2** | Spike | 600mm | 0.00 | **1.90** | 15.20 | |
| **GM3** | Spike | 600mm | 0.00 | 0.60 | 18.50 | |
| **GM4** | Spike | 600mm | 0.00 | 0.50 | 19.50 | |
| **GM5** | Spike | 600mm | 0.00 | 0.50 | 18.60 | |
| **GM7** | Spike | 600mm | 0.00 | 0.90 | 18.50 | |
| **GM8** | Spike | 600mm | 0.00 | 0.60 | 19.80 | |
| **GM9** | Spike | 600mm | 0.00 | 0.90 | 18.80 | |
| **GM10** | Spike | 600mm | 0.00 | **1.60** | 18.20 | |
| **GM11** | Spike | 600mm | 0.00 | **1.70** | 17.40 | |
| **GM12** | Spike | 600mm | 0.00 | **1.80** | 15.40 | |
| **GM13** | Spike | 600mm | 0.00 | 1.10 | 17.60 | |
| **GM14** | Spike | 600mm | 0.00 | 0.90 | 19.60 | |
| **GM15** | Spike | 600mm | 0.00 | 0.10 | 20.30 | |
| **GM16** | Spike | 600mm | 0.00 | 0.30 | 20.10 | |
| **GM17** | Spike | 600mm | 0.00 | 1.10 | 19.10 | |
| **GM18** | Spike | 600mm | 0.00 | 1.20 | 19.50 | |
| **GM19** | Spike | 600mm | 0.00 | 1.40 | 10.60 | |
| **GM20** | Spike | 600mm | 0.00 | 1.00 | 19.00 | |
| **GM21** | Spike | 600mm | 0.00 | 1.40 | 16.90 | |
| **GM22** | Spike | 600mm | 0.00 | 0.80 | 18.70 | |
| **GM23** | Spike | 600mm | 0.00 | 1.30 | 16.30 | |

# LANDFILL GAS MIGRATION MONITORING FORM

| | | |
|---|---|---|
| **Site Name:** Dunmore Landfill Site | **Site Address:** Dunmore, Co. Kilkenny | |
| **Operator:** Kilkenny County Council | **National Grid Reference:** 160572N 249519E | |
| **Site Status:** Active | **Date:** 02/07/09 | **Time:** 12:37 |
| **Instrument Used:** Infra red Gas Analyser - GA 94 | **Date Of Calibration:** Mar '09<br>**Next Calibration Due:** Sep'09 | |
| **Monitoring Personnel:** Alan Ratigan | **Weather:** Dry | **Barometric Pressure (mb):** 1011 |

## RESULTS

| Sample Station Number | Borehole/ Spike/ Other | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | Comments |
|---|---|---|---|---|---|---|
| GM1 | Spike | 600mm | 0.00 | 1.50 | 18.80 | |
| GM2 | Spike | 600mm | 0.00 | 1.90 | 18.70 | |
| GM3 | Spike | 600mm | 0.00 | 1.20 | 17.90 | |
| GM4 | Spike | 600mm | 0.00 | 1.40 | 18.50 | |
| GM5 | Spike | 600mm | 0.00 | 2.00 | 13.60 | |
| GM7 | Spike | 600mm | 0.00 | 1.40 | 18.90 | |
| GM8 | Spike | 600mm | 0.00 | 0.80 | 18.50 | |
| GM9 | Spike | 600mm | 0.00 | 0.10 | 20.10 | |
| GM10 | Spike | 600mm | 0.00 | 2.40 | 15.40 | |
| GM11 | Spike | 600mm | 0.00 | 2.00 | 17.10 | |
| GM12 | Spike | 600mm | 0.00 | 1.60 | 15.00 | |
| GM13 | Spike | 600mm | 0.00 | 1.00 | 15.00 | |
| GM14 | Spike | 600mm | 0.00 | 1.30 | 18.80 | |
| GM15 | Spike | 600mm | 0.00 | 0.10 | 20.30 | |
| GM16 | Spike | 600mm | 0.00 | 1.30 | 19.40 | |
| GM17 | Spike | 600mm | 0.00 | 1.60 | 18.60 | |
| GM18 | Spike | 600mm | 0.00 | 2.00 | 18.10 | |
| GM19 | Spike | 600mm | 0.00 | 1.80 | 5.30 | |
| GM20 | Spike | 600mm | 0.00 | 0.80 | 19.20 | |
| GM21 | Spike | 600mm | 0.00 | 1.60 | 18.20 | |
| GM22 | Spike | 600mm | 0.00 | 1.10 | 18.90 | |
| GM23 | Spike | 600mm | 0.00 | 1.50 | 18.20 | |

# LANDFILL GAS MIGRATION MONITORING FORM

| | | |
|---|---|---|
| **Site Name:** Dunmore Landfill Site | **Site Address:** Dunmore, Co. Kilkenny | |
| **Operator:** Kilkenny County Council | **National Grid Reference:** 160572N 249519E | |
| **Site Status:** Active | **Date:** 12/08/09 | **Time:** 15:15 |
| **Instrument Used:** Infra red Gas Analyser - GA 94 | **Date Of Calibration:** Mar '09<br>**Next Calibration Due:** Sep'09 | |
| **Monitoring Personnel:** Alan Ratigan | **Weather:** Dry | **Barometric Pressure (mb):** 1015 |

## RESULTS

| Sample Station Number | Borehole/ Spike/ Other | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | Comments |
|---|---|---|---|---|---|---|
| GM1 | Spike | 600mm | 0.00 | 0.50 | 19.40 | |
| GM2 | Spike | 600mm | 0.00 | **2.40** | 16.80 | |
| GM3 | Spike | 600mm | 0.00 | 0.50 | 18.50 | |
| GM4 | Spike | 600mm | 0.00 | 0.60 | 19.30 | |
| GM5 | Spike | 600mm | 0.00 | 0.70 | 18.40 | |
| GM7 | Spike | 600mm | 0.00 | 0.20 | 20.10 | |
| GM8 | Spike | 600mm | 0.00 | 0.70 | 19.30 | |
| GM9 | Spike | 600mm | 0.00 | 0.90 | 18.10 | |
| GM10 | Spike | 600mm | 0.00 | **1.90** | 16.50 | |
| GM11 | Spike | 600mm | 0.00 | **2.10** | 16.40 | |
| GM12 | Spike | 600mm | 0.00 | **1.60** | 16.30 | |
| GM13 | Spike | 600mm | 0.00 | 0.60 | 18.80 | |
| GM14 | Spike | 600mm | 0.00 | 0.70 | 19.60 | |
| GM15 | Spike | 600mm | 0.00 | 0.90 | 19.10 | |
| GM16 | Spike | 600mm | 0.00 | 0.50 | 19.70 | |
| GM17 | Spike | 600mm | 0.00 | **2.10** | 17.80 | |
| GM18 | Spike | 600mm | 0.00 | 1.30 | 18.80 | |
| GM19 | Spike | 600mm | 0.00 | **1.80** | 8.50 | |
| GM20 | Spike | 600mm | 0.00 | **1.50** | 18.60 | |
| GM21 | Spike | 600mm | 0.00 | **1.80** | 17.20 | |
| GM22 | Spike | 600mm | 0.00 | 1.00 | 19.20 | |
| GM23 | Spike | 600mm | 0.00 | 0.90 | 17.70 | |

# LANDFILL GAS MIGRATION MONITORING FORM

| | | |
|---|---|---|
| **Site Name:** Dunmore Landfill Site | **Site Address:** Dunmore, Co. Kilkenny | |
| **Operator:** Kilkenny County Council | **National Grid Reference:** 160572N 249519E | |
| **Site Status:** Active | **Date:** 01/09/09 | **Time:** 16:13 |
| **Instrument Used:** Infra red Gas Analyser - GA 94 | **Date Of Calibration:** Mar '09<br>**Next Calibration Due:** Sep'09 | |
| **Monitoring Personnel:** Alan Rhatigan | **Weather:** Dry | **Barometric Pressure (mb):** 989 |

## RESULTS

| Sample Station Number | Borehole/ Spike/ Other | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | Comments |
|---|---|---|---|---|---|---|
| GM1 | Spike | 600mm | 0.00 | 0.70 | 19.80 | |
| GM2 | Spike | 600mm | 0.00 | **2.30** | 18.20 | |
| GM3 | Spike | 600mm | 0.00 | 0.60 | 20.00 | |
| GM4 | Spike | 600mm | 0.00 | 0.50 | 19.50 | |
| GM5 | Spike | 600mm | 0.00 | 1.30 | 17.10 | |
| GM7 | Spike | 600mm | 0.00 | 0.00 | 20.50 | |
| GM8 | Spike | 600mm | 0.00 | 0.60 | 19.30 | |
| GM9 | Spike | 600mm | 0.00 | 0.80 | 18.20 | |
| GM10 | Spike | 600mm | 0.00 | **2.50** | 15.40 | |
| GM11 | Spike | 600mm | 0.00 | **2.20** | 16.50 | |
| GM12 | Spike | 600mm | 0.00 | 1.20 | 15.60 | |
| GM13 | Spike | 600mm | 0.00 | 0.10 | 20.40 | |
| GM14 | Spike | 600mm | 0.00 | **1.50** | 18.70 | |
| GM15 | Spike | 600mm | 0.00 | 0.20 | 20.50 | |
| GM16 | Spike | 600mm | 0.00 | 1.30 | 19.40 | |
| GM17 | Spike | 600mm | 0.00 | 1.40 | 18.30 | |
| GM18 | Spike | 600mm | 0.00 | **1.90** | 18.70 | |
| GM19 | Spike | 600mm | 0.00 | 1.20 | 11.70 | |
| GM20 | Spike | 600mm | 0.00 | 1.10 | 19.20 | |
| GM21 | Spike | 600mm | 0.00 | 1.40 | 18.90 | |
| GM22 | Spike | 600mm | 0.00 | 1.10 | 19.60 | |
| GM23 | Spike | 600mm | 0.00 | 0.80 | 19.20 | |

# LANDFILL GAS MIGRATION MONITORING FORM

| | | |
|---|---|---|
| **Site Name:** Dunmore Landfill Site | **Site Address:** Dunmore, Co. Kilkenny | |
| **Operator:** Kilkenny County Council | **National Grid Reference:** 160572N 249519E | |
| **Site Status:** Active | **Date:** 27/10/09 | **Time:** 13:19 |
| **Instrument Used:** Infra red Gas Analyser - GA 94 | **Date Of Calibration:** Mar '09<br>**Next Calibration Due:** Sep'09 | |
| **Monitoring Personnel:** Alan Rhatigan | **Weather:** Dry | **Barometric Pressure (mb):** 1002 |

## RESULTS

| Sample Station Number | Borehole/ Spike/ Other | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | Comments |
|---|---|---|---|---|---|---|
| **GM1** | Spike | 600mm | 0.00 | 0.60 | 19.90 | |
| **GM2** | Spike | 600mm | 0.00 | **2.30** | 17.50 | |
| **GM3** | Spike | 600mm | 0.00 | 0.50 | 20.10 | |
| **GM4** | Spike | 600mm | 0.00 | **1.60** | 18.50 | |
| **GM5** | Spike | 600mm | 0.00 | **1.90** | 15.10 | |
| **GM7** | Spike | 600mm | 0.00 | 0.10 | 20.30 | |
| **GM8** | Spike | 600mm | 0.00 | 0.60 | 20.00 | |
| **GM9** | Spike | 600mm | 0.00 | 1.00 | 19.40 | |
| **GM10** | Spike | 600mm | 0.00 | **2.20** | 17.90 | |
| **GM11** | Spike | 600mm | 0.00 | **1.70** | 15.60 | |
| **GM12** | Spike | 600mm | 0.00 | **2.40** | 12.70 | |
| **GM13** | Spike | 600mm | 0.00 | 0.80 | 18.60 | |
| **GM14** | Spike | 600mm | 0.00 | **2.20** | 17.20 | |
| **GM15** | Spike | 600mm | 0.00 | 0.60 | 20.10 | |
| **GM16** | Spike | 600mm | 0.00 | **1.50** | 18.70 | |
| **GM17** | Spike | 600mm | 0.00 | **2.30** | 17.90 | |
| **GM18** | Spike | 600mm | 0.00 | **2.10** | 18.60 | |
| **GM19** | Spike | 600mm | 0.00 | **2.30** | 5.20 | |
| **GM20** | Spike | 600mm | 0.00 | 0.70 | 19.60 | |
| **GM21** | Spike | 600mm | 0.00 | 0.60 | 19.90 | |
| **GM22** | Spike | 600mm | 0.00 | 1.20 | 17.90 | |
| **GM23** | Spike | 600mm | 0.00 | 1.10 | 19.00 | |

# LANDFILL GAS MIGRATION MONITORING FORM

| | | |
|---|---|---|
| **Site Name:** Dunmore Landfill Site | **Site Address:** Dunmore, Co. Kilkenny | |
| **Operator:** Kilkenny County Council | **National Grid Reference:** 160572N 249519E | |
| **Site Status:** Active | **Date:** 01/10/09 | **Time:** 12:17 |
| **Instrument Used:** Infra red Gas Analyser - GA 94 | **Date Of Calibration:** Mar '09<br>**Next Calibration Due:** Sep'09 | |
| **Monitoring Personnel:** Alan Rhatigan | **Weather:** Dry | **Barometric Pressure (mb):** 1018 |

## RESULTS

| Sample Station Number | Borehole/ Spike/ Other | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | Comments |
|---|---|---|---|---|---|---|
| GM1 | Spike | 600mm | 0.00 | 0.70 | 19.30 | |
| GM2 | Spike | 600mm | 0.00 | **2.50** | 13.20 | |
| GM3 | Spike | 600mm | 0.00 | 0.50 | 18.60 | |
| GM4 | Spike | 600mm | 0.00 | 0.60 | 19.50 | |
| GM5 | Spike | 600mm | 0.00 | 0.80 | 18.80 | |
| GM7 | Spike | 600mm | 0.00 | 0.20 | 20.20 | |
| GM8 | Spike | 600mm | 0.00 | 0.70 | 19.30 | |
| GM9 | Spike | 600mm | 0.00 | 0.90 | 18.20 | |
| GM10 | Spike | 600mm | 0.00 | **2.50** | 17.20 | |
| GM11 | Spike | 600mm | 0.00 | **2.10** | 18.50 | |
| GM12 | Spike | 600mm | 0.00 | 1.10 | 18.00 | |
| GM13 | Spike | 600mm | 0.00 | 0.10 | 20.00 | |
| GM14 | Spike | 600mm | 0.00 | **1.50** | 17.60 | |
| GM15 | Spike | 600mm | 0.00 | 1.20 | 19.00 | |
| GM16 | Spike | 600mm | 0.00 | 0.10 | 20.50 | |
| GM17 | Spike | 600mm | 0.00 | **2.90** | 18.30 | |
| GM18 | Spike | 600mm | 0.00 | **2.40** | 17.40 | |
| GM19 | Spike | 600mm | 0.00 | **2.20** | 17.80 | |
| GM20 | Spike | 600mm | 0.00 | **1.60** | 18.40 | |
| GM21 | Spike | 600mm | 0.00 | **1.60** | 16.70 | |
| GM22 | Spike | 600mm | 0.00 | 0.90 | 19.10 | |
| GM23 | Spike | 600mm | 0.00 | 1.30 | 18.10 | |

# LANDFILL GAS MIGRATION MONITORING FORM

| | | |
|---|---|---|
| **Site Name:** Dunmore Landfill Site | **Site Address:** Dunmore, Co. Kilkenny | |
| **Operator:** Kilkenny County Council | **National Grid Reference:** 160572N 249519E | |
| **Site Status:** Active | **Date:** 02/12/09 | **Time:** 12:57 |
| **Instrument Used:** Infra red Gas Analyser - GA 94 | **Date Of Calibration:** Mar '09<br>**Next Calibration Due:** Sep'09 | |
| **Monitoring Personnel:** Alan Rhatigan | **Weather:** Dry | **Barometric Pressure (mb):** 982 |

## RESULTS

| Sample Station Number | Borehole/ Spike/ Other | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | Comments |
|---|---|---|---|---|---|---|
| **GM1** | Spike | 600mm | 0.00 | 0.70 | 20.50 | |
| **GM2** | Spike | 600mm | 0.00 | **2.40** | 18.70 | |
| **GM3** | Spike | 600mm | 0.00 | 0.60 | 19.70 | |
| **GM4** | Spike | 600mm | 0.00 | 1.40 | 16.90 | |
| **GM5** | Spike | 600mm | 0.00 | 1.40 | 18.50 | |
| **GM7** | Spike | 600mm | 0.00 | 0.20 | 20.40 | |
| **GM8** | Spike | 600mm | 0.00 | 0.40 | 20.40 | |
| **GM9** | Spike | 600mm | 0.00 | 0.80 | 19.40 | |
| **GM10** | Spike | 600mm | 0.00 | **2.30** | 17.20 | |
| **GM11** | Spike | 600mm | 0.00 | **1.70** | 17.70 | |
| **GM12** | Spike | 600mm | 0.00 | **2.10** | 17.50 | |
| **GM13** | Spike | 600mm | 0.00 | 0.60 | 19.90 | |
| **GM14** | Spike | 600mm | 0.00 | **2.40** | 17.10 | |
| **GM15** | Spike | 600mm | 0.00 | 0.50 | 20.30 | |
| **GM16** | Spike | 600mm | 0.00 | **1.60** | 18.30 | |
| **GM17** | Spike | 600mm | 0.00 | **2.60** | 18.50 | |
| **GM18** | Spike | 600mm | 0.00 | **2.10** | 17.90 | |
| **GM19** | Spike | 600mm | 0.00 | **2.10** | 16.80 | |
| **GM20** | Spike | 600mm | 0.00 | 0.60 | 19.70 | |
| **GM21** | Spike | 600mm | 0.00 | 0.60 | 18.90 | |
| **GM22** | Spike | 600mm | 0.00 | 1.30 | 19.00 | |
| **GM23** | Spike | 600mm | 0.00 | 0.80 | 19.00 | |

# LANDFILL GAS MIGRATION MONITORING FORM

| | | |
|---|---|---|
| **Site Name:** Dunmore Landfill Site | **Site Address:** Dunmore, Co. Kilkenny | |
| **Operator:** Kilkenny County Council | **National Grid Reference:** 160572N 249519E | |
| **Site Status:** Active | **Date:** 05-Jan-10 | **Time:** |
| **Instrument Used:** Infra red Gas Analyser - GA 94 | **Date Of Calibration:** Mar '09<br>**Next Calibration Due:** Sep'09 | |
| **Monitoring Personnel:** Alan Rhatigan | **Weather:** Dry | **Barometric Pressure (mb):** 1004 |

## RESULTS

| Sample Station Number | Borehole/ Spike/ Other | Survey Depth | $CH_4$ % v/v | $CO_2$ % v/v | $O_2$ % v/v | Comments |
|---|---|---|---|---|---|---|
| GM1 | Spike | 600mm | 0.00 | 0.60 | 19.90 | |
| GM2 | Spike | 600mm | 0.00 | 2.10 | 18.40 | |
| GM3 | Spike | 600mm | 0.00 | 0.50 | 20.50 | |
| GM4 | Spike | 600mm | 0.00 | 0.60 | 20.20 | |
| GM5 | Spike | 600mm | 0.00 | 0.80 | 20.00 | |
| GM7 | Spike | 600mm | 0.00 | 0.10 | 20.80 | |
| GM8 | Spike | 600mm | 0.00 | 0.70 | 18.40 | |
| GM9 | Spike | 600mm | 0.00 | 0.40 | 20.30 | |
| GM10 | Spike | 600mm | 0.00 | 2.00 | 18.60 | |
| GM11 | Spike | 600mm | 0.00 | 1.70 | 18.40 | |
| GM12 | Spike | 600mm | 0.00 | 0.60 | 20.00 | |
| GM13 | Spike | 600mm | 0.00 | 0.30 | 20.40 | |
| GM14 | Spike | 600mm | 0.00 | 1.20 | 19.30 | |
| GM15 | Spike | 600mm | 0.00 | 0.20 | 19.30 | |
| GM16 | Spike | 600mm | 0.00 | 0.00 | 21.00 | |
| GM17 | Spike | 600mm | 0.00 | 1.80 | 19.30 | |
| GM18 | Spike | 600mm | 0.00 | 2.50 | 17.90 | |
| GM19 | Spike | 600mm | 0.00 | 1.60 | 18.80 | |
| GM20 | Spike | 600mm | 0.00 | 0.60 | 19.80 | |
| GM21 | Spike | 600mm | 0.00 | 1.00 | 19.40 | |
| GM22 | Spike | 600mm | 0.00 | 0.70 | 19.60 | |
| GM23 | Spike | 600mm | 0.00 | 0.90 | 19.10 | |

# Appendix C

Surface, Ground Water Monitoring

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Leachate Monitoring

| GW 3 | 1st 1/4 2004 | 2nd 1/4 2004 | 3rd 1/4 2004 | 4th 1/4 2004 | 1st1/4 2005 | 2nd 1/4 2005 | 3rd 1/4 2005 | 4th 1/4 2005 | 1st 1/4 2006 | 2nd 1/4 2006 | 3rd 1/4 2006 | 4th 1/4 2006 | 1st 1/4 2007 | 2nd 1/4 2007 | 3rd 1/4 2007 | 4th 1/4 2007 | 1st 1/4 2008 | 2nd 1/4 2008 | 3rd 1/4 2008 | 4th 1/4 2008 | 1st 1/4 2009 | 2nd 1/4 2009 | 3rd 1/4 2009 | 4th 1/4 2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PH | 7.3 | 7.3 | 7.3 | | 7.4 | | | | | | | | | | | | | | | | | | | |
| Temperature °C | 11.6 | 12 | 13.2 | | 12.2 | | | | | | | | | | | | | | | | | | | |
| Conductivity uS/CM 20°C | - | - | - | - | - | | | | | | | | | | | | | | | | | | | |
| Conductivity uS/CM 25°C | 755 | 777 | 748 | | 751 | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | |
| Ammonia mg/l N | 0.006 | <0.003 | <0.003 | | <0.003 | o | o | o | o | o | o | o | o | o | o | o | o | o | o | o | o | o | o | |
| Dissolved Oxygen %sat | 73.6 | 71.2 | 75.3 | | 72.5 | | | | | | | | | | | | | | | | | | | |
| Calcium mg/l Ca | 121 | - | - | | | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | |
| Cadmium mg/l Cd | <0.0001 | - | - | | | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | |
| Chromium mg/l Cr | 0.0060 | | | | | m | m | m | m | m | m | m | m | m | m | m | m | m | m | m | m | m | m | |
| Chloride mg/l Cl | 19 | 18 | 18 | | 20 | p | p | p | p | p | p | p | p | p | p | p | p | p | p | p | p | p | p | |
| Copper mg/l Cu | 0.00197 | - | - | | | l | l | l | l | l | l | l | l | l | l | l | l | l | l | l | l | l | l | |
| Iron mg/l Fe | 0.187 | <0.060 | <0.006 | | <60 | e | e | e | e | e | e | e | e | e | e | e | e | e | e | e | e | e | e | |
| Lead Mg/l Pb | <0.0001 | - | - | | | | | | | | | | | | | | | | | | | | | |
| Magnesium mg/l Mg | 10.4 | - | - | | | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | |
| Manganese mg/l Mn | <0.001 | - | - | | | v | v | v | v | v | v | v | v | v | v | v | v | v | v | v | v | v | v | |
| Mercury mg/l Hg | - | - | - | | | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | |
| Nickel mg/l Ni | 0.00184 | - | - | | | i | i | i | i | i | i | i | i | i | i | i | i | i | i | i | i | i | i | |
| Potassium mg/l K | 1.76 | 2.1 | 1.6 | | | l | l | l | l | l | l | l | l | l | l | l | l | l | l | l | l | l | l | |
| Sodium mg/l Na | 9.5 | 9 | 9.1 | | | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | |
| Sulphate mg/l $SO_4$ | 13.3 | | | | | b | b | b | b | b | b | b | b | b | b | b | b | b | b | b | b | b | b | |
| Zinc mg/l Zn | 0.013 | - | - | | | l | l | l | l | l | l | l | l | l | l | l | l | l | l | l | l | l | l | |
| Alkalinity $CaCO_3$ | - | - | - | | | e | e | e | e | e | e | e | e | e | e | e | e | e | e | e | e | e | e | |
| TOC mg/l C | 0.68 | - | 0.42 | | 0 | | | | | | | | | | | | | | | | | | | |
| TON mg/l N | 8.5 | 8.6 | 8.1 | | 8.9 | | | | | | | | | | | | | | | | | | | |
| Nitrate+Nitrite mg/l N | - | - | - | | | | | | | | | | | | | | | | | | | | | |
| Flouride mg/l F | <0.1 | - | - | | | | | | | | | | | | | | | | | | | | | |
| Phosphorous mg/l P | - | - | - | | | | | | | | | | | | | | | | | | | | | |
| Nitrite mg/l N | <0.001 | 0.001 | <0.001 | | <0.001 | | | | | | | | | | | | | | | | | | | |
| Suspended Solids mg/l | - | - | - | | | | | | | | | | | | | | | | | | | | | |
| o-Phosphate mg/l P | <0.006 | <0.006 | <0.006 | | <0.006 | | | | | | | | | | | | | | | | | | | |
| Colour Hazen | - | - | - | | | | | | | | | | | | | | | | | | | | | |
| Total Coliforms/100ml | 0 | 0 | 0 | | 0 | | | | | | | | | | | | | | | | | | | |
| Faecal Coliforms/100ml | - | - | - | | | | | | | | | | | | | | | | | | | | | |
| Aluminium mg/l | <0.05 | - | - | | | | | | | | | | | | | | | | | | | | | |
| e-coli | | | | | 0 | | | | | | | | | | | | | | | | | | | |

| Well 14 | 1st 1/4 2004 | 2nd 1/4 2004 | 3rd 1/4 2004 | 4th 1/4 2004 | 1st 1/4 2005 | 2nd 1/4 2005 | 3rd 1/4 2005 | 4th 1/4 2005 | 1st 1/4 2006 | 2nd 1/4 2006 | 3rd 1/4 2006 | 4th 1/4 2006 | 1st 1/4 2007 | 2nd 1/4 2007 | 3rd 1/4 2007 | 4th 1/4 2007 | 1st 1/4 2008 | 2nd 1/4 2008 | 3rd 1/4 2008 | 4th 1/4 2008 | 1st 1/4 2009 | 2nd 1/4 2009 | 3rd 1/4 2009 | 4th 1/4 2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PH | 7.5 | 7.8 | 7.1 | 7.2 | 7.5 | 7.7 | 7.1 | 7.5 | 7.5 | 7.4 | 7.4 | 7.5 | 7.6 | 7.2 | 7.4 | 7.5 | 7.6 | 7.6 | 7.6 | 7.7 | 7.7 | 7.2 | 7.2 | |
| Temperature $^{o}$C | 9.6 | 9 | 13 | 13.8 | 10.7 | 10.8 | 14.3 | 16.5 | 11 | 11.9 | 16.7 | 16.4 | 9.5 | 14.3 | 14.9 | 13.4 | 10.6 | 13.9 | 14.8 | 9.8 | 10 | 14.1 | 15.5 | |
| Conductivity uS/CM 20 $^{o}$C | - | - | - | | - | - | | | | | | | | | | | | | | | | | | |
| Conductivity uS/CM 25 $^{o}$C | 399 | 406 | 657 | 435 | 414 | 434 | 524 | 585 | 539 | 438 | 567 | 532 | 441 | 679 | 771 | 637 | 508 | 582 | 459 | 436 | 437 | 484 | 513 | |
| Ammonia mg/l N | 0.037 | <0.003 | 0.13 | 0.024 | 0.006 | 0.018 | 0.05 | 0.033 | <0.003 | | 0.082 | 0.022 | 0.024 | 0.012 | 0.023 | 0.019 | 0.017 | 0.23 | 0.02 | 0.14 | 0.5 | 0.06 | 0.26 | |
| Dissolved Oxygen %sat | 82.4 | 63.1 | 29 | 55.4 | 71.6 | 63.3 | 21 | 44.2 | 102.5 | 72 | 46.2 | 67.3 | 78.5 | 37.9 | 58.3 | 61.3 | 74 | 51.1 | 75.6 | 91 | 82.9 | 75 | 65 | |
| Calcium mg/l Ca | 54.3 | - | - | | - | - | 89 | 96.3 | 92 | 69.8 | 90 | 77 | 71 | 110 | 133 | | | 102 | | | | 76.9 | | |
| Cadmium mg/l Cd | <0.0001 | - | - | | - | - | | <.0001 | | <.0001 | | | | <0.005 | <0.005 | | | <0.001 | | | | <0.005 | | |
| Chromium mg/l Cr | 0.0026 | | | | | | | 0.00562 | | <.001 | | | | <0.005 | <0.005 | | | 0.00191 | | | | 0.0056 | | |
| Chloride mg/l Cl | 22 | 22 | 20 | 17 | 16 | 18 | 17 | 18 | 17 | | 26 | 49 | 16 | 24 | 13 | 16 | 17 | 15 | 13 | 14 | 14 | 16 | 10 | |
| Copper mg/l Cu | <0.001 | - | - | | - | - | | 0.01 | | 0.0224 | | | | <0.005 | <0.005 | | | 0.00126 | | | | <0.005 | | |
| Iron mg/l Fe | 0.154 | 0.082 | 0.085 | 2.13 | 0.1 | 0.153 | 0.077 | 0.605 | 0.785 | 0.329 | 0.062 | | | 0.0572 | 0.166 | | | 0.152 | | 0.199 | 0.086 | <0.25 | 0.37 | |
| Lead Mg/l Pb | <0.0001 | - | - | | - | - | | <.001 | | <.001 | | | | <0.005 | <0.005 | | | <0.001 | | | | <0.005 | | |
| Magnesium mg/l Mg | 5.25 | - | - | | - | - | | 6.16 | 6.6 | 5.54 | 5.5 | 4.1 | 6.3 | <1 | 9.43 | | | 7.92 | | | | 13 | | |
| Manganese mg/l Mn | 0.00328 | - | - | | - | - | 6.4 | 45.4 | | 0.0136 | | | | <0.050 | 0.0663 | | | 0.0156 | | | | <0.25 | | |
| Mercury mg/l Hg | - | - | - | | - | - | | | | | | | | <0.0005 | <0.005 | | | <0.0005 | | | | <0.0005 | | |
| Nickel mg/l Ni | <0.001 | - | - | | - | - | | 0.00294 | | 0.00208 | | | | <0.005 | <0.005 | | | 0.00114 | | | | <0.005 | | |
| Potassium mg/l K | 1.53 | <0.3 | 2.2 | 1 | | 2 | 1.8 | 2.11 | 1.7 | 1.33 | 1.7 | 1.5 | 1 | <1 | 1.49 | | | 1.99 | | <0.3 | 1.3 | <5 | 3.7 | |
| Sodium mg/l Na | 9.83 | | 21.7 | 9.1 | | 10.4 | 10.6 | 12 | 11.1 | | 16 | 23 | 10.5 | 19.2 | 14.9 | | | 14.6 | | 6.9 | 7 | 17.2 | 9.3 | |
| Sulphate mg/l $SO_4$ | 11 | 9.6 | | | | | | - | | 9.7 | | | | 73.8 | | | | 50.2 | | | | 17 | | |
| Zinc mg/l Zn | 0.0118 | - | - | | - | - | | 0.0213 | | <.001 | | | | <0.030 | <0.030 | | | 0.0188 | | | | <0.005 | | |
| Alkalinity $CaCO_3$ | - | - | - | | - | 177 | | 272 | | | | | | 226 | | | | | | | | 213 | | |
| TOC mg/l C | 2.7 | - | 2.7 | 5.9 | - | 4.48 | | - | | | | 3.6 | 4.2 | 3.7 | 2.5 | 3.3 | 3.1 | | 5.3 | 3.9 | 2.5 | 2.7 | 5.1 | |
| TON mg/l N | 4.4 | 3.8 | 2.2 | 2.8 | 2.9 | 3.6 | 2.7 | 2.2 | 6.7 | | 5.9 | 4.9 | 4.1 | 5.1 | 3 | 3 | 4.7 | 4 | 3.5 | 3.3 | 2.8 | 3.1 | 2.2 | |
| Nitrate+Nitrite mg/l N | - | - | - | | - | - | | | | | | | | | | | | | | | | | | |
| Flouride mg/l F | 0.14 | - | - | | - | - | | - | | <.1 | | | | 0.16 | | | | <0.10 | | | | 0.08 | | |
| Phosphorous mg/l P | - | - | - | | - | - | | | | | | | | | | | | | | | | | | |
| Nitrite mg/l N | 0.005 | 0.004 | 0.043 | 0.007 | 0.002 | 0.003 | 0.004 | 0.003 | 0.001 | | 0.016 | 0.006 | 0.002 | 0.016 | 0.015 | 0.002 | | 0.006 | 0.002 | | | 0.009 | | |
| Suspended Solids mg/l | - | - | - | | - | - | | | | | | | | | | | | | | | | | | |
| o-Phosphate mg/l P | 0.018 | 0.092 | 0.023 | 0.015 | 0.016 | 0.026 | <0.006 | <0.006 | 0.019 | | <.006 | <0.006 | 0.012 | 0.012 | 0.03 | 0.036 | | 0.04 | | | | 0.13 | | |
| Colour Hazen | - | - | - | | - | - | | | | | | | | | | | | | | | | | | |
| Total Coliforms/100ml | 1986 | 2380 | 12033 | 24192 | >2419 | >2419 | 3448 | 2420 | >2419 | 549 | >2419 | 1986 | >2419 | >2419 | 6867 | 5475 | >2419 | 1986 | >2419 | 1198 | 468 | 6900 | 24000 | |
| Faecal Coliforms/100ml | - | - | - | | - | - | | | | | | | | | | | | | | | | | | |
| Aluminium mg/l | 0.058 | - | - | | - | - | | 0.439 | | 0.22 | | | | <0.025 | <0.025 | | | 0.0322 | | | | <0.25 | | |
| e-coli | | | | | 27 | 147 | 89 | 161 | 649 | 17 | 613 | 108 | 38 | 326 | <10 | 275 | 1203 | 99 | 461 | 74 | 26 | 120 | 4400 | |

| Well 6 | 1st 1/4 2004 | 2nd 1/4 2004 | 3rd 1/4 2004 | 4th 1/4 2004 | 1st 1/4 2005 | 2nd 1/4 2005 | 3rd 1/4 2005 | 4th1/4 2005 | 1st1/4 2006 | 2nd1/4 2006 | 3rd 1/4 2006 | 4th 1/4 2006 | 1st 1/4 2007 | 2nd 1/4 2007 | 3rd 1/4 2007 | 4th 1/4 2007 | 1st 1/4 2008 | 2nd 1/4 2008 | 3rd 1/4 2008 | 4th 1/4 2008 | 1st 1/4 2009 | 2nd 1/4 2009 | 3rd 1/4 2009 | 4th 1/4 2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PH | 7.3 | 7.4 | 7.4 | 7.3 | 7.3 | 7.4 | 7.3 | 7.8 | 7.3 | 7.2 | 7.6 | 7.2 | 7.3 | 7.2 | 7.3 | 7.2 | 7.3 | 7.3 | 7.3 | 7.4 | 7.2 | 7.2 | 7.1 | |
| Temperature $^{o}C$ | 9.8 | 10.6 | 12.9 | 11.9 | 10.9 | 10.5 | 13.1 | 12.3 | 9.7 | 10.7 | 15.3 | 12.9 | 10.8 | 12.2 | 11.4 | 10.6 | 10.4 | 11.9 | 11.8 | 9.8 | 10.8 | 14.1 | 12.3 | |
| Conductivity uS/CM 20 $^{o}C$ | - | - | - | | | - | | | | | | | | | | | | | | | | | | |
| Conductivity uS/CM 25 $^{o}C$ | 721 | 733 | 733 | 737 | 737 | 739 | 730 | 780 | 741 | 749 | 631 | 744 | 769 | 724 | 756 | 748 | 760 | 766 | 750 | 753 | 754 | 743 | 744 | |
| Ammonia mg/l N | 0.033 | <0.003 | 0.013 | 0.004 | <0.003 | 0.023 | <.003 | 0.004 | <.003 | | 0.21 | 0.01 | <0.003 | 0.12 | 0.028 | 0.013 | <0.003 | <0.003 | 0.006 | 0.005 | <0.003 | 0.18 | 0.04 | |
| Dissolved Oxygen %sat | 30.6 | 13 | 35.2 | 18.4 | 14.7 | 16.8 | 30 | 66.7 | 27.4 | 15.3 | 46 | 51.5 | 18.1 | 35.4 | 16.5 | 22 | 25 | 27.1 | 27.5 | 39 | 38 | 40.1 | 34 | |
| Calcium mg/l Ca | 105 | - | - | | | - | 122 | 129 | 129 | 129 | 107 | 130 | 132 | 125 | 121 | | | | | | | 121 | | |
| Cadmium mg/l Cd | <0.0001 | - | - | | | - | | <0.0001 | | <.0001 | | | | <0.005 | <0.005 | | | | | | | <0.005 | | |
| Chromium mg/l Cr | 0.0065 | | | | | | | 0.00531 | | 0.0037 | | | | <0.005 | <0.005 | | | | | | | <0.005 | | |
| Chloride mg/l Cl | 24 | 28 | 24 | 23 | 21 | 23 | 21 | 24 | 16 | | 19 | 22 | 23 | 22 | 23 | 23 | 22 | 22 | 22 | 22 | 21 | 22 | 20 | |
| Copper mg/l Cu | <0.001 | - | - | | | - | | <.0227 | | <.001 | | | | <0.005 | <0.005 | | | | | | | <0.005 | | |
| Iron mg/l Fe | 0.165 | <0.06 | 0.108 | <0.06 | <0.06 | <0.06 | 0.085 | 0.143 | <0.06 | 137 | <.06 | | | 0.05 | 0.119 | | | | | 0.23 | 0.11 | <0.25 | 0.1 | |
| Lead Mg/l Pb | <0.001 | - | - | | | - | | <.001 | | <.001 | | | | <0.005 | <0.005 | | | | | | | <0.005 | | |
| Magnesium mg/l Mg | 11.3 | - | - | | | - | | 11.3 | 13.3 | 12.3 | 10.6 | 11.4 | 13.3 | 1.3 | 11.6 | | | | | | | 17.8 | | |
| Manganese mg/l Mn | <0.001 | - | - | | | - | 12.3 | 0.015 | | 0.0915 | | | | <0.050 | <0.050 | | | | | | | <0.25 | | |
| Mercury mg/l Hg | - | - | - | | | - | | | | | | | | <0.0005 | <0.0005 | | | | | | | <0.0005 | | |
| Nickel mg/l Ni | 0.00181 | - | - | | | - | | 0.00213 | | <.001 | | | | <0.005 | <0.005 | | | | | | | <0.005 | | |
| Potassium mg/l K | 2.39 | 3.1 | 2.6 | 1.1 | | 3 | 2.6 | 2.33 | 2.6 | 2.61 | 2.4 | 2.8 | 2.7 | <1 | 2.7 | | | | | 2.6 | 2.3 | <5 | 4.3 | |
| Sodium mg/l Na | 13.9 | 13.3 | 12.4 | 12.3 | | 13.5 | 12.8 | 10.9 | 12.2 | | 10.5 | 11.1 | 13.1 | 12 | 10.9 | | | | | 9.8 | 8.1 | 18.5 | 12 | |
| Sulphate mg/l $SO_4$ | 16.3 | | | | | | | - | | 9.2 | | | | 19.2 | | | | 31.2 | | | | 21 | | |
| Zinc mg/l Zn | 0.0079 | - | - | | | - | | 0.122 | | <.001 | | | | <0.030 | <0.030 | | | | | | | <0.005 | | |
| Alkalinity $CaCO_3$ | - | - | - | | | 322 | | 306 | | | | | | 297 | | | | 341 | | | | 350 | | |
| TOC mg/l C | 0.46 | - | 0.34 | 0.6 | | 1.56 | - | - | | | | 1.6 | 0.8 | 1.2 | 0.5 | <0.5 | 3 | <0.5 | 1.2 | 1.1 | <0.5 | 1.6 | 1.7 | |
| TON mg/l N | 8.1 | 8.2 | 7.6 | 7.9 | 7.2 | 8.2 | 7.9 | 6.2 | 7.6 | | 7.8 | 8.5 | 8.3 | 9.6 | 9.9 | 9 | 8.8 | 9 | 8.9 | 8.5 | 8.4 | 8.4 | 7.6 | |
| Nitrate+Nitrite mg/l N | - | - | - | | | - | | | | | | | | | | | | | | | | | | |
| Flouride mg/l F | <0.1 | - | - | | | - | | - | | <0.1 | | | | 0.12 | | | | 0.1 | | | | 0.08 | | |
| Phosphorous mg/l P | - | - | - | | | - | | | | | | | | | | | | | | | | | | |
| Nitrite mg/l N | 0.005 | 0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <.001 | | 0.012 | <0.001 | <0.001 | 0.003 | <0.001 | <0.001 | | 0.001 | 0.001 | | | <0.001 | | |
| Suspended Solids mg/l | - | - | - | | | - | | | | | | | | | | | | | | | | | | |
| o-Phosphate mg/l P | <0.006 | 0.05 | <0.006 | <0.006 | <0.006 | 0.02 | <0.006 | <0.006 | 0.027 | | 0.024 | <0.006 | 0.022 | <0.006 | 0.019 | 0.026 | | 0.01 | | | | 0.1 | | |
| Colour Hazen | - | - | - | | | - | | | | | | | | | | | | | | | | | | |
| Total Coliforms/100ml | 1553 | 126 | - | 222 | 387 | 2419 | 47 | >2420 | 12 | 30 | >2419 | 461 | 3 | 866 | 1049 | 34 | 16 | >2419 | 51 | <10 | <5 | 96 | 74 | |
| Faecal Coliforms/100ml | - | - | - | | | - | | | | | | | | | | | | | | | | | | |
| Aluminium mg/l | <0.050 | - | - | | | - | | <0.05 | | <.050 | | | | <0.025 | <0.025 | | | | | | | <0.25 | | |
| e-coli | | | | | 0 | 1 | 0 | 517 | 0 | 0 | 0 | 0 | 0 | 0 | <5 | 0 | 1 | 0 | 10 | <10 | <5 | <10 | 31 | |

| Well 3 | 1st 1/4 2004 | 2nd 1/4 2004 | 3rd 1/4 2004 | 4th 1/4 2004 | 1st 1/4 2005 | 2nd 1/4 2005 | 3rd 1/4 2005 | 4th 1/4 2005 | 1st 1/4 2006 | 2nd 1/4 2006 | 3rd 1/4 2006 | 4th 1/4 2006 | 1st 1/4 2007 | 2nd 1/4 2007 | 3rd 1/4 2007 | 4th 1/4 2007 | 1st 1/4 2008 | 2nd 1/4 2008 | 3rd 1/4 2008 | 4th 1/4 2008 | 1st 1/4 2009 | 2nd 1/4 2009 | 3rd 1/4 2009 | 4th 1/4 2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PH | 7.4 | 7.5 | 7.4 | | 7.5 | 7.5 | 7.3 | 7.6 | | | 7.5 | 7.4 | 7.4 | 7.3 | 7.5 | 7.3 | 7.5 | 7.3 | 7.5 | | 7.3 | 7.3 | 7.1 | |
| Temperature $^{o}$C | 10.2 | 9.4 | 13.8 | - | 8.2 | 9.2 | 14.3 | 7.2 | | | 16.3 | 12.3 | 7.1 | 14.5 | 12.7 | 10.5 | 7.4 | 12.1 | 12.2 | | 9.4 | 14.7 | 11.8 | |
| Conductivity uS/CM 20 $^{o}$C | - | - | - | - | - | - | | | | | | | | | | | | | | | | | | |
| Conductivity uS/CM 25 $^{o}$C | 603 | 590 | 630 | | 590 | 620 | 648 | 599 | | | 656 | 644 | 592 | 637 | 648 | 625 | 589 | 653 | 596 | | 610 | 653 | 663 | |
| Ammonia mg/l N | <0.003 | <0.003 | <0.003 | - | 0.009 | <0.003 | 0.22 | <0.003 | | | 0.021 | 0.01 | 0.013 | <0.003 | 0.013 | 0.02 | 0.005 | <0.003 | 0.003 | | <0.003 | <0.01 | <0.01 | |
| Dissolved Oxygen %sat | 12.4 | 39.1 | 71 | - | 36 | 38.4 | 71.6 | 103.1 | | | 50.5 | | | 61.3 | 82.4 | 58 | 36.7 | 67.8 | 43.7 | | 50 | 71 | 71 | |
| Calcium mg/l Ca | 84.4 | - | - | - | - | - | 109 | 100 | | | 113 | 111 | 91 | 102 | 106 | | | | | | | 112 | | |
| Cadmium mg/l Cd | 0.0050 | - | - | - | - | - | | | | | | | | <0.005 | <0.005 | | | | | | | <0.005 | | |
| Chromium mg/l Cr | 0.0050 | | | | | | | | | | | | | <0.005 | <0.005 | | | | | | | 0.00559 | | |
| Chloride mg/l Cl | 23 | 23 | 25 | | 22 | 25 | 23 | 21 | | | 25 | 25 | 23 | 22 | 23 | 19 | 22 | 23 | 23 | | 24 | 23 | 23 | |
| Copper mg/l Cu | 0.0104 | - | - | - | - | - | | | | | | | | 0.0127 | 0.0116 | | | | | | | 0.00754 | | |
| Iron mg/l Fe | 0.156 | <0.06 | <0.06 | - | <0.06 | 0.089 | <0.06 | 0.156 | | | <.06 | | | 0.0986 | 0.113 | | | | | | 0.09 | <0.25 | | |
| Lead Mg/l Pb | <0.001 | - | - | - | - | - | | | | | | | | <0.005 | <0.005 | | | | | | | <0.005 | | |
| Magnesium mg/l Mg | 12.7 | - | - | - | - | - | 8.4 | 12.1 | | | 7.8 | 8 | 15.5 | <1 | 8.59 | | | | | | | 15 | | |
| Manganese mg/l Mn | 0.00388 | - | - | - | - | - | | | | | | | | <0.050 | <0.050 | | | | | | | <0.25 | | |
| Mercury mg/l Hg | - | - | - | - | - | - | | | | | | | | <0.0005 | <0.0005 | | | | | | | <0.0005 | | |
| Nickel mg/l Ni | <0.001 | - | - | - | - | - | | | | | | | | <0.005 | <0.005 | | | | | | | <0.005 | | |
| Potassium mg/l K | 1.11 | 1.8 | 0.8 | | | 0.4 | 0.8 | 1 | | | 0.9 | 1 | 1.3 | <1 | <1.0 | | | | | | 1.4 | <5 | | |
| Sodium mg/l Na | 10.7 | 10.1 | 11.4 | | | 12.1 | 11.9 | 11.2 | | | 11.8 | 12.3 | 11 | 12 | 12 | | | | | | 8.7 | 19.8 | | |
| Sulphate mg/l $SO_4$ | 18.9 | | | | | | | | | | | | | 22 | | | | 33.4 | | | | 25 | | |
| Zinc mg/l Zn | 0.126 | - | - | - | - | - | | | | | | | | 0.227 | 0.113 | | | | | | | 0.0594 | | |
| Alkalinity $CaCO_3$ | - | - | - | - | - | 271 | | | | | | | | 231 | | | | 252 | | | | 261 | | |
| TOC mg/l C | 0.33 | - | 0.56 | - | - | 1.24 | | | | | | 1 | 0.7 | 0.7 | 1.1 | 0.6 | 1.-0 | 1 | 0.9 | | <0.5 | 1.6 | 2.4 | |
| TON mg/l N | 2.7 | 1.5 | 7.8 | - | 2.1 | 5.3 | 9.2 | 3.7 | | | 9.7 | 8.7 | 2.5 | 9.8 | 10 | 7.5 | 2.8 | 9.4 | 2.9 | | 4.1 | 9.3 | 7.2 | |
| Nitrate+Nitrite mg/l N | - | - | - | - | - | - | | | | | | | | | | | | | | | | | | |
| Flouride mg/l F | <0.0001 | - | - | - | - | - | | | | | | | | 0.12 | | | | <0.10 | | | | 0.1 | | |
| Phosphorous mg/l P | - | - | - | - | - | - | | | | | | | | | | | | | | | | | | |
| Nitrite mg/l N | <0.001 | <0.001 | <0.001 | | <0.001 | <0.001 | <0.001 | <0.001 | | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | | <0.001 | <0.001 | | | <0.002 | | |
| Suspended Solids mg/l | - | - | - | - | - | - | | | | | | | | | | | | | | | | | | |
| o-Phosphate mg/l P | <0.006 | <0.006 | <0.006 | - | <0.006 | <0.006 | <0.006 | 0.0041 | | | <0.006 | <0.006 | <0.006 | <0.006 | <0.006 | 0.012 | | <0.006 | | | | 0.07 | | |
| Colour Hazen | - | - | - | - | - | - | | | | | | | | | | | | | | | | | | |
| Total Coliforms/100ml | 222 | 35 | - | - | 102 | 173 | 2419 | 249 | | | 167 | 57 | 96 | 501 | 455 | 29 | 38 | 308 | 613 | | 10 | 20 | 87 | |
| Faecal Coliforms/100ml | - | - | - | - | - | - | | | | | | | | | | | | | | | | | | |
| Aluminium mg/l | <0.050 | - | - | - | - | - | | | | | | | | <0.025 | <0.025 | | | | | | | <0.25 | | |
| e-coli | | | | | 0 | 1 | 0 | 0 | | | 19 | 3 | 1 | 0 | <5 | 0 | 0 | 1 | 0 | | <5 | <10 | 3 | |

N o S a m p l e A v a i l a b l e

| MW 1 | 1st 1/4 2004 | 2nd 1/4 2004 | 3rd 1/4 2004 | 4th 1/4 2004 | 1st 1/4 2005 | 2nd 1/4 2005 | 3rd 1/4 2005 | 4th 1/4 2005 | 1st 1/4 2006 | 2nd 1/4 2006 | 3rd 1/4 2006 | 4th 1/4 2006 | 1st 1/4 2007 | 2nd 1/4 2007 | 3rd 1/4 2007 | 4th 1/4 2007 | 1st 1/4 2008 | 2nd 1/4 2008 | 3rd 1/4 2008 | 4th 1/4 2008 | 1st 1/4 2009 | 2nd 1/4 2009 | 3rd 1/4 2009 | 4th 1/4 2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PH | 7.2 | 7.3 | 7.2 | 7.2 | 7.3 | 7.3 | 7 | 7.5 | 7.2 | 7.1 | 7.3 | 7.2 | 7.2 | 7.1 | 7.3 | 7.2 | 7.2 | 7.2 | 7.2 | 7.3 | 7.1 | 7.2 | 7.2 | |
| Temperature $^{o}$C | 10.9 | 11.6 | 12.9 | 11.1 | 11.3 | 11.2 | 12.4 | 11.5 | 10.7 | 11.6 | 14.1 | 11.9 | 10.8 | 12.2 | 11.8 | 11.6 | 10.9 | 12.1 | 11.7 | 10.3 | 11.5 | 13.4 | 11.5 | |
| Conductivity uS/CM 20 $^{o}$C | - | - | - | | | | | | | | | | | | | | | | | | | | | |
| Conductivity uS/CM 25 $^{o}$C | 798 | 796 | 823 | 776 | 797 | 803 | 776 | 776 | 788 | 799 | 789 | 768 | 808 | 807 | 759 | 743 | 760 | 793 | 748 | 755 | 758 | 764 | 742 | |
| Ammonia mg/l N | 0.016 | 0.29 | 0.019 | 0.044 | 0.041 | <0.003 | <0.003 | 0.004 | 0.01 | | 0.042 | 0.014 | <0.003 | 0.014 | 0.058 | 0.015 | 0.008 | 0.007 | 0.004 | 0.011 | 0.003 | 0.064 | 0.1 | |
| Dissolved Oxygen %sat | 32.7 | 25.9 | 42.3 | 42.6 | 53.8 | 39.2 | 38 | 35.9 | 54.9 | 53.3 | 55.6 | 50.3 | 47 | 52.2 | 53.6 | 54.8 | 49 | 59.1 | 53 | 60 | 62 | 68 | 61 | |
| Calcium mg/l Ca | 126 | - | - | | | | 135 | 128 | 143 | 139 | 142 | 137 | 146 | 147 | 128 | | | | | | | 131 | | |
| Cadmium mg/l Cd | <0.0001 | - | - | | | | | <.0001 | | 0.0001 | | | | <0.005 | <0.005 | | | | | | | <0.005 | | |
| Chromium mg/l Cr | 0.0066 | | | | | | | <.00643 | | 0.00373 | | | | <0.005 | <0.005 | | | | | | | 0.0064 | | |
| Chloride mg/l Cl | 22 | 24 | 24 | 22 | 23 | 23 | 18 | 22 | 21 | | 22 | 22 | 21 | 22 | 23 | 24 | 21 | 23 | 21 | 21 | 21 | 23 | 21 | |
| Copper mg/l Cu | <0.001 | - | - | | | | | <.0107 | | 0.001 | | | | <0.005 | <0.005 | | | | | | | <0.005 | | |
| Iron mg/l Fe | 0.42 | 0.32 | 1.16 | 0.326 | 0.754 | 0.07 | 0.106 | 0.143 | 0.183 | 0.141 | <.06 | | | 0.0637 | 0.125 | | | | | 0.175 | 0.089 | <0.25 | 0.1 | |
| Lead Mg/l Pb | <0.001 | - | - | | | | | <0.001 | | <.001 | | | | <0.005 | <0.005 | | | | | | | <0.005 | | |
| Magnesium mg/l Mg | 12 | - | - | | | | | 12.3 | 13 | 12.1 | 11.4 | 11.3 | 12.7 | 1.4 | 11.6 | | | | | | | 19 | | |
| Manganese mg/l Mn | 0.0127 | - | - | | | | | 0.00233 | | <.001 | | | | <0.050 | <0.050 | | | | | | | <0.25 | | |
| Mercury mg/l Hg | - | - | - | | | | | | | | | | | <0.0005 | <0.0005 | | | | | | | <0.0005 | | |
| Nickel mg/l Ni | 0.00268 | - | - | | | | | <.001 | | <0.001 | | | | <0.005 | <0.005 | | | | | | | <0.005 | | |
| Potassium mg/l K | 1.74 | 2 | 1.6 | <0.3 | | 2.2 | 1.4 | 1.4 | 1.3 | 1.23 | 1.4 | 1.2 | 1.1 | <1 | 1.06 | | | | | 1.2 | 1.1 | <5 | 2.8 | |
| Sodium mg/l Na | 11.8 | 11.4 | 12.7 | 11.4 | | 12.3 | 11.6 | 11.2 | 11.5 | | 11.1 | 11.2 | 11 | 12.6 | 10.7 | | | | | 9.9 | 7.7 | 19.7 | 11 | |
| Sulphate mg/l $SO_4$ | 14 | | | | | | | 13.8 | | 11.7 | | | | 15.8 | | | | 30.6 | | | | 20 | | |
| Zinc mg/l Zn | 0.00748 | - | - | | | | | 0.0206 | | <.001 | | | | <0.030 | <0.030 | | | | | | | <0.005 | | |
| Alkalinity $CaCO_3$ | - | - | - | | | 364 | 343 | 343 | | | | | | 239 | | | | 364 | | | | 363 | | |
| TOC mg/l C | 0.6 | - | 0.61 | 0.84 | - | 1.22 | 0.6 | | | | | 1.2 | 1.3 | 1 | <0.5 | <0.5 | 1.1 | 0.9 | 0.9 | 1 | <0.5 | 1.6 | 2.2 | |
| TON mg/l N | 8.1 | 8 | 7.6 | 7.7 | 7.5 | 8 | 6.8 | 7.5 | 7.8 | | 12 | 8.1 | 8.5 | 10 | 9.3 | 8.3 | 7.7 | 8.4 | 7.9 | 7.1 | 7.1 | 7.1 | 6.6 | |
| Nitrate+Nitrite mg/l N | - | - | - | | | | | | | | | | | | | | | | | | | | | |
| Flouride mg/l F | <0.0001 | - | - | | | | | <.1 | | <0.1 | | | | 0.1 | | | | <0.1 | | | | <0.05 | | |
| Phosphorous mg/l P | - | - | - | | | | | | | | | | | | | | | | | | | | | |
| Nitrite mg/l N | <0.001 | <0.001 | <0.001 | 0.003 | <0.001 | <0.001 | <0.001 | <0.001 | <.001 | | <0.001 | <0.001 | <0.001 | <0.001 | 0.001 | 0.005 | | <0.001 | <0.001 | | | <0.001 | | |
| Suspended Solids mg/l | - | - | - | | | | | | | | | | | | | | | | | | | | | |
| o-Phosphate mg/l P | <0.006 | <0.006 | <0.006 | <0.006 | 0.007 | <0.006 | <0.006 | <0.006 | 0.062 | | <.006 | <0.006 | <0.006 | <0.006 | 0.12 | 0.31 | | 0.006 | | | | 0.17 | | |
| Colour Hazen | - | - | - | | | | | | | | | | | | | | | | | | | | | |
| Total Coliforms/100ml | 70 | 80 | 70 | 0 | 1046 | 51 | 99 | 816 | 1203 | 659 | >2419 | 225 | 2419 | 79 | 2359 | 1533 | 1 | 115 | >2419 | 2247 | 21 | 41 | 31 | |
| Faecal Coliforms/100ml | - | - | - | | | | | | | | | | | | | | | | | | | | | |
| Aluminium mg/l | 0.0938 | - | - | | | | | 0.005 | | 0.005 | | | | <0.025 | <0.025 | | | | | | | <0.25 | | |
| e-coli | | | | | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | <10 | <10 | 0 | 0 | 0 | <10 | <5 | <10 | <10 | |

| GW 4 | 1st 1/4 2004 | 2nd 1/4 2004 | 3rd 1/4 2004 | 4th 1/4 2004 | 1st 1/4 2005 | 2nd 1/4 2005 | 3rd 1/4 2005 | 4th 1/4 2005 | 1st 1/4 2006 | 2nd 1/4 2006 | 3rd 1/4 2006 | 4th 1/4 2006 | 1st 1/4 2007 | 2nd 1/4 2007 | 3rd 1/4 2007 | 4th 1/4 2007 | 1st 1/4 2008 | 2nd 1/4 2008 | 3rd 1/4 2008 | 4th 1/4 2008 | 1st 1/4 2009 | 2nd 1/4 2009 | 3rd 1/4 2009 | 4th 1/4 2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PH | 7.3 | 7.4 | 7.3 | 7.3 | 7.4 | 7.3 | 7 | 7.3 | 7.3 | 7.2 | 7.5 | 7.2 | 7.4 | 7.2 | 7.3 | 7.2 | 7.2 | 7.3 | 7.3 | 7.2 | 7.2 | 7.2 | 7.1 | |
| Temperature $^{o}C$ | 10.9 | 10.9 | 11.9 | 11.7 | 11.6 | 11.3 | 12.4 | 12.3 | 11.6 | 11.8 | 13.1 | 13 | 11.4 | 13.1 | 12.4 | 12.4 | 12 | 13 | 12.6 | 12.4 | 12.9 | 13.2 | 12.8 | |
| Conductivity uS/CM 20 $^{o}C$ | - | - | - | | | | | | | | | | | | | | | | | | | | | |
| Conductivity uS/CM 25 $^{o}C$ | 701 | 643 | 702 | 751 | 677 | 734 | 737 | 766 | 694 | 638 | 643 | 748 | 688 | 720 | 695 | 698 | 712 | 731 | 701 | 699 | 717 | 707 | 711 | |
| Ammonia mg/l N | <0.003 | <0.003 | 0.017 | 0.009 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | | 0.032 | 0.021 | 0.003 | 0.006 | 0.013 | 0.063 | 0.008 | 0.51 | 0.004 | 0.04 | <0.003 | 0.12 | 0.06 | |
| Dissolved Oxygen %sat | 44.6 | 63 | 59.5 | 56.1 | 46.9 | 48.9 | 54.5 | 59.4 | 65.8 | 62.2 | 61.2 | 64.5 | 61.2 | 62.9 | 56.8 | 51.6 | 63.4 | 62.5 | 56.5 | 61 | 67 | 64 | 62 | |
| Calcium mg/l Ca | 110 | - | - | | | | 113 | 127 | 124 | 110 | 113 | 135 | 120 | | 119 | | | 139 | | | | 122 | | |
| Cadmium mg/l Cd | <0.0001 | - | - | | | | | <01 | | <.1 | | | | | <0.005 | | | <0.001 | | | | <0.005 | | |
| Chromium mg/l Cr | 0.0643 | | | | | | | 0.0107 | | 0.00223 | | | | | <0.005 | | | 0.00221 | | | | 0.0055 | | |
| Chloride mg/l Cl | 20 | 21 | 21 | 20 | 21 | 22 | 20 | 22 | 20 | | 22 | 23 | 22 | 22 | 23 | 22 | 20 | 21 | 22 | 19 | 22 | 22 | 22 | |
| Copper mg/l Cu | <0.001 | - | - | | | | | 0.00311 | | <.001 | | | | | <0.005 | | | 0.00193 | | | | <0.005 | | |
| Iron mg/l Fe | 0.235 | 0.43 | 0.494 | 0.845 | 0.599 | 0.875 | 0.321 | 0.266 | 0.139 | 0.203 | 0.06 | | | | 0.152 | | | 0.184 | | 0.116 | 0.1 | <0.25 | 0.11 | |
| Lead Mg/l Pb | <0.001 | - | - | | | | | <.001 | | <.001 | | | | | <0.005 | | | <0.001 | | | | <0.005 | | |
| Magnesium mg/l Mg | 8.72 | - | - | | | | 9 | 8.48 | 9.3 | 7.8 | 7 | 9.8 | 8.6 | | 8.24 | | | 8.99 | | | | 14.8 | | |
| Manganese mg/l Mn | 0.00965 | - | - | | | | | 0.018 | | 0.0154 | | | | | <0.050 | | | <0.01 | | | | <0.25 | | |
| Mercury mg/l Hg | - | - | - | | | | | | | | | | | | <0.0005 | | | <00005 | | | | <0.0005 | | |
| Nickel mg/l Ni | 0.00204 | - | - | | | | | 0.00213 | | 0.001 | | | | | <0.005 | | | 0.00122 | | | | <0.005 | | |
| Potassium mg/l K | 1.75 | 2.4 | 1.9 | 2.7 | | 4.3 | 2.2 | 1.99 | 2 | 1.92 | 1.9 | 2.1 | 2 | | <5.0 | | | 3.24 | | <0.3 | 2.1 | 4.52 | 3.9 | |
| Sodium mg/l Na | 10.9 | 9.3 | 10.1 | 10.3 | | 11.2 | 11.5 | 7.3 | 10.5 | | 9.8 | 10 | 10.8 | | 10.1 | | | 13.8 | | 17.5 | 8.4 | 18.8 | 11 | |
| Sulphate mg/l $SO_4$ | 16.7 | | | | | | | 14.2 | | 12.3 | | | | 18.5 | | | | 35.3 | | | | 23 | | |
| Zinc mg/l Zn | 0.00754 | - | - | | | | | 0.0172 | | 0.101 | | | | | <0.030 | | | 0.0154 | | | | <0.005 | | |
| Alkalinity $CaCO_3$ | - | - | - | | | 317 | | 324 | | 241 | | | | 279 | | | | | | | | 296 | | |
| TOC mg/l C | 0.75 | - | 0.72 | 0.69 | - | 1.89 | <0.05 | <0.5 | | | | 1.2 | 1.1 | 1 | 0.7 | <0.5 | 1.2 | | 0.9 | 1.2 | <0.5 | 1.7 | 2.4 | |
| TON mg/l N | 8.3 | 7.6 | 8.8 | 10 | 7.6 | 10 | 9.5 | 10 | 9.5 | | 10 | 10 | 12 | 14 | 12 | 11 | 9.9 | 10 | 9.7 | 9.5 | 11 | 11 | 9.9 | |
| Nitrate+Nitrite mg/l N | - | - | - | | | | | | | | | | | | | | | | | | | | | |
| Flouride mg/l F | <0.1 | - | - | | | | | <0.1 | | <0.1 | | | | 0.13 | | | | <0.10 | | | | 0.07 | | |
| Phosphorous mg/l P | - | - | - | | | | | | | | | | | | | | | | | | | | | |
| Nitrite mg/l N | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | | 0.007 | <0.001 | | | <0.001 | | |
| Suspended Solids mg/l | - | - | - | | | | | | | | | | | | | | | | | | | | | |
| o-Phosphate mg/l P | <0.006 | <0.006 | <0.006 | <0.006 | <0.01 | <0.006 | <0.006 | <0.006 | 0.056 | | <0.006 | <0.006 | <0.006 | <0.006 | 0.025 | 0.29 | | <0.006 | | | | 0.4 | | |
| Colour Hazen | - | - | - | | | | | | | | | | | | | | | | | | | | | |
| Total Coliforms/100ml | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | <10 | 0 | 0 | 0 | <5 | <5 | 0 | 0 | 0 | <10 | <5 | <5 | <10 | |
| Faecal Coliforms/100ml | - | - | - | | | | | | | | | | | | | | | | | | | | | |
| Aluminium mg/l | <0.05 | - | - | | | | | 98.4 | | 0.0691 | | | | | <0.025 | | | <0.005 | | | | <0.25 | | |
| e-coli | | | | | 0 | 0 | 0 | 0 | 0 | 0 | <10 | 0 | 0 | 0 | <5 | <5 | 0 | 0 | 0 | <10 | <5 | <5 | <10 | |

| Well 15 | 1st 1/4 2004 | 2nd 1/4 2004 | 3rd 1/4 2004 | 4th 1/4 2004 | 1st 1/4 2005 | 2nd 1/4 2005 | 3rd 1/4 2005 | 4th 1/4 2005 | 1st 1/4 2006 | 2nd 1/4 2006 | 3rd 1/4 2006 | 4th 1/4 2006 | 1st 1/4 2007 | 2nd 1/4 2007 | 3rd 1/4 2007 | 4th 1/4 2007 | 1st 1/4 2008 | 2nd 1/4 2008 | 3rd 1/4 2008 | 4th 1/4 2008 | 1st 1/4 2009 | 2nd 1/4 2009 | 3rd 1/4 2009 | 4th 1/4 2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PH | 7.3 | 7.3 | 7.5 | 7.2 | 7.1 | 7.3 | 7.2 | 7.2 | 7.2 | 7.2 | 7.3 | 7.2 | 7.2 | 7.1 | 7.3 | 7.5 | 7.2 | 7.2 | 7.2 | 7.3 | 7.2 | | 7.1 | |
| Temperature $^{o}$C | 9.2 | 9.4 | 13.3 | 13.6 | 10.1 | 9.7 | 13.4 | 13.4 | 9.2 | 9.5 | 14.3 | 14.5 | 9 | 12.8 | 13.4 | 11.4 | 8.5 | 12.1 | 13.7 | 8.5 | 8.7 | 13.6 | 13.5 | |
| Conductivity uS/CM 20 $^{o}$C | - | - | - | | - | - | | | | | | | | | | | | | | | | | | |
| Conductivity uS/CM 25 $^{o}$C | 739 | 726 | 725 | 761 | 739 | 727 | 744 | 742 | 721 | 730 | 734 | 737 | 705 | 721 | 714 | 637 | 721 | 734 | 732 | 728 | 726 | 713 | 711 | |
| Ammonia mg/l N | 0.007 | 0.5 | 0.034 | 0.003 | 0.005 | <0.003 | 0.75 | <0.003 | 0.087 | | 0.032 | 0.008 | 0.005 | 0.036 | 0.075 | 0.024 | 1.2 | 0.009 | <0.003 | 0.017 | <0.003 | 1 | 0.04 | |
| Dissolved Oxygen %sat | 34.6 | 23.2 | 32.2 | 29.7 | 16.3 | 16.9 | 31 | 25.1 | 21 | 31.4 | 25.9 | 47 | 23.1 | 20.1 | 16.3 | 15.2 | 22.5 | 16.9 | 24.1 | 34 | 34 | 32 | 24 | |
| Calcium mg/l Ca | 113 | - | - | | - | - | 130 | 122 | 130 | 129 | 136 | 131 | 126 | 116 | 121 | | | | | | | 120 | | |
| Cadmium mg/l Cd | <0.0001 | - | - | | - | - | | <0.001 | | <.0001 | | | | <0.005 | <0.005 | | | | | | | <0.005 | | |
| Chromium mg/l Cr | 0.0049 | | | | | | | 0.00604 | | 0.00406 | | | | <0.005 | <0.005 | | | | | | | 0.006 | | |
| Chloride mg/l Cl | 25 | 26 | 22 | 24 | 21 | 21 | 21 | 27 | 19 | | 22 | 23 | 21 | 22 | 22 | 21 | 25 | 22 | 23 | 23 | 22 | 21 | 20 | |
| Copper mg/l Cu | <0.001 | - | - | | - | - | | 0.00773 | | <.001 | | | | <0.005 | <0.005 | | | | | | | <0.005 | | |
| Iron mg/l Fe | 0.453 | 0.333 | 0.807 | 0.458 | 0.278 | 0.466 | 1.24 | 0.502 | 0.526 | 0.479 | <.06 | | | 0.14 | 0.158 | | | | | 0.382 | 0.25 | <0.25 | 0.22 | |
| Lead Mg/l Pb | <0.001 | - | - | | - | - | | <0.001 | | <.001 | | | | <0.005 | <0.005 | | | | | | | <0.005 | | |
| Magnesium mg/l Mg | 10.7 | - | - | | - | - | 11.2 | 11.5 | 11.6 | 11 | 10.8 | 10.7 | 10.9 | 1 | 9.98 | | | | | | | 16.5 | | |
| Manganese mg/l Mn | 0.0475 | - | - | | - | - | | 0.297 | | 0.151 | | | | 0.101 | 0.0813 | | | | | | | <0.25 | | |
| Mercury mg/l Hg | - | - | - | | - | - | | | | | | | | <0.0005 | <0.0005 | | | | | | | <0.0005 | | |
| Nickel mg/l Ni | 0.00341 | - | - | | - | - | | 0.00253 | | 2.68 | | | | <0.005 | <0.005 | | | | | | | <0.005 | | |
| Potassium mg/l K | 1.59 | 2.2 | 2 | | | 2.2 | 2.1 | 2.16 | 1.8 | 1.73 | 2 | 2.1 | 1.7 | <1 | 1.95 | | | | | 1.8 | 1.8 | <5 | 3.8 | |
| Sodium mg/l Na | 10.6 | 9.6 | 10.5 | | | 10.5 | 10.7 | 10.1 | 10 | | 10.4 | 10.8 | 9.9 | 9 | 9.08 | | | | | 7.9 | 7.5 | 17.4 | 11 | |
| Sulphate mg/l $SO_4$ | 0.0264 | | | | | | | 19.3 | | 14.6 | | | | 16.7 | | | | 26.8 | | | | 19 | | |
| Zinc mg/l Zn | 0.00697 | - | - | | - | - | | 0.0216 | | 0.00653 | | | | <0.030 | <0.030 | | | | | | | <0.005 | | |
| Alkalinity $CaCO_3$ | - | - | - | | - | 330 | | 324 | | | | | | | | | | 323 | | | | 337 | | |
| TOC mg/l C | 0.46 | - | 0.98 | 0.67 | - | 1.58 | | <.5 | | | | 1.8 | 1.7 | <0.5 | 0.8 | <0.5 | 1.4 | 0.6 | 2.1 | 1.1 | 0.5 | 1.6 | | |
| TON mg/l N | 9.3 | 7 | 6 | 6.5 | 5 | 5.6 | 6.9 | 6.7 | 5.5 | | 6 | 6.5 | 5.6 | 7.5 | 7.8 | 6.1 | 6.5 | 7.5 | 6.8 | 7 | 6.8 | 6.5 | 5.5 | |
| Nitrate+Nitrite mg/l N | - | - | - | | - | - | | | | | | | | | | | | | | | | | | |
| Flouride mg/l F | <0.0001 | - | - | | - | - | | <0.1 | | <.1 | | | | 0.13 | | | | <0.10 | | | | 0.09 | | |
| Phosphorous mg/l P | - | - | - | | - | - | | | | | | | | | | | | | | | | | | |
| Nitrite mg/l N | <0.001 | <0.001 | <0.001 | <0.001 | 0.002 | 0.001 | <0.001 | <0.001 | <.001 | | <0.001 | <0.001 | <0.001 | | 0.006 | 0.001 | | 0.001 | 0.007 | | | 0.005 | | |
| Suspended Solids mg/l | - | - | - | | - | - | | | | | | | | | | | | | | | | | | |
| o-Phosphate mg/l P | <0.006 | 0.018 | <0.006 | <0.006 | 0.011 | <0.006 | <0.006 | <0.006 | <.009 | | <0.006 | <0.006 | <0.006 | 0.016 | 0.019 | 0.035 | | 0.006 | | | | 0.11 | | |
| Colour Hazen | - | - | - | | - | - | | | | | | | | | | | | | | | | | | |
| Total Coliforms/100ml | 2 | 13 | 91 | 5 | 548 | 1414 | 20 | 11 | 86 | 93 | 8664 | 727 | 1733 | 10 | 1266 | 66 | 435 | 22 | 2419 | 295 | 98 | 340 | 180 | |
| Faecal Coliforms/100ml | - | - | - | | - | - | | | | | | | | | | | | | | | | | | |
| Aluminium mg/l | 0.105 | - | - | | - | - | | 0.16 | | 0.138 | | | | <0.025 | <0.025 | | | | | | | <0.25 | | |
| e-coli | | | | | 75 | 225 | 9 | 0 | 4 | 14 | 52 | 0 | 46 | 0 | 265 | 26 | 23 | 3 | 345 | 74 | 41 | 120 | 74 | |

| Manhole 3 | 3rd 1/4 2006 | 4th 1/4 2006 | 1st 1/4 2007 | 2nd 1/4 2007 | 3rd 1/4 2007 | 4th 1/4 2007 | 1st 1/4 2008 | 2nd 1/4 2008 | 3rd 1/4 2008 | 4th 1/4 2008 | 1st 1/4 2009 | 2nd 1/4 2009 | 3rd 1/4 2009 | 4th 1/4 2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PH | 7.3 | 7.6 | 7.2 | 7.3 | 7.5 | 7 | 7.3 | 7.2 | 7.4 | 7.1 | 7.3 | 7.3 | 7.2 | 7.1 |
| Temperature oC | 17 | 17 | 11 | 15 | 15 | 12 | 10 | 14 | 16 | 13.5 | 11 | 15.7 | 16.2 | 11.5 |
| Conductivity uS/CM 20oC | | | | | | | | | | | | | | |
| Conductivity uS/CM 25oC | 14160 | 4450 | 5900 | 10890 | 4960 | 4110 | 16490 | 5710 | 2330 | 6690 | | 3160 | 93200 | 3550 |
| C.O.D. | 890 | 210 | 1527 | 1059 | 226 | 273 | 1144 | 374 | 94 | 557 | 2565 | 168 | 61 | 660 |
| B.O.D. | 80 | 8 | >656 | 42 | 22.6 | 10 | 79 | 31 | 4.4 | 109.5 | 1360 | 21 | 5.8 | 284 |
| Ammonia mg/l N | 940 | 300 | 240 | 630 | >298 | 200 | <0.003 | 190 | 78 | 0.98 | 240 | 150 | 71 | 120 |
| Dissolved Oxygen %sat | | | | | | | | | | | | | | |
| Calcium mg/l Ca | | | | 149 | | | | 306 | | | | 61 | | |
| Cadmium mg/l Cd | | | | <0.005 | | | | <0.001 | | | | <0.005 | | |
| Chromium mg/l Cr | | | | 0.0319 | | | | 0.0234 | | | | 0.016 | | |
| Chloride mg/l Cl | 2241 | 679 | 688 | 1503 | 690 | 570 | | >696 | 269 | 825 | 903 | 380 | 173 | 376 |
| Copper mg/l Cu | | | | 0.0126 | | | | 0.0112 | | | | <0.005 | | |
| Iron mg/l Fe | | | | 9.28 | | | | 7.823 | | | | 2.3 | | |
| Lead Mg/l Pb | | | | <0.005 | | | | 0.00186 | | | | <0.005 | | |
| Magnesium mg/l Mg | | | | 0.012 | | | | 69.3 | | | | 28 | | |
| Manganese mg/l Mn | | | | 1.66 | | | | 3.549 | | | | 0.42 | | |
| Mercury mg/l Hg | | | | <0.0005 | | | | <0.0005 | | | | <0.0005 | | |
| Nickel mg/l Ni | | | | 0.0767 | | | | 0.0581 | | | | 0.023 | | |
| Potassium mg/l K | | | | 37.5 | | | | 194 | | | | 99 | | |
| Sodium mg/l Na | | | | 32.6 | | | | 581 | | | | 270 | | |
| Sulphate mg/l SO4 | | | | 26.5 | | | | 330.9 | | | | 34 | | |
| Zinc mg/l Zn | | | | 0.0343 | | | | 0.11 | | | | <0.005 | | |
| Alkalinity CaCO3 | | | | | | | | | | | | | | |
| TOC mg/l C | | | | | | | | | | | | | | |
| TON mg/l N | 7.5 | 8.4 | 4 | 17 | 1.3 | 17 | 0.3 | 1.1 | 0.1 | 0.1 | <0.1 | 0.6 | <0.5 | 0.6 |
| o-Phosphate mg/l P | 1.3 | 0.039 | 0.28 | 0.55 | 0.32 | 0.1 | | 0.25 | | | | 0.26 | | |
| Flouride mg/l F | | | | 8.07 | | | | 1.31 | | | | 0.9 | | |
| Phosphorous mg/l P | | | | | | | | | | | | | | |
| Nitrite mg/l N | 0.071 | | <0.001 | 0.18 | 0.48 | 0.085 | | <0.001 | | | | 0.022 | | |
| Nitrate mg/l N | | | | | | | | | | | | | | |
| Suspended Solids mg/l | | | | | | | | | | | | | | |
| Colour Hazen | | | | | | | | | | | | | | |
| Total Coliforms/100ml | | | | 24190 | | | | >9677 | | | | 370 | | |
| E Coli/100 ml | | | | 10 | | | | 147 | | | | 52 | | |
| Faecal Coliforms/100ml | | | | | | | | | | | | | | |
| Aluminium mg/l | | | | 0.268 | | | | 0.0876 | | | | 0.53 | | |

| Manhole 4 | 1st 1/4 2004 | 2nd 1/4 2004 | 3rd 1/4 2004 | 4th 1/4 2004 | 1st1/4 2005 | 2nd 1/4 2005 | 3rd 1/4 2005 | 4th 1/4 2005 | 1st 1/4 2006 | 2nd 1/4 2006 | 3rd 1/4 2006 | 4th 1/4 2006 | 1st 1/4 2007 | 2nd 1/4 2007 | 3rd 1/4 2007 | 4th 1/4 2007 | 1st 1/4 2008 | 2nd 1/4 2008 | 3rd 1/4 2008 | 4th 1/4 2008 | 1st 1/4 2009 | 2nd 1/4 2009 | 3rd 1/4 2009 | 4th 1/4 2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PH | No Sample Taken | | NO Sample Available | NO Sample Available | NO Sample Available | NO Sample Available | NO Sample Available | NO Sample Available | NO Sample Available | NO Sample Available | NO Sample Available | NO Sample Available | NO Sample Available | NO Sample Available | 7.3 | NO Sample Available | NO Sample Available | NO Sample Available | NO Sample Available | NO Sample Available | NO Sample Available | NO Sample Available | | |
| Temperature oC | | | | | | | | | | | | | | | 15 | | | | | | | | | |
| Conductivity uS/CM 20oC | | | | | | | | | | | | | | | | | | | | | | | | |
| Conductivity uS/CM 25oC | | | | | | | | | | | | | | | 6660 | | | | | | | | | |
| C.O.D. | | | | | | | | | | | | | | | 623 | | | | | | | | | |
| B.O.D. | | | | | | | | | | | | | | | 129.6 | | | | | | | | | |
| Ammonia mg/l N | | | | | | | | | | | | | | | >326 | | | | | | | | | |
| Dissolved Oxygen %sat | | | | | | | | | | | | | | | | | | | | | | | | |
| Calcium mg/l Ca | | | | | | | | | | | | | | | | | | | | | | | | |
| Cadmium mg/l Cd | | | | | | | | | | | | | | | | | | | | | | | | |
| Chromium mg/l Cr | | | | | | | | | | | | | | | | | | | | | | | | |
| Chloride mg/l Cl | | | | | | | | | | | | | | | 746 | | | | | | | | | |
| Copper mg/l Cu | | | | | | | | | | | | | | | | | | | | | | | | |
| Iron mg/l Fe | | | | | | | | | | | | | | | | | | | | | | | | |
| Lead Mg/l Pb | | | | | | | | | | | | | | | | | | | | | | | | |
| Magnesium mg/l Mg | | | | | | | | | | | | | | | | | | | | | | | | |
| Manganese mg/l Mn | | | | | | | | | | | | | | | | | | | | | | | | |
| Mercury mg/l Hg | | | | | | | | | | | | | | | | | | | | | | | | |
| Nickel mg/l Ni | | | | | | | | | | | | | | | | | | | | | | | | |
| Potassium mg/l K | | | | | | | | | | | | | | | | | | | | | | | | |
| Sodium mg/l Na | | | | | | | | | | | | | | | | | | | | | | | | |
| Sulphate mg/l SO4 | | | | | | | | | | | | | | | | | | | | | | | | |
| Zinc mg/l Zn | | | | | | | | | | | | | | | | | | | | | | | | |
| Alkalinity CaCO3 | | | | | | | | | | | | | | | | | | | | | | | | |
| TOC mg/l C | | | | | | | | | | | | | | | | | | | | | | | | |
| TON mg/l N | | | | | | | | | | | | | | | 0.4 | | | | | | | | | |
| o-Phosphate mg/l P | | | | | | | | | | | | | | | 1.6 | | | | | | | | | |
| Flouride mg/l F | | | | | | | | | | | | | | | | | | | | | | | | |
| Phosphorous mg/l P | | | | | | | | | | | | | | | | | | | | | | | | |
| Nitrite mg/l N | | | | | | | | | | | | | | | <0.001 | | | | | | | | | |
| Nitrate mg/l N | | | | | | | | | | | | | | | | | | | | | | | | |
| Suspended Solids mg/l | | | | | | | | | | | | | | | | | | | | | | | | |
| Colour Hazen | | | | | | | | | | | | | | | | | | | | | | | | |
| Total Coliforms/100ml | | | | | | | | | | | | | | | | | | | | | | | | |
| Faecal Coliforms/100ml | | | | | | | | | | | | | | | | | | | | | | | | |

| Leachate Lagoon | 1st 1/4 2006 | 2nd 1/4 2006 | 3rd 1/4 2006 | 4th 1/4 2006 | 1st 1/4 2007 | 2nd 1/4 2007 | 3rd 1/4 2007 | 4th 1/4 2007 | 1st 1/4 2008 | 2nd 1/4 2008 | 3rd 1/4 2008 | 4th 1/4 2008 | 1st 1/4 2009 | 2nd 1/4 2009 | 3rd 1/4 2009 | 4th 1/4 2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PH | 7.5 | 7.3 | 8.2 | 7.2 | 7.3 | | | | 7.7 | 7.8 | 7.5 | 7.1 | 7.2 | 7.3 | 7.2 | 7.2 |
| Temperature oC | 8 | 14 | 20 | 20 | 10 | | | 7.3 | 7 | 14 | 15 | 13.1 | 12 | 23 | 18.4 | 14.8 |
| Conductivity uS/CM 20oC | | | | | | | | | | | | | | | | |
| Conductivity uS/CM 25oC | 6690 | 5900 | 8930 | 6910 | 7870 | | | 6750 | 4910 | 14650 | 6200 | 4540 | 7580 | 6840 | 38500 | 6180 |
| C.O.D. | 436 | 454 | 660 | 791 | 910 | | | 903 | 1484 | 1291 | 659 | 696 | 2675 | 1242 | 281 | 985 |
| B.O.D. | 10 | 88 | 60 | 248 | 440 | | | 45 | 548 | 45 | 158 | 150 | 1500 | 380 | 31.5 | 400 |
| Ammonia mg/l N | 330 | 290 | 680 | 470 | 850 | | | 330 | 100 | 670 | 260 | 150 | 270 | <0.003 | 120 | 240 |
| Dissolved Oxygen %sat | | | | | | | | | | | | | | | | |
| Calcium mg/l Ca | | 193 | | | | | | | | 164 | | | | 220 | | |
| Cadmium mg/l Cd | | >0.002 | | | | | | | | <0.001 | | | | <0.005 | | |
| Chromium mg/l Cr | | 0.0601 | | | | | | | | 0.0582 | | | | 0.04 | | |
| Chloride mg/l Cl | 762 | 666 | 1782 | 1575 | 1093 | | | 909 | | >1416 | 811 | 475 | 947 | 25121 | 451 | 790 |
| Copper mg/l Cu | | 0.0165 | | | | | | | | 0.0285 | | | | <0.005 | | |
| Iron mg/l Fe | | 8.55 | | | | | | | | 10.12 | | | | 3.3 | | |
| Lead Mg/l Pb | | >0.02 | | | | | | | | 0.00257 | | | | <0.005 | | |
| Magnesium mg/l Mg | | 72.2 | | | | | | | | 98.9 | | | | 110 | | |
| Manganese mg/l Mn | | 2.03 | | | | | | | | 1.27 | | | | 1.7 | | |
| Mercury mg/l Hg | | | | | | | | | | <0.0005 | | | | <0.0005 | | |
| Nickel mg/l Ni | | 0.073 | | | | | | | | 0.15 | | | | 0.059 | | |
| Potassium mg/l K | | 197 | | | | | | | | 510 | | | | 260 | | |
| Sodium mg/l Na | | 503 | | | | | | | | 1750 | | | | 620 | | |
| Sulphate mg/l SO4 | | 24.4 | | | | | | | | 185.9 | | | | 170 | | |
| Zinc mg/l Zn | | 0.666 | | | | | | | | 0.0601 | | | | <0.005 | | |
| Alkalinity CaCO3 | | | | | | | | | | | | | | | | |
| TOC mg/l C | | | | | | | | | | | | | | | | |
| TON mg/l N | <10 | 0.4 | 5.8 | 8.9 | 0.3 | | | 12 | 0.2 | 1.1 | 0.4 | 0.2 | <0.1 | <0.1 | <0.5 | 2.3 |
| o-Phosphate mg/l P | 0.68 | 0.27 | 0.26 | 0.62 | 0.62 | | | 0.22 | | 1.9 | | | | 0.2 | | |
| Flouride mg/l F | | 0.75 | | | | | | | | 3.46 | | | | 29 | | |
| Phosphorous mg/l P | | | | | | | | | | | | | | | | |
| Nitrite mg/l N | 0.036 | >0.001 | 0.039 | | <0.001 | | | 0.75 | | <0.001 | | | | 0.029 | | |
| Nitrate mg/l N | | | | | | | | | | | | | | | | |
| Suspended Solids mg/l | | | | | | | | | | | | | | | | |
| Colour Hazen | | | | | | | | | | | | | | | | |
| Total Coliforms/100ml | | 4044 | | | | | | | | 7945 | | | | >24192 | | |
| E Coli/100ml | | 1514 | | | | | | | | 30 | | | | >24192 | | |
| Faecal Coliforms/100ml | | | | | | | | | | | | | | | | |
| Aluminium mg/l | | >1 | | | | | | | | 0.203 | | | | <0.25 | | |

NO Sample Available

NO Sample Available

| Manhole 5 | 1st 1/4 2006 | 2nd 1/4 2006 | 3rd 1/4 2006 | 4th 1/4 2006 | 1st 1/4 2007 | 2nd 1/4 2007 | 3rd 1/4 2007 | 4th 1/4 2007 | 1st 1/4 2008 | 2nd 1/4 2008 | 3rd 1/4 2008 | 4th 1/4 2008 | 1st 1/4 2009 | 2nd 1/4 2009 | 3rd 1/4 2009 | 4th 1/4 2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PH | 7.5 | 7 | 7.6 | 7.2 | 7.3 | 7.2 | 7.3 | 7.2 | 7.7 | 7.8 | 7.3 | 7 | 7 | 7.2 | 7.3 | 7.1 |
| Temperature oC | 9 | 12 | 16 | 19 | 10 | 13 | 15 | 13 | 7 | 14 | 14 | 11.2 | 11 | 15.5 | 18.5 | 13.9 |
| Conductivity uS/CM 20oC | | | | | | | | | | | | | | | | |
| Conductivity uS/CM 25oC | 8120 | 5740 | 15870 | 7690 | 7970 | 15280 | 6640 | 7730 | 5250 | 14770 | 7380 | 5090 | 5992 | 11120 | 47800 | 6480 |
| C.O.D. | 547 | 309 | 1071 | 756 | 915 | 5380 | 666 | 814 | 1575 | 1196 | 524 | 435 | 309 | 849 | 306 | 917 |
| B.O.D. | 48 | 39 | 96 | 208 | 380 | >2400 | 126.6 | 46 | 540 | 39 | 110 | 114 | 84 | 195 | 38 | 360 |
| Ammonia mg/l N | 450 | 320 | 1200 | 420 | 850 | 840 | >350 | 410 | 110 | 980 | 390 | 260 | 370 | 0.036 | 190 | 280 |
| Dissolved Oxygen %sat | | | | | | | | | | | | | | | | |
| Calcium mg/l Ca | | 178 | | | | 532 | | | | 157 | | | | 180 | | |
| Cadmium mg/l Cd | | 0.002 | | | | <0.005 | | | | <0.001 | | | | <0.005 | | |
| Chromium mg/l Cr | | 0.0718 | | | | 0.0635 | | | | 0.0641 | | | | 0.05 | | |
| Chloride mg/l Cl | 924 | 592 | 2664 | 1083 | 1054 | 2248 | 872 | 960 | | >1676 | 1009 | 525 | 629 | 1553 | 338 | 856 |
| Copper mg/l Cu | | 0.0286 | | | | 0.0667 | | | | 0.0229 | | | | <0.005 | | |
| Iron mg/l Fe | | 22.8 | | | | 8.15 | | | | 6.239 | | | | 2.9 | | |
| Lead Mg/l Pb | | >0.02 | | | | <0.005 | | | | 0.00198 | | | | <0.005 | | |
| Magnesium mg/l Mg | | 61.9 | | | | 22.1 | | | | 126 | | | | 87 | | |
| Manganese mg/l Mn | | 1.67 | | | | 6.33 | | | | 1.296 | | | | 1.1 | | |
| Mercury mg/l Hg | | | | | | <0.0005 | | | | <0.0005 | | | | <0.0005 | | |
| Nickel mg/l Ni | | 0.0624 | | | | 0.0902 | | | | 0.1564 | | | | 0.058 | | |
| Potassium mg/l K | | 185 | | | | 41 | | | | 569 | | | | 330 | | |
| Sodium mg/l Na | | 453 | | | | 43.7 | | | | 1922 | | | | 910 | | |
| Sulphate mg/l SO4 | | 17.9 | | | | 34.7 | | | | 197.2 | | | | 100 | | |
| Zinc mg/l Zn | | 1.47 | | | | 0.209 | | | | 0.0504 | | | | <0.005 | | |
| Alkalinity CaCO3 | | | | | | | | | | | | | | | | |
| TOC mg/l C | | | | | | | | | | 4 | | | | | | |
| TON mg/l N | <10 | 0.7 | 6.7 | 6.8 | 2.6 | <0.1 | 0.4 | 3.2 | 0.2 | 1.1 | 0.4 | 0.7 | 0.2 | <0.1 | <0.5 | 2.9 |
| o-Phosphate mg/l P | 0.95 | 0.26 | 1.8 | 0.57 | 0.62 | 1.5 | 29 | 0.37 | | 2 | | | | 2.3 | | |
| Flouride mg/l F | | 0.2 | | | | 98.7 | | | | 4.77 | | | | 3.2 | | |
| Phosphorous mg/l P | | | | | | | | | | | | | | | | |
| Nitrite mg/l N | <0.001 | >0.001 | <0.001 | | <0.001 | <0.005 | <0.001 | <0.001 | | <0.001 | | | | <0.01 | | |
| Nitrate mg/l N | | | | | | | | | | | | | | | | |
| Suspended Solids mg/l | | | | | | | | | | | | | | | | |
| Colour Hazen | | | | | | | | | | | | | | | | |
| Total Coliforms/100ml | | 2764 | | | | >24190 | | | | >9677 | | | | >24192 | | |
| E Coli/100 ml | | 575 | | | | 19863 | | | | 54 | | | | >24192 | | |
| Faecal Coliforms/100ml | | | | | | | | | | | | | | | | |
| Aluminium mg/l | | >1 | | | | 0.219 | | | | 0.227 | | | | <0.250 | | |

| Upstream 'A' | 1st 1/4 2004 | 2nd 1/4 2004 | 3rd 1/4 2004 | 4th 1/4 2004 | 1st 1/4 2005 | 2nd 1/4 2005 | 3rd 1/4 2005 | 4th 1/4 2005 | 1st 1/4 2006 | 2nd 1/4 2006 | 3rd 1/4 2006 | 4th 1/4 2006 | 1st 1/4 2007 | 2nd 1/4 2007 | 3rd 1/4 2007 | 4th 1/4 2007 | 1st 1/4 2008 | 2nd 1/4 2008 | 3rd 1/4 2008 | 4th 1/4 2008 | 1st 1/4 2009 | 2nd 1/4 2009 | 3rd 1/4 2009 | 4th 1/4 2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PH | 8.1 | 8.4 | | 8.3 | 8.2 | 8.3 | | | 8 | 8.3 | | 8.3 | 7.4 | | | 8 | 8.3 | | 8.1 | 8.3 | 8.4 | 8.4 | 8.1 | |
| Temperature oC | 9.3 | 11.7 | | 11.3 | 8.6 | 10.1 | | | 7.3 | 8.1 | | 12.8 | 7.4 | | | 11.1 | 6.7 | | 13.2 | 8.2 | 11.2 | 15.9 | 13.5 | |
| Conductivity uS/CM 20oC | - | - | | | | | | | | | | | | | | | | | | | | | | |
| Conductivity uS/CM 25oC | 389 | 410 | N o t A v a i l a b l e | 434 | 382 | 390 | N o t A v a i l a b l e | N o t A v a i l a b l e | 367 | 418 | N o t A v a i l a b l e | 434 | 412 | N o t A v a i l a b l e | N o t A v a i l a b l e | 420 | 317 | N o t A v a i l a b l e | 381 | 558 | 428 | 451 | 370 | |
| C.O.D. | 25 | <8 | | 10 | <8 | 16 | | | 22 | 8 | | <8 | 27 | | | <8 | 38 | | 22 | 24 | <8 | | <20 | |
| B.O.D. | 0.5 | 1.3 | | 0.8 | 0.7 | 1 | | | 0.8 | 0.5 | | 0.9 | 1.5 | | | 0.8 | 1.6 | | 1.2 | 1.2 | 0.5 | 1 | 0.9 | |
| Ammonia mg/l N | 0.01 | 0.034 | | 0.008 | 0.022 | 0.018 | | | 0.007 | 0.01 | | 0.011 | 0.003 | | | 0.019 | 0.012 | | 0.021 | 0.022 | 0.006 | 0.017 | <0.01 | |
| Dissolved Oxygen %sat | 96.8 | 102.4 | | 95.2 | 96.4 | 91.5 | | | 113.5 | 101 | | 112 | 99.3 | | | 92 | 99.2 | | 97.2 | 100 | 101.3 | 99 | 100.8 | |
| Calcium mg/l Ca | 55.3 | - | | | | | | | | 64.5 | | | | | | | | | | | | 140 | | |
| Cadmium mg/l Cd | <0.0001 | - | | | | | | | | <.0001 | | | | | | | | | | | | <0.005 | | |
| Chromium mg/l Cr | 0.0024 | - | | | | | | | | <.001 | | | | | | | | | | | | 0.00678 | | |
| Chloride mg/l Cl | 18 | 21 | | 18 | 18 | 18 | | | 15 | 18 | | 18 | 15 | | | 14 | 14 | | 13 | 54 | 16 | 16 | 10 | |
| Copper mg/l Cu | <0.001 | | | | | | | | | <.001 | | | | | | | | | | | | <0.005 | | |
| Iron mg/l Fe | 0.163 | - | | | | | | | | 0.0815 | | | | | | | | | | | | <0.25 | | |
| Lead Mg/l Pb | <0.0001 | - | | | | | | | | 0.001 | | | | | | | | | | | | <0.005 | | |
| Magnesium mg/l Mg | 5.26 | - | | | | | | | | 6.01 | | | | | | | | | | | | 36.5 | | |
| Manganese mg/l Mn | 0.0047 | - | | | | | | | | 0.0027 | | | | | | | | | | | | <0.25 | | |
| Mercury mg/l Hg | - | - | | | | | | | | | | | | | | | | | | | | <0.0005 | | |
| Nickel mg/l Ni | <0.001 | - | | | | | | | | <.001 | | | | | | | | | | | | <0.005 | | |
| Potassium mg/l K | 1.1 | - | | | | | | | | 0.78 | | | | | | | | | | | | <5 | | |
| Sodium mg/l Na | 8.95 | | | | | | | | | 8.37 | | | | | | | | | | | | 29.4 | | |
| Sulphate mg/l SO4 | 13.5 | - | | | | | | | | | | | | | | | | | | | | 13 | | |
| Zinc mg/l Zn | 0.0083 | - | | | | | | | | <.001 | | | | | | | | | | | | 0.24 | | |
| Alkalinity CaCO3 | - | - | | | | 161 | | | | 157 | | | | | | | | | | | | 200 | | |
| TOC mg/l C | - | - | | | | | | | | | | | | | | | | | | | | | | |
| TON mg/l N | 4.5 | 4.2 | | 3.7 | 2.8 | 3.3 | | | 3.7 | 6 | | 5.2 | 4 | | | | | | | | | 4 | 2.5 | |
| o-Phosphate mg/l P | 0.009 | 0.048 | | 0.014 | 0.013 | 0.021 | | | 0.011 | 0.0037 | | 0.02 | 0.01 | | | | | | | | | 0.2 | | |
| Flouride mg/l F | <0.1 | - | | | | | | | | | | | | | | | | | | | | | | |
| Phosphorous mg/l P | - | - | | | | | | | | | | | | | | | | | | | | | | |
| Nitrite mg/l N | 0.002 | 0.013 | | | 0.001 | 0.005 | | | 0.002 | 0.006 | | 0.005 | 0.001 | | | | | | | | | 0.007 | | |
| Nitrate mg/l N | - | - | | 0.003 | | | | | | | | | | | | | | | | | | | | |
| Suspended Solids mg/l | - | <6 | | <6 | 9 | <6 | | | <10 | 65.4 | | <6.0 | <6.0 | | | | 7 | | 34 | 42 | <6 | <17 | | |
| Colour Hazen | - | - | | | | | | | | | | | | | | | | | | | | | | |
| Total Coliforms/100ml | - | - | | | | | | | | | | | | | | | | | | | | | | |
| Faecal Coliforms/100ml | - | - | | | | | | | | | | | | | | | | | | | | | | |

| Downstream 'A' | 1st 1/4 2004 | 2nd 1/4 2004 | 3rd 1/4 2004 | 4th 1/4 2004 | 1st 1/4 2005 | 2nd 1/4 2005 | 3rd 1/4 2005 | 4th 1/4 2005 | 1st 1/4 2006 | 2nd 1/4 2006 | 3rd 1/4 2006 | 4th 1/4 2006 | 1st 1/4 2007 | 2nd 1/4 2007 | 3rd 1/4 2007 | 4th 1/4 2007 | 1st 1/4 2008 | 2nd 1/4 2008 | 3rd 1/4 2008 | 4th 1/4 2008 | 1st 1/4 2009 | 2nd 1/4 2009 | 3rd 1/4 2009 | 4th 1/4 2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PH | 8.1 | 8.6 | | | 8.4 | 8.4 | | | 7.9 | 8.1 | | | 8 | | | 8.2 | 8.3 | | 8.2 | 8.3 | 8.5 | 8.3 | 7.8 | |
| Temperature oC | 8.2 | 7.1 | | | 8.1 | 9.5 | | | 7.9 | 8.1 | | | 7.1 | | | 11.1 | 7.5 | | 13 | 8 | 10.4 | 16.2 | 14 | |
| Conductivity uS/CM 20oC | - | - | | | | | | | | | | | | | | | | | | | | | | |
| Conductivity uS/CM 25oC | 459 | 367 | N o S a m p l e A v a i l a b l e | N o S a m p l e A v a i l a b l e | 402 | 360 | N o S a m p l e A v a i l a b l e | N o S a m p l e A v a i l a b l e | 487 | 412 | N o S a m p l e A v a i l a b l e | N o S a m p l e A v a i l a b l e | 408 | N o S a m p l e A v a i l a b l e | N o S a m p l e A v a i l a b l e | 455 | 294 | N o S a m p l e A v a i l a b l e | 411 | 487 | 415 | 471 | 370 | |
| C.O.D. | 29 | <8 | | | <8 | 9 | | | 16 | 24 | | | 31 | | | <8 | 46 | | 13 | <8 | 12 | | 47 | |
| B.O.D. | 1 | 0.6 | | | 0.7 | 1.6 | | | 1 | 0.6 | | | 0.9 | | | 0.8 | 2.2 | | 0.7 | 0.9 | 0.5 | 1.4 | 1.8 | |
| Ammonia mg/l N | 2.1 | <0.003 | | | 0.004 | 0.12 | | | 0.4 | 0.008 | | | 0.009 | | | 0.012 | 0.031 | | 0.059 | 0.018 | 0.006 | 0.014 | 0.03 | |
| Dissolved Oxygen %sat | 89 | 103.6 | | | 98.4 | 94.2 | | | 114.4 | 104 | | | 99.9 | | | 89 | 101.2 | | 98 | 100 | 104 | 94 | 108.6 | |
| Calcium mg/l Ca | 44.2 | - | | | | | | | | 64.5 | | | | | | | | | | | | 74.9 | | |
| Cadmium mg/l Cd | <0.0001 | - | | | | | | | | <.0001 | | | | | | | | | | | | <0.005 | | |
| Chromium mg/l Cr | 0.0035 | - | | | | | | | | 0.00242 | | | | | | | | | | | | 0.00527 | | |
| Chloride mg/l Cl | 31 | 19 | | | 17 | 19 | | | 19 | 17 | | | 15 | | | 14 | 14 | | 14 | 30 | 16 | 16 | 11 | |
| Copper mg/l Cu | 0.0018 | - | | | | | | | | 0.00289 | | | | | | | | | | | | <0.005 | | |
| Iron mg/l Fe | 0.135 | | | | | | | | | 0.0778 | | | | | | | | | | | | <0.25 | | |
| Lead Mg/l Pb | <0.001 | - | | | | | | | | <.001 | | | | | | | | | | | | <0.005 | | |
| Magnesium mg/l Mg | 6.25 | - | | | | | | | | 6.08 | | | | | | | | | | | | 12.7 | | |
| Manganese mg/l Mn | 0.0044 | - | | | | | | | | 0.0335 | | | | | | | | | | | | <0.25 | | |
| Mercury mg/l Hg | - | - | | | | | | | | | | | | | | | | | | | | <0.0005 | | |
| Nickel mg/l Ni | 0.0022 | - | | | | | | | | <.001 | | | | | | | | | | | | <0.005 | | |
| Potassium mg/l K | 5.74 | - | | | | | | | | 0.92 | | | | | | | | | | | | <5 | | |
| Sodium mg/l Na | 25.1 | | | | | | | | | 9.5 | | | | | | | | | | | | 17.4 | | |
| Sulphate mg/l SO4 | 7.1 | - | | | | | | | | | | | | | | | | | | | | 17 | | |
| Zinc mg/l Zn | 0.0089 | - | | | | | | | | <1 | | | | | | | | | | | | <0.005 | | |
| Alkalinity CaCO3 | - | - | | | | 153 | | | | 150 | | | | | | | | | | | | 205 | | |
| TOC mg/l C | - | - | | | | | | | | | | | | | | | | | | | | | | |
| TON mg/l N | 6.9 | 4 | | | 3.1 | 3 | | | 6.1 | 5.7 | | | 5 | | | | | | | | | 3 | | |
| o-Phosphate mg/l P | 0.009 | 0.041 | | | 0.01 | 0.012 | | | 0.008 | 0.006 | | | 0.01 | | | | | | | | | 0.11 | | |
| Flouride mg/l F | 0.19 | - | | | | | | | | | | | | | | | | | | | | | | |
| Phosphorous mg/l P | - | - | | | | | | | | | | | | | | | | | | | | | | |
| Nitrite mg/l N | 0.035 | 0.01 | | | 0.002 | 0.007 | | | 0.001 | 0.004 | | | 0.003 | | | | | | | | | 0.023 | | |
| Nitrate mg/l N | - | - | | | | | | | | | | | | | | | | | | | | | | |
| Suspended Solids mg/l | - | <6.3 | | | <6 | <6 | | | 21.6 | 61.3 | | | <6.0 | | | | 8 | | <6 | <7.5 | <6 | 29 | | |
| Colour Hazen | - | - | | | | | | | | | | | | | | | | | | | | | | |
| Total Coliforms/100ml | - | - | | | | | | | | | | | | | | | | | | | | | | |
| Faecal Coliforms/100ml | - | - | | | | | | | | | | | | | | | | | | | | | | |

# Appendix D

Sampling Points Drawing

DUNMORE
COTTAGE

EP

Total Depth
of Lagoon
3.45m

62m

MH1 Base depth 50.46
Present Height 64m
Final Height 62m

MH2 Base depth 50.11m (Blocked)
Present Height 60.684m
Final Height 61.5m

61m

60m

54m

MH3 Base depth 48.836m
Final & Present Height 55.341m

MH7 Base depth 50.136
Side Riser 8.2m

MH6 Base depth 49.946
Side Riser 6.5m

MH4 Base depth 49.616
Final & Present Height 53.036m

MH5 Base depth 49.23
Final & Present Height 53.22m

Total Depth
of Lagoon
3.25m

54m
56.5
58.5m
60.5
61.5m

61.5m
56.5m
58.5m
60.5m

60.1

61.2

61.8

DEC.

Revision Description By Da

Restotation Plan
01/07/03 800
1:2500
30-2-DWG03

...\OLK2\Final Contour.dgn 17/08/2006 15:51:14

DUNMORE
COTTAGE

Road Edge Planting to be completed as part of road contract

Existing hedge line retained, protected and replaced as necessary

Ornamental planting for Civic Amenity Site

New hedge row to be established

Road Edge Planting to be completed as part of road contract

Woodland to be established as part of the final cap on landfilled areas

Grassed Area

Existing hedge line retained, protected and replaced as necessary

Woodland to be established as part of the final cap on landfilled areas

All landfill infrastructure to be removed

Entrance to lagoon and lagoon to be retained

Hedgeline to be renewed in this area

New Hedge Line to be established

Grassed Area

Grassed Area

Existing hedge line retained, protected and replaced as necessary

DEC.

EP

60.1

61.2

61.8

## List of Species to be Used

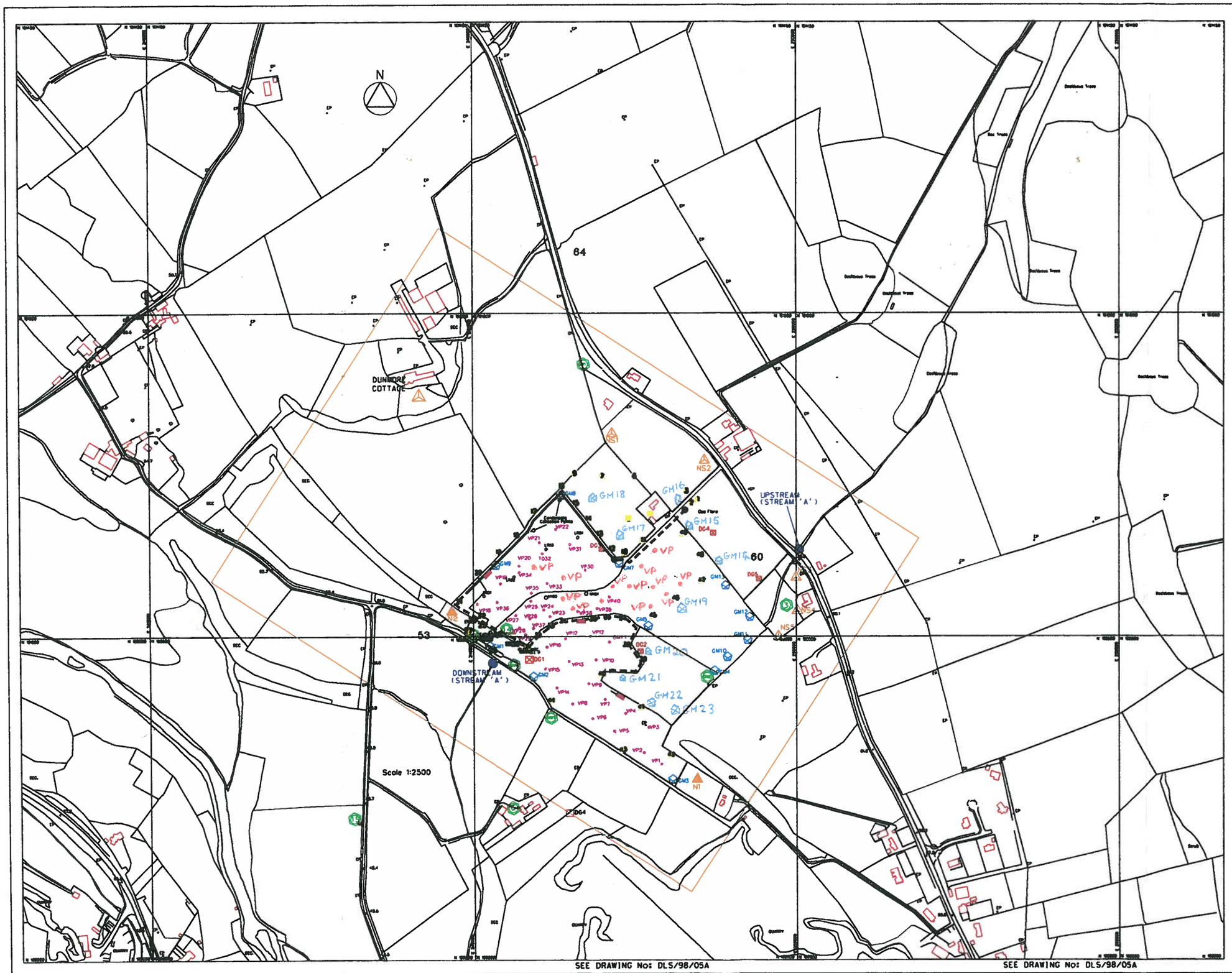
| *Tree/plant type* | *Species* |
|---|---|
| Common Ash | Fraxinus Excelsior |
| Hawthorn | Crataegus Monogyna |
| Whitebeam | Sorbus Hibernica |
| Blackthorn | Prunus Spinosa |
| Elder | Sambucas Nigra |
| Cherry | Prunus Avium |
| Gorse | Ulex Europaeus |
| Bristly ox tongue | Picris Hieracioides |
| Holly | Ilex Aquifolium |
| Hazel | Corylus Avellana |
| Common Beech | Figus Sylvatica |
| Silver Beech | Betula Pendula |

OS Licence Number
Kilkenny CCMA 9802

| Revision | Description | By | Da |
|---|---|---|---|

Restotation Plan
01/07/03 BOD
1:2500
30-2-DWG02

...\OLK2\Restoration.dgn 17/08/2006 15:37:03




EXTRACT FROM O.S.S. Nos: 4645-C & 4645-D
OS Licence No.Kilkenny CCMA9802

LEGEND:

- GROUNDWATER MONITORING POINTS
- SURFACE WATER MONITORING POINTS
- NOISE MONITORING POINTS
- GAS MONITORING POINTS — VP
- GAS MIGRATION MONITORING POINTS — GM
- DUST MONITORING POINTS — DG
- BAIT BOXES — 13

| REVISION | DESCRIPTION | BY | DATE |
|---|---|---|---|
| K | Alteration of Noise, Dust, Leachate, Gas Monitoring Points | MG | June '06 |
| J | Alteration of Bait Monitoring Points | MG | Mar '06 |
| I | Alteration of Gas Well Points | MG | JAN '05 |
| H | Alteration of Noise Monitoring Points | BOD | OCT '03 |
| G | Vermin Baits Pts. 7-11 Removed | BOD | SEP '02 |
| F | Vermin Bait Box Points Added Pts. 1-40 | BOD | JAN '01 |
| E | GAS MONITORING POINTS (VP19,VP20 & VP21) ADDED<br>DUST MONITORING POINT (DG 5) ADDED | BOD | JAN '00 |
| D | GROUNDWATER MONITORING POINTS MW1 ADDED | ROC | MAY '99 |
| C | GAS MONITORING POINTS (VP17 & VP18) ADDED<br>GROUNDWATER MONITORING POINTS GW1 TO GW4 ADDED | ROC | APR '99 |
| B | GAS MONITORING POINTS (VP15 & VP16) ADDED | ROC | NOV '98 |
| A | GAS MIGRATION MONITORING POINTS ADDED<br>DUST MONITORING POINTS ADDED<br>CPC GAS REMOVAL LOCATION ADDED<br>GROUNDWATER MONITORING POINT 13 - RELOCATED TO CORRECT POSITION | ROC | AUG '98<br>AUG '98<br>AUG '98<br>AUG '98 |

PROJECT: DUNMORE LANDFILL SITE

ENVIRONMENT SECTION
KILKENNY CO.CO.
COUNTY HALL,
JOHN STREET,
KILKENNY.

DESC: MONITORING POINTS
DATE: MAY '99 BY: ROC
SCALES: Not to Scale
DRAWING NO: DLS/98/05/RevE

...\monitoring-Rev-2dmg.dgn 06/07/2006 10:03:26

# Appendix E

Meteorological Monitoring

| METEOROLOGICAL DATA | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Jan-09 |
| year | month | day | max. temperature (degrees Celsius) | min. temperature (degrees Celsius) | rainfall (mm) | mean wind speed (knots) | mean relative humididty (%) | mean CBL pressure (hPa) |
| 2009 | 1 | 1 | 3.6 | -2.8 | 0.0 | 2.6 | 93.6 | 1020.8 |
| 2009 | 1 | 2 | 4.9 | 0.7 | 0.0 | 5.5 | 76.3 | 1022.8 |
| 2009 | 1 | 3 | 3.6 | 0.6 | 0.0 | 3.3 | 67.9 | 1022.3 |
| 2009 | 1 | 4 | 4.4 | -2.2 | 0.0 | 2.3 | 85.7 | 1016.4 |
| 2009 | 1 | 5 | 4.3 | -4.7 | 0.0 | 1.8 | 94.4 | 1017.4 |
| 2009 | 1 | 6 | 1.7 | -5.9 | | 1.9 | 88.6 | 1021.3 |
| 2009 | 1 | 7 | 3.3 | -7.0 | 0.0 | 1.4 | 90.9 | 1020.1 |
| 2009 | 1 | 8 | 4.9 | -5.7 | 0.0 | 3.3 | 91.0 | 1020.2 |
| 2009 | 1 | 9 | 5.2 | 0.3 | 0.2 | 4.9 | 85.8 | 1017.7 |
| 2009 | 1 | 10 | 8.7 | 2.9 | 0.3 | 14.2 | 77.5 | 1009.5 |
| 2009 | 1 | 11 | 11.1 | 8.4 | 13.5 | 21.1 | 93.5 | 1000.0 |
| 2009 | 1 | 12 | 10.8 | 5.4 | 1.8 | 7.1 | 93.0 | 995.5 |
| 2009 | 1 | 13 | 7.2 | -0.7 | 0.7 | 4.5 | 90.3 | 1000.8 |
| 2009 | 1 | 14 | 10.1 | -1.3 | 10.5 | 12.9 | 95.0 | 997.2 |
| 2009 | 1 | 15 | 10.4 | 5.7 | 7.6 | 12.5 | 91.0 | 991.8 |
| 2009 | 1 | 16 | 9.4 | 3.9 | 3.4 | 9.0 | 92.2 | 995.0 |
| 2009 | 1 | 17 | 8.9 | 2.1 | 9.4 | 15.9 | 85.0 | 986.1 |
| 2009 | 1 | 18 | 5.0 | 0.4 | 7.1 | 11.9 | 86.6 | 982.1 |
| 2009 | 1 | 19 | 5.1 | 1.2 | 8.0 | 9.5 | 87.6 | 969.9 |
| 2009 | 1 | 20 | 4.5 | 0.2 | 0.0 | 9.0 | 84.2 | 979.6 |
| 2009 | 1 | 21 | 9.7 | 0.2 | 10.1 | 10.1 | 91.4 | 983.8 |
| 2009 | 1 | 22 | 10.6 | 2.1 | 3.8 | 8.1 | 83.1 | 972.2 |
| 2009 | 1 | 23 | 6.6 | -0.2 | 0.0 | 8.3 | 87.0 | 972.3 |
| 2009 | 1 | 24 | 7.4 | -0.8 | 1.5 | 8.6 | 88.6 | 977.2 |
| 2009 | 1 | 25 | 7.8 | 2.2 | 6.2 | 9.6 | 91.2 | 967.0 |
| 2009 | 1 | 26 | 8.7 | 1.4 | 1.2 | 6.0 | 86.4 | 991.8 |
| 2009 | 1 | 27 | 8.8 | 1.9 | 1.3 | 3.5 | 95.5 | 1000.1 |
| 2009 | 1 | 28 | 9.3 | -1.4 | 0.0 | 4.1 | 93.4 | 1005.0 |
| 2009 | 1 | 29 | 8.6 | 4.5 | 4.1 | 14.6 | 92.5 | 998.3 |
| 2009 | 1 | 30 | 11.7 | 6.6 | 16.0 | 18.3 | 94.8 | 993.7 |
| 2009 | 1 | 31 | 6.7 | 5.2 | 6.7 | 9.2 | 94.3 | 996.4 |
| | | | | **Total monthly rainfall** | **113.4** | | | |

| potential evapotranspiration (mm) | Class A pan evaporation (mm) |
|---|---|
| 9.8 | |

| METEOROLOGICAL DATA | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Feb-09 |
| year | month | day | max. temperature (degrees Celsius) | min. temperature (degrees Celsius) | rainfall (mm) | mean wind speed (knots) | mean relative humididty (%) | mean CBL pressure (hPa) |
| 2009 | 2 | 1 | 5.5 | 1.4 | 0.0 | 7.9 | 73.2 | 1003.2 |
| 2009 | 2 | 2 | 1.4 | -1.5 | 6.6 | 7.7 | 90.7 | 998.4 |
| 2009 | 2 | 3 | 1.6 | -1.1 | 8.4 | 6.4 | 96.5 | 980.7 |
| 2009 | 2 | 4 | 4.7 | 0.8 | 2.0 | 6.7 | 90.2 | 983.2 |
| 2009 | 2 | 5 | 2.0 | -0.3 | 2.0 | 9.4 | 92.3 | 986.5 |
| 2009 | 2 | 6 | 4.3 | -1.4 | 0.0 | 7.5 | 84.5 | 990.8 |
| 2009 | 2 | 7 | 4.6 | -3.2 | 0.0 | 7.6 | 77.5 | 995.8 |
| 2009 | 2 | 8 | 6.6 | -2.4 | 5.6 | 4.5 | 87.7 | 992.7 |
| 2009 | 2 | 9 | 3.7 | -0.3 | 0.0 | 6.0 | 94.5 | 987.7 |
| 2009 | 2 | 10 | 7.7 | -0.2 | 0.0 | 6.6 | 86.2 | 999.9 |
| 2009 | 2 | 11 | 8.7 | -2.3 | 0.0 | 3.0 | 91.7 | 1012.4 |
| 2009 | 2 | 12 | 10.6 | 1.3 | 1.5 | 6.0 | 90.3 | 1017.9 |
| 2009 | 2 | 13 | 9.4 | 5.2 | 0.0 | 2.6 | 90.6 | 1017.9 |
| 2009 | 2 | 14 | 8.8 | 4.9 | 0.0 | 3.7 | 91.0 | 1019.5 |
| 2009 | 2 | 15 | 11.6 | 5.0 | 0.0 | 4.5 | 81.3 | 1020.6 |
| 2009 | 2 | 16 | 10.3 | 1.5 | 0.0 | 5.8 | 81.3 | 1020.7 |
| 2009 | 2 | 17 | 10.8 | 7.0 | 0.0 | 5.4 | 75.1 | 1022.4 |
| 2009 | 2 | 18 | 8.1 | 5.7 | 0.0 | 3.7 | 75.7 | 1020.4 |
| 2009 | 2 | 19 | 8.6 | 3.3 | 0.3 | 3.4 | 88.5 | 1021.7 |
| 2009 | 2 | 20 | 10.4 | -1.9 | 0.0 | 2.9 | 86.6 | 1025.3 |
| 2009 | 2 | 21 | 10.5 | -0.6 | 0.0 | 4.9 | 87.4 | 1026.4 |
| 2009 | 2 | 22 | 11.0 | 6.5 | 0.0 | 7.1 | 83.5 | 1023.9 |
| 2009 | 2 | 23 | 11.1 | 6.4 | 0.3 | 4.8 | 90.9 | 1021.4 |
| 2009 | 2 | 24 | 9.8 | 7.1 | 0.0 | 3.4 | 89.0 | 1021.0 |
| 2009 | 2 | 25 | 10.1 | 3.1 | 0.0 | 7.4 | 79.8 | 1020.5 |
| 2009 | 2 | 26 | 11.0 | 2.0 | 0.0 | 7.5 | 83.7 | 1017.2 |
| 2009 | 2 | 27 | 9.8 | 6.8 | 0.0 | 7.4 | 83.5 | 1011.7 |
| 2009 | 2 | 28 | 9.9 | 6.0 | 2.5 | 9.4 | 89.3 | 1002.4 |
| | | | | **Total monthly rainfall** | **29.2** | | | |

| potential evapotranspiration (mm) | Class A pan evaporation (mm) |
|---|---|
| 16.1 | |

| METEOROLOGICAL DATA | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Mar-09 |
| year | month | day | max. temperature (degrees Celsius) | min. temperature (degrees Celsius) | rainfall (mm) | mean wind speed (knots) | mean relative humididty (%) | mean CBL pressure (hPa) |
| 2009 | 3 | 1 | 10.4 | 3.1 | 1.3 | 7.8 | 82.5 | 1001.9 |
| 2009 | 3 | 2 | 10.1 | 0.9 | 0.7 | 6.7 | 89.2 | 1007.2 |
| 2009 | 3 | 3 | 6.9 | -0.2 | 10.6 | 9.7 | 88.0 | 987.3 |
| 2009 | 3 | 4 | 5.2 | -1.1 | 0.2 | 6.5 | 85.3 | 974.1 |
| 2009 | 3 | 5 | 8.9 | -1.8 | 0.7 | 6.1 | 83.6 | 989.6 |
| 2009 | 3 | 6 | 11.4 | -0.5 | 0.9 | 6.9 | 91.1 | 997.4 |
| 2009 | 3 | 7 | 14.6 | 4.1 | 1.6 | 12.5 | 83.5 | 997.0 |
| 2009 | 3 | 8 | 6.6 | 2.1 | 3.3 | 16.3 | 79.6 | 994.0 |
| 2009 | 3 | 9 | 8.8 | 2.9 | 7.6 | 11.1 | 80.4 | 1001.7 |
| 2009 | 3 | 10 | 10.8 | 5.9 | 1.0 | 6.8 | 87.0 | 1003.3 |
| 2009 | 3 | 11 | 14.9 | 6.7 | 0.0 | 8.3 | 85.8 | 1011.6 |
| 2009 | 3 | 12 | 13.0 | 5.6 | 0.1 | 7.4 | 78.5 | 1012.1 |
| 2009 | 3 | 13 | 9.8 | 6.9 | 1.3 | 10.7 | 90.3 | 1005.9 |
| 2009 | 3 | 14 | 12.5 | 5.7 | 0.1 | 11.0 | 71.4 | 1010.9 |
| 2009 | 3 | 15 | 12.6 | 2.6 | 0.0 | 7.4 | 77.3 | 1023.1 |
| 2009 | 3 | 16 | 12.4 | 2.6 | 0.0 | 4.8 | 81.2 | 1024.1 |
| 2009 | 3 | 17 | 13.1 | 1.3 | 0.0 | 5.4 | 83.9 | 1025.7 |
| 2009 | 3 | 18 | 13.2 | 2.4 | 0.1 | 4.7 | 89.8 | 1023.1 |
| 2009 | 3 | 19 | 14.0 | 0.9 | 0.1 | 5.3 | 84.5 | 1020.2 |
| 2009 | 3 | 20 | 11.9 | 3.0 | 0.0 | 7.8 | 84.0 | 1021.4 |
| 2009 | 3 | 21 | 11.6 | 0.3 | 0.0 | 4.0 | 90.4 | 1026.8 |
| 2009 | 3 | 22 | 14.2 | 0.4 | 0.0 | 6.8 | 82.0 | 1027.9 |
| 2009 | 3 | 23 | 11.7 | 4.4 | 0.3 | 12.8 | 74.2 | 1016.7 |
| 2009 | 3 | 24 | 11.5 | 1.3 | 0.1 | 9.8 | 78.6 | 1012.3 |
| 2009 | 3 | 25 | 12.1 | 6.8 | 0.0 | 14.7 | 67.5 | 1002.4 |
| 2009 | 3 | 26 | 10.3 | 3.6 | 1.3 | 15.4 | 77.0 | 994.8 |
| 2009 | 3 | 27 | 9.4 | 2.3 | 1.2 | 12.5 | 74.7 | 991.0 |
| 2009 | 3 | 28 | 8.4 | -1.2 | 0.0 | 11.5 | 61.3 | 1001.2 |
| 2009 | 3 | 29 | 9.9 | -0.7 | 0.0 | 8.6 | 80.2 | 1004.0 |
| 2009 | 3 | 30 | 12.0 | 6.4 | 0.0 | 4.2 | 82.9 | 1010.6 |
| 2009 | 3 | 31 | 14.7 | 3.0 | 0.1 | 4.4 | 80.2 | 1014.9 |
| | | | | **Total monthly rainfall** | **32.6** | | | |

| potential evapotranspiration (mm) | Class A pan evaporation (mm) |
|---|---|
| 36.7 | |

| METEOROLOGICAL DATA | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Apr-09 |
| year | month | day | max. temperature (degrees Celsius) | min. temperature (degrees Celsius) | rainfall (mm) | mean wind speed (knots) | mean relative humididty (%) | mean CBL pressure (hPa) |
| 2009 | 4 | 1 | 12.6 | 5.5 | 0.0 | 4.7 | 72.8 | 1016.0 |
| 2009 | 4 | 2 | 16.1 | 0.8 | 0.0 | 4.2 | 77.3 | 1013.4 |
| 2009 | 4 | 3 | 11.8 | 2.5 | 4.9 | 8.9 | 90.9 | 1006.7 |
| 2009 | 4 | 4 | 12.3 | 2.5 | 0.1 | 8.4 | 71.9 | 1010.6 |
| 2009 | 4 | 5 | 11.8 | 0.8 | 0.4 | 7.3 | 80.0 | 1011.9 |
| 2009 | 4 | 6 | 9.9 | 5.1 | 8.8 | 9.5 | 87.9 | 996.0 |
| 2009 | 4 | 7 | 11.8 | 3.3 | 8.5 | 15.6 | 84.3 | 990.3 |
| 2009 | 4 | 8 | 14.2 | 5.5 | 2.9 | 11.2 | 71.8 | 994.2 |
| 2009 | 4 | 9 | 11.2 | 7.2 | 13.0 | 17.2 | 92.1 | 988.5 |
| 2009 | 4 | 10 | 12.2 | 2.8 | 0.6 | 6.0 | 75.5 | 992.4 |
| 2009 | 4 | 11 | 13.2 | 1.2 | 0.3 | 5.4 | 81.5 | 1001.3 |
| 2009 | 4 | 12 | 13.0 | 2.4 | 0.0 | 7.4 | 84.0 | 1006.1 |
| 2009 | 4 | 13 | 9.8 | 7.6 | 4.2 | 9.4 | 92.1 | 998.5 |
| 2009 | 4 | 14 | 13.3 | 5.9 | 2.0 | 6.9 | 87.4 | 999.2 |
| 2009 | 4 | 15 | 11.5 | 6.3 | 0.9 | 5.1 | 89.8 | 1000.0 |
| 2009 | 4 | 16 | 13.2 | 8.9 | 4.8 | 5.8 | 87.0 | 1000.1 |
| 2009 | 4 | 17 | 10.4 | 8.1 | 1.6 | 4.4 | 90.2 | 1005.1 |
| 2009 | 4 | 18 | 14.4 | 4.2 | 0.0 | 4.5 | 72.5 | 1012.2 |
| 2009 | 4 | 19 | 16.5 | 1.6 | 0.0 | 4.3 | 79.0 | 1017.2 |
| 2009 | 4 | 20 | 17.8 | 3.8 | 0.0 | 4.8 | 78.2 | 1020.0 |
| 2009 | 4 | 21 | 17.7 | 6.3 | 0.0 | 6.5 | 75.0 | 1019.5 |
| 2009 | 4 | 22 | 14.0 | 5.7 | 0.2 | 11.6 | 84.6 | 1015.6 |
| 2009 | 4 | 23 | 13.2 | 8.6 | 5.8 | 5.8 | 93.8 | 1009.5 |
| 2009 | 4 | 24 | 11.4 | 8.3 | 15.7 | 5.9 | 93.7 | 1001.7 |
| 2009 | 4 | 25 | 12.3 | 4.5 | 11.6 | 8.3 | 85.8 | 995.9 |
| 2009 | 4 | 26 | 12.0 | 3.2 | 3.6 | 6.3 | 89.5 | 997.6 |
| 2009 | 4 | 27 | 12.1 | 4.6 | 4.4 | 7.6 | 81.4 | 987.6 |
| 2009 | 4 | 28 | 13.5 | 2.7 | 0.1 | 3.8 | 79.4 | 995.9 |
| 2009 | 4 | 29 | 12.2 | 7.3 | 6.0 | 7.3 | 92.0 | 995.9 |
| 2009 | 4 | 30 | 15.6 | 7.8 | 2.0 | 4.9 | 76.7 | 1003.7 |
| | | | | Total monthly rainfall | 102.4 | | | |

| potential evapotranspiration (mm) | Class A pan evaporation (mm) |
|---|---|
| 46.3 | |

| METEOROLOGICAL DATA | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | May-09 |
| year | month | day | max. temperature (degrees Celsius) | min. temperature (degrees Celsius) | rainfall (mm) | mean wind speed (knots) | mean relative humididty (%) | mean CBL pressure (hPa) |
| 2009 | 5 | 1 | 15.6 | 5.7 | 4.4 | 10.5 | 74.3 | 1011.7 |
| 2009 | 5 | 2 | 13.9 | 4.6 | 4.6 | 7.1 | 80.1 | 1019.8 |
| 2009 | 5 | 3 | 13.1 | 3.9 | 0.1 | 7.9 | 74.0 | 1022.4 |
| 2009 | 5 | 4 | 14.4 | 7.3 | 0.8 | 12.0 | 84.3 | 1017.6 |
| 2009 | 5 | 5 | 16.2 | 10.6 | 0.0 | 13.7 | 76.5 | 1012.9 |
| 2009 | 5 | 6 | 16.1 | 8.0 | 1.5 | 13.5 | 77.9 | 1006.1 |
| 2009 | 5 | 7 | 14.3 | 5.4 | 2.8 | 13.0 | 74.5 | 999.6 |
| 2009 | 5 | 8 | 14.0 | 4.5 | 1.5 | 13.5 | 72.1 | 999.1 |
| 2009 | 5 | 9 | 14.1 | 6.1 | 0.6 | 8.7 | 72.3 | 1004.6 |
| 2009 | 5 | 10 | 14.7 | 4.8 | 0.0 | 2.9 | 72.9 | 1012.3 |
| 2009 | 5 | 11 | 15.8 | 4.5 | 0.0 | 6.5 | 65.6 | 1015.9 |
| 2009 | 5 | 12 | 14.6 | 4.8 | 0.0 | 5.9 | 63.7 | 1015.1 |
| 2009 | 5 | 13 | 12.1 | 4.6 | 0.9 | 4.4 | 83.5 | 1007.1 |
| 2009 | 5 | 14 | 13.9 | 9.7 | 1.0 | 3.3 | 93.6 | 1001.0 |
| 2009 | 5 | 15 | 12.9 | 5.5 | 1.2 | 5.3 | 90.1 | 993.0 |
| 2009 | 5 | 16 | 12.1 | 7.0 | 11.4 | 13.7 | 85.2 | 985.5 |
| 2009 | 5 | 17 | 11.8 | 6.8 | 7.9 | 9.1 | 84.5 | 989.2 |
| 2009 | 5 | 18 | 13.9 | 8.2 | 15.2 | 10.5 | 87.1 | 995.3 |
| 2009 | 5 | 19 | 14.8 | 8.4 | 6.7 | 9.7 | 85.9 | 1002.7 |
| 2009 | 5 | 20 | 14.4 | 7.9 | 1.6 | 7.0 | 86.5 | 1006.8 |
| 2009 | 5 | 21 | 15.3 | 6.5 | 0.1 | 6.6 | 77.2 | 1006.7 |
| 2009 | 5 | 22 | 19.4 | 9.2 | 1.0 | 7.8 | 87.4 | 1005.8 |
| 2009 | 5 | 23 | 14.8 | 6.5 | 0.9 | 8.7 | 80.2 | 1008.0 |
| 2009 | 5 | 24 | 18.2 | 4.5 | 0.0 | 6.4 | 74.3 | 1012.1 |
| 2009 | 5 | 25 | 17.8 | 7.3 | 0.2 | 5.0 | 83.1 | 1008.1 |
| 2009 | 5 | 26 | 15.0 | 4.3 | 0.8 | 10.2 | 73.4 | 1010.2 |
| 2009 | 5 | 27 | 16.0 | 8.8 | 3.8 | 11.2 | 91.6 | 1010.5 |
| 2009 | 5 | 28 | 22.3 | 11.5 | 0.0 | 4.8 | 80.7 | 1021.7 |
| 2009 | 5 | 29 | 19.5 | 10.5 | 0.0 | 7.4 | 86.1 | 1020.6 |
| 2009 | 5 | 30 | 20.3 | 9.4 | 0.0 | 5.9 | 72.4 | 1017.2 |
| 2009 | 5 | 31 | 21.5 | 7.2 | 0.0 | 3.5 | 69.3 | 1019.8 |
| | | | | **Total monthly rainfall** | **69.0** | | | |

| potential evapotranspiration (mm) | Class A pan evaporation (mm) |
|---|---|
| 72.6 | |

| METEOROLOGICAL DATA | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Jun-09 |
| year | month | day | max. temperature (degrees Celsius) | min. temperature (degrees Celsius) | rainfall (mm) | mean wind speed (knots) | mean relative humididty (%) | mean CBL pressure (hPa) |
| 2009 | 6 | 1 | 23.9 | 8.3 | 0.0 | 2.9 | 70.6 | 1020.2 |
| 2009 | 6 | 2 | 26.8 | 8.8 | 0.0 | 2.1 | 65.8 | 1019.7 |
| 2009 | 6 | 3 | 21.2 | 8.5 | 0.0 | 5.1 | 74.0 | 1015.7 |
| 2009 | 6 | 4 | 20.7 | 5.9 | 0.0 | 3.1 | 75.6 | 1011.3 |
| 2009 | 6 | 5 | 16.1 | 5.4 | 0.0 | 6.8 | 75.9 | 1003.4 |
| 2009 | 6 | 6 | 9.7 | 4.6 | 16.7 | 9.1 | 90.1 | 996.7 |
| 2009 | 6 | 7 | 14.4 | 7.7 | 1.2 | 7.9 | 76.2 | 997.6 |
| 2009 | 6 | 8 | 14.2 | 5.5 | 0.3 | 6.4 | 78.3 | 999.6 |
| 2009 | 6 | 9 | 15.2 | 7.5 | 0.1 | 5.3 | 72.1 | 1002.7 |
| 2009 | 6 | 10 | 16.0 | 5.6 | 0.3 | 2.9 | 78.9 | 1004.4 |
| 2009 | 6 | 11 | -999.0 | -999.0 | 0.0 | -999.0 | 73.2 | 1011.0 |
| 2009 | 6 | 12 | 16.9 | 9.0 | 0.8 | 7.3 | 83.3 | 1010.8 |
| 2009 | 6 | 13 | 19.2 | 10.3 | 0.1 | 9.1 | 77.4 | 1009.2 |
| 2009 | 6 | 14 | 18.0 | 9.4 | 3.1 | 5.4 | 84.0 | 1009.8 |
| 2009 | 6 | 15 | 18.0 | 8.4 | 0.4 | 4.1 | 84.4 | 1008.8 |
| 2009 | 6 | 16 | 20.9 | 7.6 | 0.9 | 7.7 | 80.3 | 1012.2 |
| 2009 | 6 | 17 | 17.1 | 9.1 | 26.4 | 11.2 | 80.4 | 1004.8 |
| 2009 | 6 | 18 | 16.8 | 8.9 | 0.7 | 10.8 | 76.4 | 1008.8 |
| 2009 | 6 | 19 | 16.7 | 9.5 | 0.0 | 10.5 | 72.6 | 1015.5 |
| 2009 | 6 | 20 | 18.8 | 11.5 | 0.0 | 7.4 | 73.2 | 1018.9 |
| 2009 | 6 | 21 | 22.7 | 11.6 | 0.4 | 4.7 | 83.9 | 1019.3 |
| 2009 | 6 | 22 | 22.4 | 14.2 | 0.0 | 3.8 | 84.1 | 1021.1 |
| 2009 | 6 | 23 | 24.0 | 14.2 | 0.0 | 4.1 | 75.2 | 1020.1 |
| 2009 | 6 | 24 | 20.6 | 12.1 | 0.0 | 5.1 | 70.3 | 1013.9 |
| 2009 | 6 | 25 | 21.8 | 12.5 | 0.1 | 4.1 | 71.0 | 1007.1 |
| 2009 | 6 | 26 | 19.0 | 13.9 | 10.6 | 3.9 | 90.5 | 1005.2 |
| 2009 | 6 | 27 | 21.5 | 12.6 | 0.0 | 5.0 | 83.4 | 1007.8 |
| 2009 | 6 | 28 | 20.1 | 10.2 | 2.6 | 5.5 | 84.6 | 1007.2 |
| 2009 | 6 | 29 | 21.2 | 13.6 | 0.1 | 4.2 | 87.2 | 1008.7 |
| 2009 | 6 | 30 | 22.9 | 11.9 | 0.2 | 6.9 | 85.4 | 1011.9 |
| | | | | **Total monthly rainfall** | **65.0** | | | |

| potential evapotranspiration (mm) | Class A pan evaporation (mm) |
|---|---|
| 84.6 | |

| METEOROLOGICAL DATA | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Jul-09 |
| year | month | day | max. temperature (degrees Celsius) | min. temperature (degrees Celsius) | rainfall (mm) | mean wind speed (knots) | mean relative humididty (%) | mean CBL pressure (hPa) |
| 2009 | 7 | 1 | 19.6 | 16.6 | 5.9 | 5.8 | 94.4 | 1013.2 |
| 2009 | 7 | 2 | 19.5 | 16.0 | 14.4 | 5.3 | 94.2 | 1009.2 |
| 2009 | 7 | 3 | 20.9 | 13.6 | 0.2 | 9.4 | 82.2 | 1003.2 |
| 2009 | 7 | 4 | 19.8 | 12.3 | 17.7 | 9.0 | 82.1 | 1000.3 |
| 2009 | 7 | 5 | 18.3 | 10.9 | 3.8 | 8.8 | 87.5 | 996.5 |
| 2009 | 7 | 6 | 17.7 | 9.1 | 5.1 | 5.6 | 87.8 | 995.2 |
| 2009 | 7 | 7 | 20.1 | 12.0 | 0.0 | 9.3 | 76.1 | 1001.6 |
| 2009 | 7 | 8 | 18.3 | 12.1 | 0.0 | 6.3 | 71.6 | 1009.3 |
| 2009 | 7 | 9 | 17.0 | 10.6 | 0.0 | 4.6 | 72.3 | 1011.8 |
| 2009 | 7 | 10 | 15.6 | 7.8 | 1.7 | 4.1 | 88.7 | 1008.8 |
| 2009 | 7 | 11 | 17.8 | 14.0 | 21.2 | 7.5 | 95.0 | 998.8 |
| 2009 | 7 | 12 | 18.9 | 12.1 | 5.8 | 9.0 | 81.0 | 995.8 |
| 2009 | 7 | 13 | 17.3 | 10.6 | 10.8 | 7.2 | 90.4 | 995.2 |
| 2009 | 7 | 14 | 18.7 | 10.5 | 10.4 | 4.9 | 88.2 | 994.9 |
| 2009 | 7 | 15 | 21.5 | 9.7 | 0.2 | 5.0 | 80.4 | 1002.0 |
| 2009 | 7 | 16 | 18.0 | 10.6 | 6.0 | 3.2 | 85.5 | 1008.3 |
| 2009 | 7 | 17 | 19.3 | 11.1 | 0.1 | 9.5 | 72.3 | 1006.6 |
| 2009 | 7 | 18 | 16.1 | 10.4 | 3.3 | 5.8 | 84.3 | 1004.1 |
| 2009 | 7 | 19 | 19.2 | 10.3 | 1.4 | 6.0 | 80.1 | 1001.7 |
| 2009 | 7 | 20 | 19.8 | 9.9 | 0.0 | 7.9 | 77.9 | 1004.1 |
| 2009 | 7 | 21 | 20.1 | 11.4 | 8.6 | 11.1 | 85.1 | 990.6 |
| 2009 | 7 | 22 | 20.4 | 12.2 | 1.5 | 8.1 | 86.4 | 986.9 |
| 2009 | 7 | 23 | 20.5 | 11.7 | 7.8 | 6.6 | 86.5 | 992.5 |
| 2009 | 7 | 24 | 20.2 | 10.8 | 2.0 | 5.8 | 85.6 | 1002.1 |
| 2009 | 7 | 25 | 20.7 | 8.4 | 2.4 | 7.6 | 82.8 | 1011.2 |
| 2009 | 7 | 26 | 19.0 | 13.1 | 6.7 | 11.7 | 82.5 | 1001.2 |
| 2009 | 7 | 27 | 19.9 | 12.1 | 0.1 | 10.1 | 73.8 | 1001.6 |
| 2009 | 7 | 28 | 17.1 | 11.4 | 4.3 | 10.5 | 89.6 | 1000.9 |
| 2009 | 7 | 29 | 18.0 | 8.9 | 0.2 | 5.4 | 82.2 | 1001.4 |
| 2009 | 7 | 30 | 19.0 | 9.8 | 0.0 | 8.8 | 70.9 | 1010.3 |
| 2009 | 7 | 31 | 15.3 | 10.6 | 10.8 | 10.8 | 92.8 | 1004.9 |
| | | | | **Total monthly rainfall** | **152.4** | | | |

| potential evapotranspiration (mm) | Class A pan evaporation (mm) |
|---|---|
| 76.4 | |

| METEOROLOGICAL DATA | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Aug-09 |
| year | month | day | max. temperature (degrees Celsius) | min. temperature (degrees Celsius) | rainfall (mm) | mean wind speed (knots) | mean relative humididty (%) | mean CBL pressure (hPa) |
| 2009 | 8 | 1 | 19.0 | 9.9 | 0.1 | 10.1 | 78.2 | 999.3 |
| 2009 | 8 | 2 | 19.1 | 8.8 | 0.1 | 7.8 | 80.4 | 1003.0 |
| 2009 | 8 | 3 | 19.6 | 13.4 | 6.8 | 11.4 | 89.0 | 998.9 |
| 2009 | 8 | 4 | 20.7 | 13.4 | 0.1 | 10.9 | 82.2 | 1000.1 |
| 2009 | 8 | 5 | 21.2 | 11.5 | 0.0 | 10.8 | 73.9 | 1006.4 |
| 2009 | 8 | 6 | 20.9 | 9.5 | 0.2 | 5.2 | 80.6 | 1011.8 |
| 2009 | 8 | 7 | 19.6 | 8.8 | 0.0 | 4.5 | 75.5 | 1014.1 |
| 2009 | 8 | 8 | 22.2 | 12.2 | 4.8 | 6.5 | 84.7 | 1012.6 |
| 2009 | 8 | 9 | 19.9 | 13.6 | 0.4 | 6.2 | 87.7 | 1010.2 |
| 2009 | 8 | 10 | 19.8 | 13.7 | 1.1 | 7.9 | 86.5 | 1006.3 |
| 2009 | 8 | 11 | 21.7 | 13.5 | 0.0 | 6.7 | 81.9 | 1014.4 |
| 2009 | 8 | 12 | 21.7 | 13.8 | 0.8 | 6.4 | 85.3 | 1012.8 |
| 2009 | 8 | 13 | 19.3 | 12.2 | 0.0 | 3.1 | 74.4 | 1013.0 |
| 2009 | 8 | 14 | 22.0 | 12.9 | 0.1 | 9.6 | 85.5 | 1005.3 |
| 2009 | 8 | 15 | 20.2 | 12.4 | 5.2 | 10.0 | 82.7 | 1002.2 |
| 2009 | 8 | 16 | 18.9 | 13.0 | 0.2 | 9.8 | 76.6 | 1006.8 |
| 2009 | 8 | 17 | 21.6 | 13.2 | 0.2 | 8.3 | 76.8 | 1007.4 |
| 2009 | 8 | 18 | 19.7 | 13.7 | 0.8 | 10.8 | 89.3 | 1005.4 |
| 2009 | 8 | 19 | 21.2 | 16.0 | 9.0 | 11.8 | 90.7 | 1000.4 |
| 2009 | 8 | 20 | 18.8 | 11.3 | 30.8 | 10.0 | 84.2 | 998.8 |
| 2009 | 8 | 21 | 18.5 | 9.4 | 0.9 | 9.3 | 74.4 | 1009.4 |
| 2009 | 8 | 22 | 20.0 | 7.7 | 1.9 | 8.9 | 81.0 | 1010.9 |
| 2009 | 8 | 23 | 19.3 | 10.4 | 2.1 | 11.6 | 89.9 | 999.5 |
| 2009 | 8 | 24 | 18.4 | 7.6 | 2.1 | 9.2 | 79.3 | 996.0 |
| 2009 | 8 | 25 | 19.5 | 9.1 | 1.0 | 8.6 | 76.9 | 997.2 |
| 2009 | 8 | 26 | 20.8 | 12.7 | 9.8 | 10.4 | 86.9 | 993.5 |
| 2009 | 8 | 27 | 16.9 | 9.3 | 2.4 | 10.1 | 85.9 | 1000.8 |
| 2009 | 8 | 28 | 17.0 | 9.8 | 3.6 | 11.2 | 81.0 | 1005.2 |
| 2009 | 8 | 29 | 16.5 | 8.2 | 0.1 | 7.8 | 80.8 | 1012.8 |
| 2009 | 8 | 30 | 19.0 | 9.6 | 4.3 | 8.4 | 95.1 | 1003.9 |
| 2009 | 8 | 31 | 17.0 | 11.0 | 12.0 | 11.4 | 93.7 | 994.6 |
| | | | | **Total monthly rainfall** | **100.9** | | | |

| potential evapotranspiration (mm) | Class A pan evaporation (mm) |
|---|---|
| 67.6 | |

| METEOROLOGICAL DATA | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Sep-09 |
| year | month | day | max. temperature (degrees Celsius) | min. temperature (degrees Celsius) | rainfall (mm) | mean wind speed (knots) | mean relative humididty (%) | mean CBL pressure (hPa) |
| 2009 | 9 | 1 | 17.3 | 9.9 | 3.9 | 8.7 | 82.5 | 994.3 |
| 2009 | 9 | 2 | 14.4 | 9.6 | 25.6 | 7.4 | 94.2 | 992.1 |
| 2009 | 9 | 3 | 16.2 | 9.4 | 1.1 | 11.3 | 80.3 | 994.1 |
| 2009 | 9 | 4 | 17.3 | 8.4 | 0.8 | 11.3 | 79.1 | 1004.3 |
| 2009 | 9 | 5 | 16.0 | 10.4 | 0.0 | 8.6 | 77.9 | 1013.2 |
| 2009 | 9 | 6 | 15.8 | 11.8 | 5.4 | 10.7 | 89.0 | 1008.0 |
| 2009 | 9 | 7 | 18.5 | 10.9 | 0.4 | 8.9 | 82.4 | 1006.6 |
| 2009 | 9 | 8 | 17.7 | 9.8 | 3.5 | 11.2 | 90.5 | 1005.2 |
| 2009 | 9 | 9 | 18.0 | 6.3 | 0.1 | 3.3 | 79.9 | 1024.5 |
| 2009 | 9 | 10 | 19.6 | 5.6 | 0.1 | 3.1 | 82.9 | 1031.3 |
| 2009 | 9 | 11 | 20.8 | 4.5 | 0.1 | 1.6 | 84.7 | 1030.6 |
| 2009 | 9 | 12 | -999.0 | -999.0 | 0.2 | 2.2 | 83.7 | 1025.6 |
| 2009 | 9 | 13 | 21.2 | 5.5 | 0.1 | 2.3 | 88.2 | 1023.4 |
| 2009 | 9 | 14 | 17.3 | 6.5 | 0.1 | 4.0 | 84.7 | 1023.3 |
| 2009 | 9 | 15 | 16.4 | 7.1 | 0.0 | 6.6 | 85.2 | 1021.4 |
| 2009 | 9 | 16 | 15.9 | 9.4 | 0.1 | 6.2 | 85.1 | 1020.5 |
| 2009 | 9 | 17 | 14.0 | 6.9 | 0.0 | 2.8 | 82.0 | 1017.4 |
| 2009 | 9 | 18 | 15.4 | 8.0 | 0.0 | 2.6 | 80.5 | 1011.2 |
| 2009 | 9 | 19 | 15.6 | 6.0 | 0.1 | 4.1 | 85.8 | 1010.3 |
| 2009 | 9 | 20 | 17.1 | 4.2 | 0.0 | 4.7 | 81.2 | 1017.0 |
| 2009 | 9 | 21 | 19.7 | 10.4 | 0.0 | 11.0 | 79.6 | 1014.3 |
| 2009 | 9 | 22 | 17.4 | 11.0 | 0.1 | 10.1 | 77.2 | 1014.0 |
| 2009 | 9 | 23 | 17.5 | 7.5 | 0.1 | 8.3 | 79.2 | 1018.0 |
| 2009 | 9 | 24 | 16.4 | 6.9 | 0.0 | 5.2 | 79.6 | 1019.9 |
| 2009 | 9 | 25 | 18.8 | 9.4 | 0.0 | 6.3 | 76.8 | 1019.9 |
| 2009 | 9 | 26 | 17.6 | 12.4 | 0.0 | 2.7 | 80.4 | 1021.1 |
| 2009 | 9 | 27 | 17.3 | 12.1 | 0.0 | 5.1 | 85.0 | 1022.0 |
| 2009 | 9 | 28 | 17.8 | 13.0 | 0.0 | 7.0 | 81.9 | 1021.2 |
| 2009 | 9 | 29 | 17.2 | 12.8 | 0.0 | 5.5 | 84.0 | 1017.8 |
| 2009 | 9 | 30 | 18.1 | 9.6 | 0.0 | 3.4 | 84.2 | 1014.4 |
| | | | | **Total monthly rainfall** | **41.8** | | | |

| potential evapotranspiration (mm) | Class A pan evaporation (mm) |
|---|---|
| 93.9 | |

| METEOROLOGICAL DATA | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Oct-09 |
| year | month | day | max. temperature (degrees Celsius) | min. temperature (degrees Celsius) | rainfall (mm) | mean wind speed (knots) | mean relative humididty (%) | mean CBL pressure (hPa) |
| 2009 | 10 | 1 | 13.0 | 9.4 | 0.0 | 4.8 | 79.4 | 1015.4 |
| 2009 | 10 | 2 | 16.8 | 8.2 | 0.0 | 9.4 | 81.8 | 1012.6 |
| 2009 | 10 | 3 | 14.2 | 8.5 | 1.4 | 11.0 | 79.8 | 1001.3 |
| 2009 | 10 | 4 | 13.9 | 6.9 | 0.0 | 3.7 | 81.8 | 1004.6 |
| 2009 | 10 | 5 | 16.4 | 7.5 | 0.0 | 3.6 | 80.8 | 1001.4 |
| 2009 | 10 | 6 | 14.0 | 5.2 | 25.2 | 5.9 | 95.4 | 995.8 |
| 2009 | 10 | 7 | 12.1 | 2.1 | 0.1 | 1.8 | 90.1 | 1006.1 |
| 2009 | 10 | 8 | 14.3 | 5.3 | 0.0 | 1.6 | 81.5 | 1011.6 |
| 2009 | 10 | 9 | 15.4 | 6.2 | 9.6 | 6.6 | 90.5 | 1003.5 |
| 2009 | 10 | 10 | 15.5 | 8.9 | 0.2 | 4.4 | 87.0 | 1008.1 |
| 2009 | 10 | 11 | 15.3 | 7.0 | 1.6 | 6.7 | 86.2 | 1011.2 |
| 2009 | 10 | 12 | 15.4 | 2.1 | 0.1 | 3.0 | 88.0 | 1022.2 |
| 2009 | 10 | 13 | 15.1 | 4.9 | 0.1 | 2.6 | 92.3 | 1023.0 |
| 2009 | 10 | 14 | 14.3 | 11.2 | 0.1 | 3.2 | 93.8 | 1023.2 |
| 2009 | 10 | 15 | 15.1 | 10.4 | 0.1 | 2.1 | 92.2 | 1026.6 |
| 2009 | 10 | 16 | 15.4 | 4.5 | 0.0 | 3.2 | 91.0 | 1028.7 |
| 2009 | 10 | 17 | 13.9 | 1.4 | 0.0 | 2.5 | 92.5 | 1024.5 |
| 2009 | 10 | 18 | 14.2 | 7.1 | 0.6 | 6.4 | 90.2 | 1013.8 |
| 2009 | 10 | 19 | 13.0 | 10.3 | 0.7 | 10.9 | 87.5 | 997.1 |
| 2009 | 10 | 20 | 14.8 | 8.6 | 11.0 | 9.7 | 87.2 | 980.2 |
| 2009 | 10 | 21 | 13.6 | 8.9 | 28.5 | 10.3 | 89.2 | 979.0 |
| 2009 | 10 | 22 | 14.1 | 9.6 | 20.8 | 5.1 | 93.7 | 983.5 |
| 2009 | 10 | 23 | 13.9 | 8.6 | 0.8 | 5.0 | 93.0 | 995.3 |
| 2009 | 10 | 24 | 16.2 | 11.2 | 5.8 | 13.7 | 88.0 | 990.3 |
| 2009 | 10 | 25 | 14.7 | 10.7 | 0.3 | 11.9 | 84.0 | 1001.0 |
| 2009 | 10 | 26 | 13.6 | 6.9 | 0.2 | 4.7 | 94.0 | 1008.1 |
| 2009 | 10 | 27 | 15.5 | 12.4 | 3.3 | 11.6 | 91.8 | 1002.6 |
| 2009 | 10 | 28 | 16.9 | 10.8 | 0.2 | 7.3 | 90.0 | 1006.8 |
| 2009 | 10 | 29 | 15.6 | 12.8 | 0.2 | 10.6 | 94.9 | 1007.9 |
| 2009 | 10 | 30 | 15.9 | 12.3 | 16.4 | 11.7 | 95.9 | 1004.7 |
| 2009 | 10 | 31 | 16.7 | 10.7 | 0.5 | 7.0 | 92.8 | 1008.1 |
| | | | | **Total monthly rainfall** | **127.8** | | | |

| potential evapotranspiration (mm) | Class A pan evaporation (mm) |
|---|---|
| 24.1 | |

| METEOROLOGICAL DATA | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Nov-09 |
| year | month | day | max. temperature (degrees Celsius) | min. temperature (degrees Celsius) | rainfall (mm) | mean wind speed (knots) | mean relative humididty (%) | mean CBL pressure (hPa) |
| 2009 | 11 | 1 | 13.2 | 6.0 | 24.7 | 10.1 | 88.4 | 990.9 |
| 2009 | 11 | 2 | 10.6 | 5.4 | 2.6 | 8.2 | 88.6 | 990.0 |
| 2009 | 11 | 3 | 11.8 | 5.9 | 5.8 | 11.2 | 84.6 | 978.2 |
| 2009 | 11 | 4 | 11.8 | 6.1 | 1.7 | 13.2 | 82.4 | 977.8 |
| 2009 | 11 | 5 | 11.1 | 6.8 | 0.0 | 13.4 | 80.1 | 990.2 |
| 2009 | 11 | 6 | 11.8 | 3.9 | 4.6 | 8.9 | 84.4 | 990.5 |
| 2009 | 11 | 7 | 8.9 | 3.4 | 4.9 | 9.3 | 89.0 | 984.7 |
| 2009 | 11 | 8 | 11.2 | 1.3 | 0.0 | 6.6 | 84.8 | 1003.7 |
| 2009 | 11 | 9 | 9.9 | 0.3 | 13.8 | 4.7 | 95.6 | 1009.7 |
| 2009 | 11 | 10 | 10.4 | 0.8 | 1.8 | 4.1 | 92.5 | 1004.6 |
| 2009 | 11 | 11 | 10.1 | -0.3 | 12.1 | 4.0 | 100.0 | 993.6 |
| 2009 | 11 | 12 | 12.1 | 5.7 | 6.1 | 9.9 | 86.9 | 983.2 |
| 2009 | 11 | 13 | 11.7 | 3.1 | 9.1 | 5.6 | 87.6 | 982.3 |
| 2009 | 11 | 14 | 10.2 | 3.3 | 6.1 | 8.9 | 86.6 | 976.7 |
| 2009 | 11 | 15 | 12.8 | 5.0 | 1.2 | 7.8 | 90.8 | 989.6 |
| 2009 | 11 | 16 | 11.2 | 6.8 | 11.4 | 11.6 | 85.1 | 984.8 |
| 2009 | 11 | 17 | 10.9 | 4.8 | 1.4 | 10.9 | 83.7 | 993.5 |
| 2009 | 11 | 18 | 13.2 | 6.5 | 11.9 | 15.6 | 90.9 | 991.7 |
| 2009 | 11 | 19 | 13.7 | 11.9 | 32.1 | 20.5 | 94.7 | 987.3 |
| 2009 | 11 | 20 | 12.2 | 5.6 | 0.3 | 8.6 | 84.2 | 998.0 |
| 2009 | 11 | 21 | 14.3 | 8.6 | 16.4 | 16.8 | 86.2 | 991.3 |
| 2009 | 11 | 22 | 9.3 | 5.9 | 5.8 | 18.9 | 80.8 | 983.2 |
| 2009 | 11 | 23 | 10.8 | 7.2 | 12.2 | 12.2 | 85.8 | 989.5 |
| 2009 | 11 | 24 | 12.8 | 5.5 | 9.6 | 13.7 | 90.2 | 987.3 |
| 2009 | 11 | 25 | 9.1 | 5.3 | 0.4 | 15.3 | 79.5 | 983.6 |
| 2009 | 11 | 26 | 8.3 | 3.6 | 0.1 | 8.2 | 83.0 | 988.0 |
| 2009 | 11 | 27 | 7.2 | 1.6 | 0.1 | 7.2 | 89.0 | 988.3 |
| 2009 | 11 | 28 | 2.4 | -0.5 | 5.9 | 4.1 | 99.9 | 983.4 |
| 2009 | 11 | 29 | 5.8 | 1.5 | 13.4 | 14.1 | 89.4 | 982.9 |
| 2009 | 11 | 30 | 4.2 | -2.3 | 0.0 | 6.2 | 87.6 | 1002.3 |
| | | | | Total monthly rainfall | 215.5 | | | |

| potential evapotranspiration (mm) | Class A pan evaporation (mm) |
|---|---|
| 13.5 | |

| METEOROLOGICAL DATA | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Dec-09 |
| year | month | day | max. temperature (degrees Celsius) | min. temperature (degrees Celsius) | rainfall (mm) | mean wind speed (knots) | mean relative humididty (%) | mean CBL pressure (hPa) |
| 2009 | 12 | 1 | 8.7 | -2.3 | 5.2 | 10.0 | 82.6 | 995.3 |
| 2009 | 12 | 2 | 9.2 | 3.2 | 9.8 | 5.2 | 94.8 | 984.6 |
| 2009 | 12 | 3 | 6.9 | 2.0 | 0.5 | 10.2 | 85.1 | 995.0 |
| 2009 | 12 | 4 | 10.2 | -0.4 | 13.6 | 5.1 | 96.0 | 994.6 |
| 2009 | 12 | 5 | 11.6 | 5.5 | 9.2 | 11.2 | 92.9 | 981.3 |
| 2009 | 12 | 6 | 8.2 | 3.9 | 0.5 | 11.3 | 83.4 | 980.4 |
| 2009 | 12 | 7 | 8.1 | 3.5 | 5.4 | 9.1 | 89.1 | 984.7 |
| 2009 | 12 | 8 | 11.8 | 2.9 | 3.4 | 9.0 | 91.3 | 995.0 |
| 2009 | 12 | 9 | 10.8 | 5.1 | 3.9 | 7.6 | 88.8 | 1004.4 |
| 2009 | 12 | 10 | 9.1 | 1.2 | 0.2 | 4.8 | 91.8 | 1019.5 |
| 2009 | 12 | 11 | 9.3 | 3.5 | 0.0 | 8.0 | 88.8 | 1022.5 |
| 2009 | 12 | 12 | 7.4 | 1.1 | 0.0 | 4.0 | 86.8 | 1025.8 |
| 2009 | 12 | 13 | 3.1 | -1.8 | 0.0 | 3.2 | 97.5 | 1025.3 |
| 2009 | 12 | 14 | 6.1 | -1.2 | 0.3 | 4.3 | 97.9 | 1018.7 |
| 2009 | 12 | 15 | 7.4 | 1.8 | 1.3 | 6.3 | 93.3 | 1012.7 |
| 2009 | 12 | 16 | 6.1 | 2.1 | 1.1 | 4.9 | 97.0 | 1008.4 |
| 2009 | 12 | 17 | 4.9 | 0.0 | 0.3 | 7.2 | 92.6 | 1010.3 |
| 2009 | 12 | 18 | 0.8 | -2.6 | 0.1 | 6.3 | 83.6 | 1016.2 |
| 2009 | 12 | 19 | 4.5 | -3.8 | 2.1 | 4.8 | 93.1 | 1006.6 |
| 2009 | 12 | 20 | 2.3 | -1.8 | 0.0 | 8.6 | 89.8 | 993.7 |
| 2009 | 12 | 21 | 1.2 | -3.3 | 0.0 | 3.9 | 95.7 | 981.5 |
| 2009 | 12 | 22 | 2.0 | -3.6 | 0.0 | 3.7 | 96.2 | 979.0 |
| 2009 | 12 | 23 | 1.0 | -4.9 | 0.0 | 3.5 | 96.1 | 979.3 |
| 2009 | 12 | 24 | 0.3 | -3.1 | 0.0 | 5.8 | 96.5 | 98101.0 |
| 2009 | 12 | 25 | 3.6 | -4.7 | 4.7 | 4.2 | 99.1 | 988.0 |
| 2009 | 12 | 26 | 5.9 | 0.2 | 0.7 | 6.5 | 91.9 | 985.5 |
| 2009 | 12 | 27 | 5.9 | -1.9 | 0.1 | 8.3 | 85.0 | 992.9 |
| 2009 | 12 | 28 | 4.0 | -4.9 | 0.0 | 2.3 | 97.6 | 994.9 |
| 2009 | 12 | 29 | 4.7 | 2.6 | 2.2 | 9.7 | 84.3 | 986.2 |
| 2009 | 12 | 30 | 4.4 | 2.7 | 8.3 | 11.4 | 86.5 | 984.1 |
| 2009 | 12 | 31 | 4.4 | -2.3 | 0.0 | 9.0 | 83.9 | 997.9 |
| | | | | **Total monthly rainfall** | **72.9** | | | |

| potential evapotranspiration (mm) | Class A pan evaporation (mm) |
|---|---|
| 6.6 | |

# Appendix F

Restoration Plan

&

Aftercare Plan

DUNMORE
COTTAGE

EP

Total Depth
of Lagoon
3.45m

62m

MH1 Base depth 50.46
Present Height 64m
Final Height 62m

MH2 Base depth 50.11m (Blocked)
Present Height 60.684m
Final Height 61.5m

61m

60m

54m

MH3 Base depth 48.836m
Final & Present Height 55.341m

MH7 Base depth 50.136
Side Riser 8.2m

MH6 Base depth 49.946
Side Riser 6.5m

MH4 Base depth 49.616
Final & Present Height 53.036m

MH5 Base depth 49.23
Final & Present Height 53.22m

Total Depth
of Lagoon
3.25m

54m
56.5
58.5m
60.5
61.5m

61.5m
56.5m
58.5m
60.5m

60.1

61.2

61.8

DEC.

Revision Description By Da

Restotation Plan
01/07/03 800
1:2500
30-2-DWG03

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DUNMORE
COTTAGE

Road Edge Planting to be completed as part of road contract

Existing hedge line retained, protected and replaced as necessary

Ornamental planting for Civic Amenity Site

New hedge row to be established

Road Edge Planting to be completed as part of road contract

Woodland to be established as part of the final cap on landfilled areas

Grassed Area

Existing hedge line retained, protected and replaced as necessary

Woodland to be established as part of the final cap on landfilled areas

All landfill infrastructure to be removed

Entrance to lagoon and lagoon to be retained

Hedgeline to be renewed in this area

New Hedge Line to be established

Grassed Area

Grassed Area

Existing hedge line retained, protected and replaced as necessary

DEC.

EP

60.1

61.2

61.8

## List of Species to be Used

| *Tree/plant type* | *Species* |
|---|---|
| Common Ash | Fraxinus Excelsior |
| Hawthorn | Crataegus Monogyna |
| Whitebeam | Sorbus Hibernica |
| Blackthorn | Prunus Spinosa |
| Elder | Sambucas Nigra |
| Cherry | Prunus Avium |
| Gorse | Ulex Europaeus |
| Bristly ox tongue | Picris Hieracioides |
| Holly | Ilex Aquifolium |
| Hazel | Corylus Avellana |
| Common Beech | Figus Sylvatica |
| Silver Beech | Betula Pendula |

OS Licence Number
Kilkenny CCMA 9802

| Revision | Description | By | Da |
|---|---|---|---|

Restotation Plan
01/07/03 BOD
1:2500
30-2-DWG02

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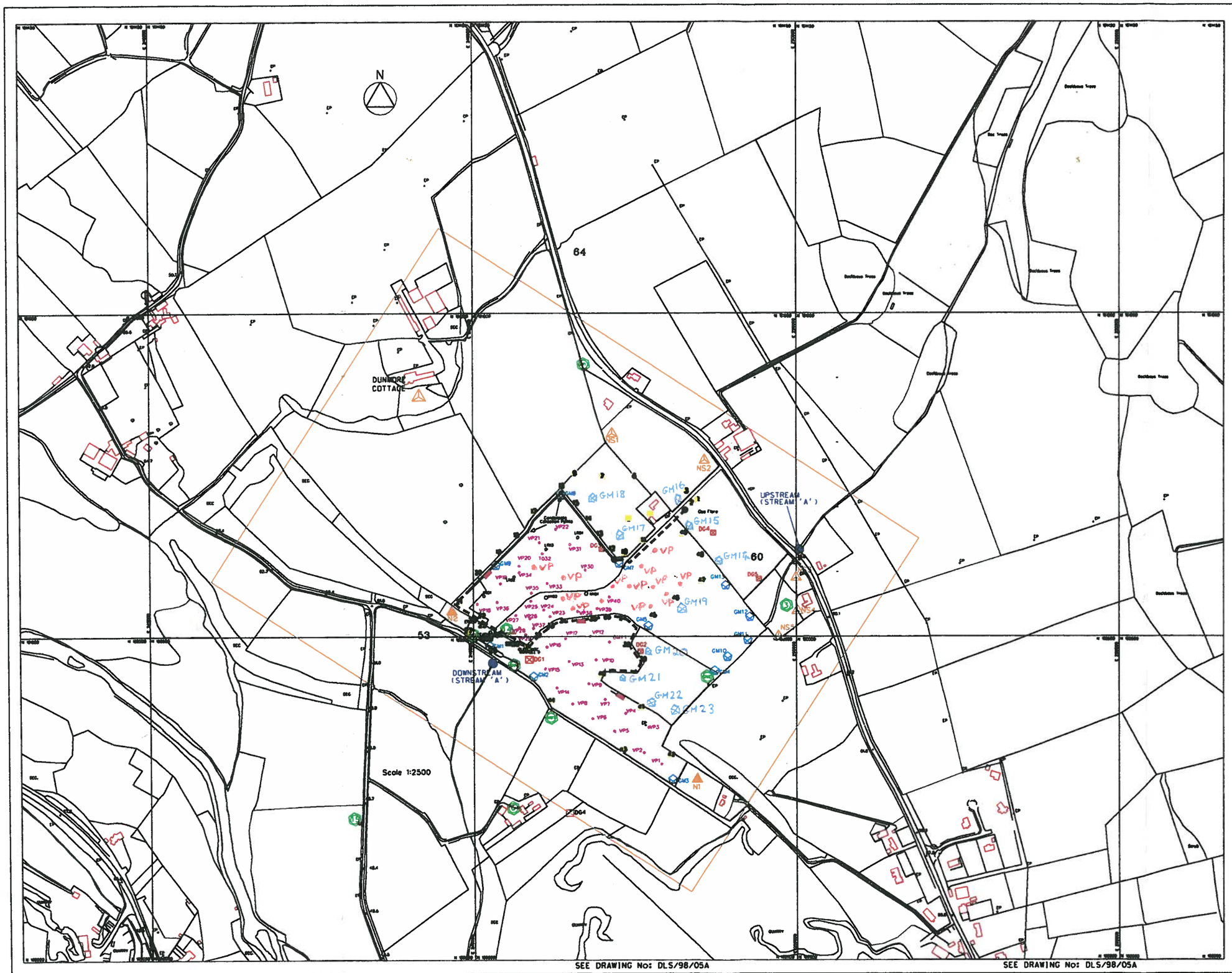


EXTRACT FROM O.S.S. Nos: 4645-C & 4645-D
OS Licence No.Kilkenny CCMA9802

LEGEND:

- GROUNDWATER MONITORING POINTS
- SURFACE WATER MONITORING POINTS
- NOISE MONITORING POINTS
- GAS MONITORING POINTS — VP
- GAS MIGRATION MONITORING POINTS — GM
- DUST MONITORING POINTS — DG
- BAIT BOXES — 13

| REVISION | DESCRIPTION | BY | DATE |
|---|---|---|---|
| K | Alteration of Noise, Dust, Leachate, Gas Monitoring Points | MG | June '06 |
| J | Alteration of Bait Monitoring Points | MG | Mar '06 |
| I | Alteration of Gas Well Points | MG | JAN '05 |
| H | Alteration of Noise Monitoring Points | BOD | OCT '03 |
| G | Vermin Baits Pts. 7-11 Removed | BOD | SEP '02 |
| F | Vermin Bait Box Points Added Pts. 1-40 | BOD | JAN '01 |
| E | GAS MONITORING POINTS (VP19,VP20 & VP21) ADDED<br>DUST MONITORING POINT (DG 5) ADDED | BOD | JAN '00 |
| D | GROUNDWATER MONITORING POINTS MW1 ADDED | ROC | MAY '99 |
| C | GAS MONITORING POINTS (VP17 & VP18) ADDED<br>GROUNDWATER MONITORING POINTS GW1 TO GW4 ADDED | ROC | APR '99 |
| B | GAS MONITORING POINTS (VP15 & VP16) ADDED | ROC | NOV '98 |
| A | GAS MIGRATION MONITORING POINTS ADDED<br>DUST MONITORING POINTS ADDED<br>CPC GAS REMOVAL LOCATION ADDED<br>GROUNDWATER MONITORING POINT 13 - RELOCATED TO CORRECT POSITION | ROC | AUG '98<br>AUG '98<br>AUG '98<br>AUG '98 |

PROJECT: DUNMORE LANDFILL SITE

ENVIRONMENT SECTION
KILKENNY CO.CO.
COUNTY HALL,
JOHN STREET,
KILKENNY.

DESC: MONITORING POINTS
DATE: MAY '99 BY: ROC
SCALES: Not to Scale
DRAWING NO: DLS/98/05/RevE

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# Appendix G

Status of Objectives and Targets

| Objectives | | Status | Comments |
|---|---|---|---|
| **Objective 1** | | | |
| Ensure that all waste acceptance requirements are met | | | |
| **Target 1.1** | All waste accepted at the facility are within the criteria set out in Part I of the Waste Licence | Compliant | |
| **Target 1.2** | The amounts of each category of waste recovered and disposed if at the facility does not exceed that specified in Schedule A of the Waste Licence | Compliant | |
| **Target 1.3** | Any restriction on waste entering the facility shall be strictly enforced | Compliant | |
| **Target 1.4** | All waste accepted for recovery and disposal shall be done so within the opening hours i.e. 8.00 – 4.30 Mon –Fri. and 8.00 12.00 Sat. | Compliant | |
| **Objective 2** | | | |
| Establish and Environmental Management System to fulfil the obligation of the Waste Licence. | | | |
| **Target 2.1** | The facility shall employ a suitably qualified facility manager as the person in charge | In place since licence granted | |

| | | | |
|---|---|---|---|
| | and that this person or a nominated deputy shall be present at all times at the facility, this person will be in place from the grant date of the licence. | | |
| **Target 2.2** | The facility manager and deputy shall complete the FAS Waste Management Training Program within 12 months of their appointment. | Completed | |
| **Target 2.3** | All personnel performing specially assigned tasks shall receive all appropriate instruction prior to carrying out that function | Ongoing as part of awareness and training | |
| **Target 2.4** | Submission of details of management structure for Dunmore Landfill Facility by the end of August 2002, which will be reviewed annually or as required. | Completed and reviewed as required | Submitted 04/12/02<br>Oct 2004<br>Jan 2007 |
| **Target 2.5** | Preparation and submission of an Environmental Management Program (EMP) to the Environmental Protection Agency by the end of November 2002, which will be reviewed annually in November and submitted to the Agency or as required. | Completed and reviewed as required | Submitted 09/04/04 |
| **Target 2.6** | Preparation and submission of an | Completed | |

| | | | |
|---|---|---|---|
| | Environmental Management System (EMS) to the Environmental Protection Agency by the end of November 2002, which will be reviewed annually in November and submitted to the Agency or as required. | and reviewed as required | Submitted 09/04/04 |
| **Target 2.7** | Establish awareness and training procedures for personnel at Dunmore Landfill Facility which will form part of the EMS | Ongoing | |
| **Target 2.8** | Submission to the EPA of a communications program as part of the EMS | Completed | Submitted as part of EMS 09/04/03 |
| **Target 2.9** | Preparation and submission of a corrective action procedure, which will be submitted to the Agency as part of the EMS | Completed | Submitted as part of EMS 09/04/03 |
| **Target 2.10** | First Annual Environment Report (AER) of Waste Licence 30-2 submitted to Agency by the end of January 2003. | Completed | Submitted 14/08/03 |
| **Target 2.11** | Review of AER by the end of January annually thereafter | Every January | |
| **Objective 3** | | | |
| Provision of required infrastructure at the facility with the agreement of the agency | | | |
| **Target 3.1** | An updated site notice board will be provided at the new | Completed by 08/03 | |

| | | | |
|---|---|---|---|
| | facility entrance by end June 2002. The new Waste Licence reference number will be provided, contacted details including revised telephone numbers and location of all environmental monitoring information | | |
| **Target 3.2** | Security fencing and security measures will be provided as part of the provision of the new access by May 2003 | Completed 07/03 | |
| **Target 3.3** | A new access will be provided from the N77 by April 2003. Detailed SEW will be submitted on the project will be submitted to the Agency, when the safety audit on the alignment has been approved by the NRA. | Completed 04/03 | |
| **Target 3.4** | Facility roads and hardstanding areas will be provided at the new access by April 2003, which will be designed to ensure safe access and movement within the site. All area will be provided with appropriate surface water drainage systems. | Complete 04/03 | |
| **Target 3.5** | New facility offices, will be provided, which will incorporate telephones and an electronic communication facility by April | Completed 04/03 | |

| | | | |
|---|---|---|---|
| | 2003. Offices shall be fitted with gas monitoring equipment, in accordance with 'Protection of New Buildings and Occupants from Landfill Gas. | | |
| **Target 3.6** | A Waste Inspection and Quarantine Area will be provided by May 2003, subject to Agreement with the Agency. Drainage from these areas will go directly to the leachate lagoon. | Completed 05/03 | |
| **Target 3.7** | The present weighbridge at the facility will be relocated or a new weighbridge will be provided at the new facility entrance, subject to agreement with the Agency, by May 2003. This weighbridge will not be made operational until approval is given by Legal Metrology Services. | Completed 05/03 | |
| **Target 3.8** | A wheel cleaning as set out in the EIS area will be provided at the facility entrance by May 2003, subject to agreement with the Agency. | Completed 05/03 | |
| **Target 3.9** | As part of the development of the new offices, a wastewater treatment plant will be provide at the new facility offices by | Complete by 05/03 | |

| | | | |
|---|---|---|---|
| | May 2003, subject to agreement with the Agency. The discharge from this unit will go directly to the new leachate lagoon. | | |
| **Target 3.10** | A revised tank and drum storage area will be provided by April 2003, to ensure any spillage that may occur is contained. | Completed by 04/03 | |
| **Target 3.11** | Four new cells will be provided (cell 11-14), between 2002 and 2005 and will be constructed to that specified in condition 3.13, subject to agreement with the Agency. | One and a half cells completed by 12/02<br><br>Others ongoing until 12/05 | QA/QC for cell 11a submitted 24/10/02<br><br>QA/QC for cell12 30/05/03 |
| **Target 3.12** | A new larger leachate lagoon shall be construction to the specified standard to provide sufficient capacity for storage by May 2003, subject to agreement with the Agency. | Completed by 05/03 | |
| **Target 3.13** | A revised landfill gas management system will be provided by November 2003, which will contain a proposal for the utilisation of Landfill Gas as an energy source. A proposal on the system will be submitted to the Agency by March 2003. | Completed by 11/03 | |
| **Target 3.14** | A SCADA system or equivalent will be installed at the facility by | Phase I completed | |

| | | | |
|---|---|---|---|
| | April 2003, where the hardware and software will be incorporated into the new facility offices, subject to the Agencies agreement. | by 11/03 other phases as landfill develops | |
| **Target 3.15** | A full surface water management system will be incorporated as infrastructure and capping is provided, subject to the Agencies agreement. Surface water from the extension will be diverted to the surface water stream once the capping system is provided. | Ongoing as part of develop. | |
| **Target 3.16** | All new infrastructures provided will have regard to the ground water in the area which is monitored on a monthly basis. | Ongoing | |
| **Target 3.17** | A construction and demolition storage area will be provided by April 2003 as part of the revised access, subject to the agreement of the Agency. | Will not be provided C&D waste Accepted direct to tip face | |
| **Target 3.18** | The civic amenity site will be provided by May 2003 and will be maintained to the highest environmental standards. It is anticipated that this area in conjunction with other County Council initiatives will increase recovery rates in the County. | Completed by 05/03 | |

| | | | |
|---|---|---|---|
| **Target 3.19** | A household hazardous waste facility will be provided at the new civic waste facility. This facility will be widely advertised and will raise awareness of the need to source segregate household hazardous waste. | Completed by 05/03 | |
| **Target 3.20** | A proposal on the provision of compost facilities will be completed by May 2003 and submitted to the Agency. Composting/shredding facilities will increase recovery rates for green waste in the County. | Proposal will be examined and submitted to the Agency | |
| **Target 3.21** | A revised proposal for the provision of berms at the facility will be submitted to the Agency by January 2003. All revision made will be as a result of consultation with adjacent properties. | Complete by 01/03 | |
| **Target 3.22** | All monitoring points required to meet the conditions of the Waste Licence will be provided as infrastructure develops, subject to the Agencies agreement. | Ongoing | |
| **Target 3.23** | A storage and shredding area for Christmas Trees shall be provided and shredded trees to be reused as landfill cover | Set up December 2003 Annually there after | |

| | | | |
|---|---|---|---|
| **Objective 4**<br>Establishment of a detailed plan for the restoration and aftercare of the facility | | | |
| **Target 4.1** | A full revised restoration and aftercare plan will be submitted to the Agency by May 2003, which will incorporate a proposal for treatment of cells 1-7 | Complete by 05/03 | |
| **Target 4.2** | Capping at the facility will commence in May 2003 in accordance with condition 4.3, subject to agreement with the Agency and will continue on a phased basis as the facility develops. | To commence 05/03<br>Ongoing until site is complete | |
| **Target 4.3** | Assessment of the capping adequacy of cells 1-7 will commence in February 2003. A proposal for the capping and collection of gas from cells 1-7 will be submitted to the Agency by May 2003. All works on this area will be completed by May 2004. | Ongoing | |
| **Target 4.4** | All material excavated for the purpose of the development of infrastructure will be reused with the facility boundary and will be stored appropriately until | Ongoing | |

| | | | |
|---|---|---|---|
| | required. | | |
| **Objective 5**<br>The facility shall be operated to ensure there are no adverse environmental effects as a result of the operation of the facility. | | | |
| **Target 5.1** | Waste shall not be disposed of in any part of the facility until approval is sought and granted by the Agency | Ongoing | 04/12/03 |
| **Target 5.2** | A procedure for the acceptance of waste at the facility shall be submitted to the Agency for agreement by August 2002 and updated annually thereafter. | Completed | |
| **Target 5.3** | All waste shall be covered appropriately at the end of each day | Ongoing | |
| **Target 5.4** | A full leachate management plan will be drawn up which shall include procedures for monitoring leachate levels, removal of leachate by tanker and control procedures to ensure that leachate levels remain within parameters set out in condition 5.11. This plan will form part of the AER and will be revised as necessary. | Completed as part of AER<br><br>SCADA System- on Going monitoring Of leachate Levels in cells and lagoons | |
| **Target 5.5** | Written records of maintenance of all monitoring and emission equipment. Maintenance of | Ongoing | |

| | | | |
|---|---|---|---|
| | these systems will take place as recommended by the manufacturer | | |
| **Target 5.6** | All lagoons structures at the site will be independently tested every three years. | Ongoing | |
| **Target 5.7** | The wheel wash at the site entrance shall be maintained and cleaned as required | Ongoing Wheel shakeout unit by 06/03 | |
| **<u>Objective 6</u>**<br>Control of emissions at the facility | | | |
| **Target 6.1** | Any emission exceeding trigger levels or unauthorised emission will be notified to the Agency. | Ongoing | |
| **Target 6.2** | Monitoring of the landfill gas flare will commence once the installation of the flare is complete. All emission values shall comply with the terms of the Waste Licence. | New flare unit installed 07/04 | |
| **Objective 7**<br>Continuing minimisation of Environmental Nuisances associated with Dunmore Landfill Facility. | | | |
| **Target 7.1** | That any potential nuisance resulting from the operation of the facility will be minimised and any methods that may eliminate nuisance will be implemented. Ongoing | Ongoing | |

| | | | |
|---|---|---|---|
| | community consultation and inspections at the facility will ensure nuisance is minimised. Full compliance with the requirements set out in Condition 7 of the Waste Licence will continue. | | |
| **Objective 8** | | | |
| Continuation of Environmental Monitoring at the facility | | | |
| **Target 8.1** | All environmental monitoring at the facility as specified in Schedule D of the Waste Licence shall commence by 10th July, 2002. | Ongoing | Submitted 08/04/03 |
| **Target 8.2** | An initial topographical survey of cells 1-10 and all areas to be developed as part of the revised licence to be completed by June 2002, and two more survey to be completed by January 2003 and May 2003, to map development of the site. A topographical survey shall be completed by January each year thereafter. | Completed | |
| **Target 8.3** | A drawing of all monitoring locations shall be submitted to the Agency by August 2002. Any changes to the location of monitoring locations will be immediately updated on this drawing and will be communicated to the Agency. | Ongoing | |
| **Target 8.4** | A stability assessment of the site will be completed by November 2002 and annually thereafter and submitted to the Agency. | Complete by 05/03 | |
| **Target 8.5** | A revised weekly nuisance monitoring system will be introduced at the site and implemented by January 2003; | Completed | |

| | | | |
|---|---|---|---|
| | all records will be held at the site. | | |
| **Objective 9** | | | |
| Contingency measures shall be put in place in the event of an incident or emergency at the site | | | |
| **Target 9.1** | An Emergency response procedure will be developed and submitted to the Agency by November 2002 and submitted to the Agency. The procedure will be revised as necessary. | Completed | Submitted by 06/12/03 |
| **Target 9.2** | An adequate supply of absorbent booms and material will be provided and maintained at the site. | Completed Continually assessed | |
| **Target 9.3** | Waste oil containers shall be bunded**.** | Completed By March 2005 | |
| **Objective 10** | | In place | |
| Records shall be maintained and available for inspection at all reasonable times | | | |
| **Target 10.1** | All records for the site shall be available at the facility office for inspection | Ongoing | |
| **Target 10.2** | Ongoing maintenance of waste records as per Condition 10.2 of the Waste Licence. | Completed 06/03 | |
| **Target 10.3** | A procedure shall be developed to log all waste leaving the civic amenity site once the project has been completed. | In place | |
| **Target 10.4** | A complaints book shall be kept at the facility office and any complaint shall be logged as per | Ongoing | |

| | | | |
|---|---|---|---|
| | condition 10.4 | | |
| **Target 10.5** | A record of all leachate leaving the facility shall be kept in accordance with condition 10.5 | Ongoing | |
| **Target 10.6** | A record shall be kept of the program for the control of vermin and flies as per condition 10.7 | Ongoing | |
| **Target 10.7** | A record of bird control activities shall be kept and regular bird counts made. | Ongoing | |
| **Target 10.8** | A written record shall be kept of the type of daily cover that is used on the site as per condition 10.9 | Ongoing | |
| **Target 10.9** | Long term environmental monitoring to continue. | | |
| **Objective 11** | | | |
| To submit all relevant reports and notifications to the Agency in the timeframes specified | | Ongoing | |
| **Target 11.1** | Any incident at the site shall be notified in accordance with the corrective action procedure | Complete 05/03 | |
| **Target 11.2** | A new contract will be entered into for the recovery/disposal white goods/brown goods by end May 2003 | Completed 04/03 | |
| **Target 11.3** | Waste recovery reports shall be submitted to the Agency by | Form part | |

| | | | |
|---|---|---|---|
| | November 2002 as outlined in condition 11.3 | of SEW reports | Report 06/12/03 |
| **Target 11.4** | A report on the achievement of the final profile at the site shall be submitted by November 2002 | Submitted | |
| **Target 11.5** | An operations procedure shall be developed for operation in adverse wind conditions and submitted to the agency by November 2002. | Submitted | Report 04/12/03 |
| **Target 11.6** | A report on procedure to control vermin and flies shall be submitted to the Agency by November 2002 | Submitted 14/08/03 | Report 12/07/02 |
| **Target 11.7** | The first AER of the License will be submitted by May 2003 | Complete | |
| **Target 11.8** | A conditioning plan in accordance with Council Directive 1991/31/EC shall be submitted to the Agency by 16th July 2002 | | |
| **Objective 12** | | | |
| To operate the landfill to compliment relevant legislation and the Landfill Directive | | In place since 03/02 | |
| **Target 12.1** | All packaging waste as defined in SI No. 61 of 2003 will be restricted from the landfill | Phased in through 2002 | |
| **Target 12.2** | All contractors using the site shall be in full compliance with SI No. 402 of 2001 | Complete by 06/03 | |

| | | | |
|---|---|---|---|
| **Target 12.3** | Whole used tyres shall be restricted from the site from 1st of June 2003, in compliance with Council Directive 1991/31/EC. Shredded tyres will be restricted from 1st June 2006 | Ongoing | |
| **Target 12.4** | The landfill site will be operated with regard to the South East Waste Management and any measures necessary to meet the terms and targets of the plan shall be implemented. This will include the acceptance of waste from outside the Kilkenny area from the partners in the South East Region | | |
| **Objective 13** | | | |
| To provide infrastructure to reduce visual impact and minimise nuisance | | Ongoing | |
| **Target 13.1** | Continuation of odour modelling and testing at the site and local properties. Recommendations will be implemented. | Ongoing | |
| **Target 13.2** | Provision of extensive planting and renewal of hedgerows. Berms will be placed in locations in order to minimise visual impact. | Ongoing | |
| **Target 13.3** | The road access and roadway along the front of the site will be | | |

| | | |
|---|---|---|
| maintained and cleaned in order to minimise visual nuisance at the entrance to the facility. | | |
| **Objective 14**<br><br>To reduce the quantity of recycling and biodegradable materials going to landfill. | | |
| **Target 14.1** To achieve a 50% reduction by commercial establishments. | Dec 06 | |
| **Target 14.2** To set up a communication procedure and reporting mechanism between landfill and enforcement officers regarding offenders. | Completed Jan 06 | |
| **Target 14.3** Provide awareness to companies of restricted landfill materials. | Ongoing | |
| **Objective 15**<br>To achieve closure of the landfill facility to an environmentally satisfactory standard and comply fully with relevant legislation and the Landfill Directive. | | |
| **Target 15.1;** The continued acceptance of acceptable waste in the landfill for such time as the required quantities are received to enable final contours be reached. | Ongoing | |
| **Target 15.2;** The notification of all customers that the landfill section at Dunmore will cease to operate from the advised date. | Ongoing | |
| **Target 15.3;** The expansion of the CAS to ensure continued availability of refuse disposal facility to householders and small business customers. | Ongoing | |

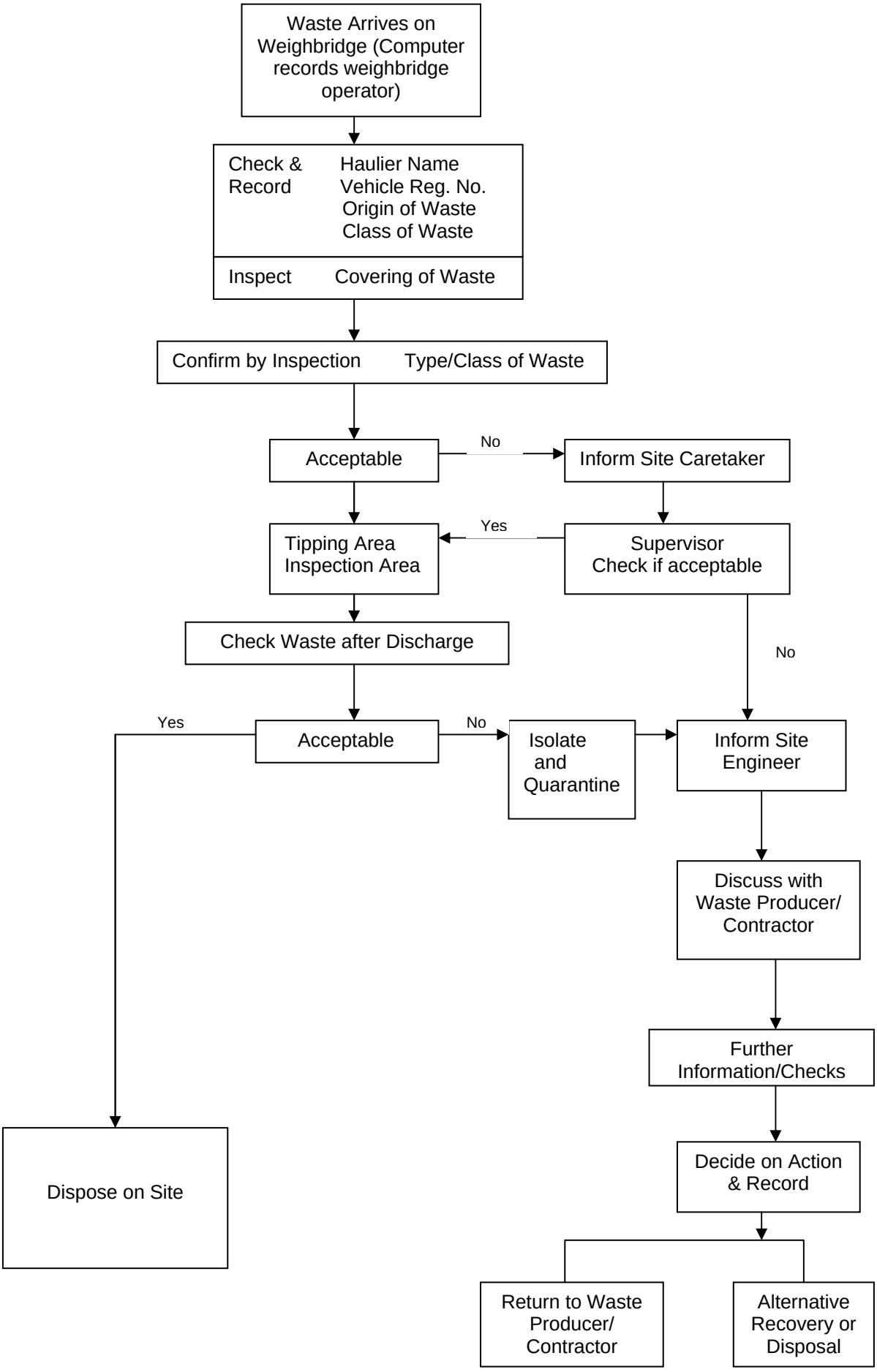
| | | | |
|---|---|---|---|
| **Target 15.4;** | Increased signage and road markings at the CAS to ensure ease of access and use for the expected increase in customers anticipated as a direct result of the landfill closure. | Ongoing | |
| **Target 15.**5; | To maintain the existing gas and leachate management system to ensure full compliance with the conditions of our license. | Ongoing | |
| **Target 15.**6; | To advertise, appoint a contractor and complete the final capping of the landfill within 2010. | Ongoing | |
| **Target 15.**7; | To maintain the nuisance montiroing system in place in relation to vermin, noise and litter control. | Ongoing | |
| **Target 15.**8; | To investigate the viability of a C&D waste facility within the site. | Ongoing | |
| **Target 15.**9; | To assess the cost structure of the CAS to examine if the facility can be self funding. | Ongoing | |

# Appendix H

Waste Acceptance Procedure Flowchart

# DUNMORE LANDFILL

## WASTE ACCEPTANCE PROCEDURE



# Appendix I

Bird Control

Bird Control Ireland Ltd.

Littlebridge Inches, Cappoquin, Co. Waterford, Ireland

**Year End Report for Dunmore Landfill Site**

**January 2009 – December 2009**

**Location:** **Dunmore Landfill, Dunmore, Co. Kilkenny**

**Type:** **Landfill Site**

**Client:** **Kilkenny County Council**

BCI Ltd operated a bird control programme at Dunmore between January 2009 and December 2009. During each visit to the site a *Visit Log* was completed giving details of activities undertaken to control nuisance birds for the period of time. A *Month End Report* was complied from the *Visit Logs* and submitted to Dunmore Landfill Site Manager each month.

Throughout the year various types of bird scaring devices were employed to include, Falcons, Hele Kites, Fire Arms, Species Specific Distress Calls and Bird Scaring Pistol.

Equipment is checked on each visit to site for faults and damages. Any reported damaged goods were repaired/replaced.

A suggested plan of action was marked out on a site Planner Board by BCI each week Site staff were responsible for daily deployment of Visual Deterrents (kites) are the visual cue for scavenging birds that danger is lurking, so when kites cannot be deployed (for example due to severe weather conditions birds will sometimes attempt to raid. Site staff also used Distress Calls.

The staff at Dunmore Landfill were enthusiastic and helpful at all times they applied the equipment diligently and adapted as necessary.

Site visits (start hours on site) were varied again throughout the year to ensure that when birds were recorded either early morning, mid day or in the evenings and as BCI Ltd. staff consistently harassed them with various bird control measures, their return to the site was slow.

By visiting the site at different times, any unusual bird activity can be recorded and a new approach tried to ensure the best bird control programme is achieved. During the month of July (67) birds numbers were high on entry to site. The breeding season also puts pressure on birds to find extra food for hungry chicks. Given the chance birds will attempt to raid. However the site staff were able to clear raiders with distress calls when required.

Tel: 00 353 58 52302 Fax: 00 353 58 52892 e-mail: bci@eircom.net
Directors: Jeremy Nicholson, Orla Nicholson - Co. Reg.: 322127

Bird Control Ireland Ltd.

Littlebridge Inches, Cappoquin, Co. Waterford, Ireland

The site Bird Scaring Pistol was used as required usually at times when visual cues could not be deployed due to adverse weather conditions.

It is clear from the figures recorded that the number of birds scavenging at Dunmore Landfill is at very low level and very much under control.

**Sheet One** shows the bird count totals for each month.

**Chart One** Monthly Bird Counts for the period Jan 09 to Dec 09

**Chart Two** Shows the mean bird value of birds from Jan 09 to Dec 09

**Chart Three** Shows a comparison of Mean Bird Values from 2005-2009

**Chart Four** Shows the distribution of main problem species on site Jan to Dec 2009

Bird Control Ireland Ltd are please with the level of bird control maintained at Dunmore Landfill Site.

Yours sincerely,

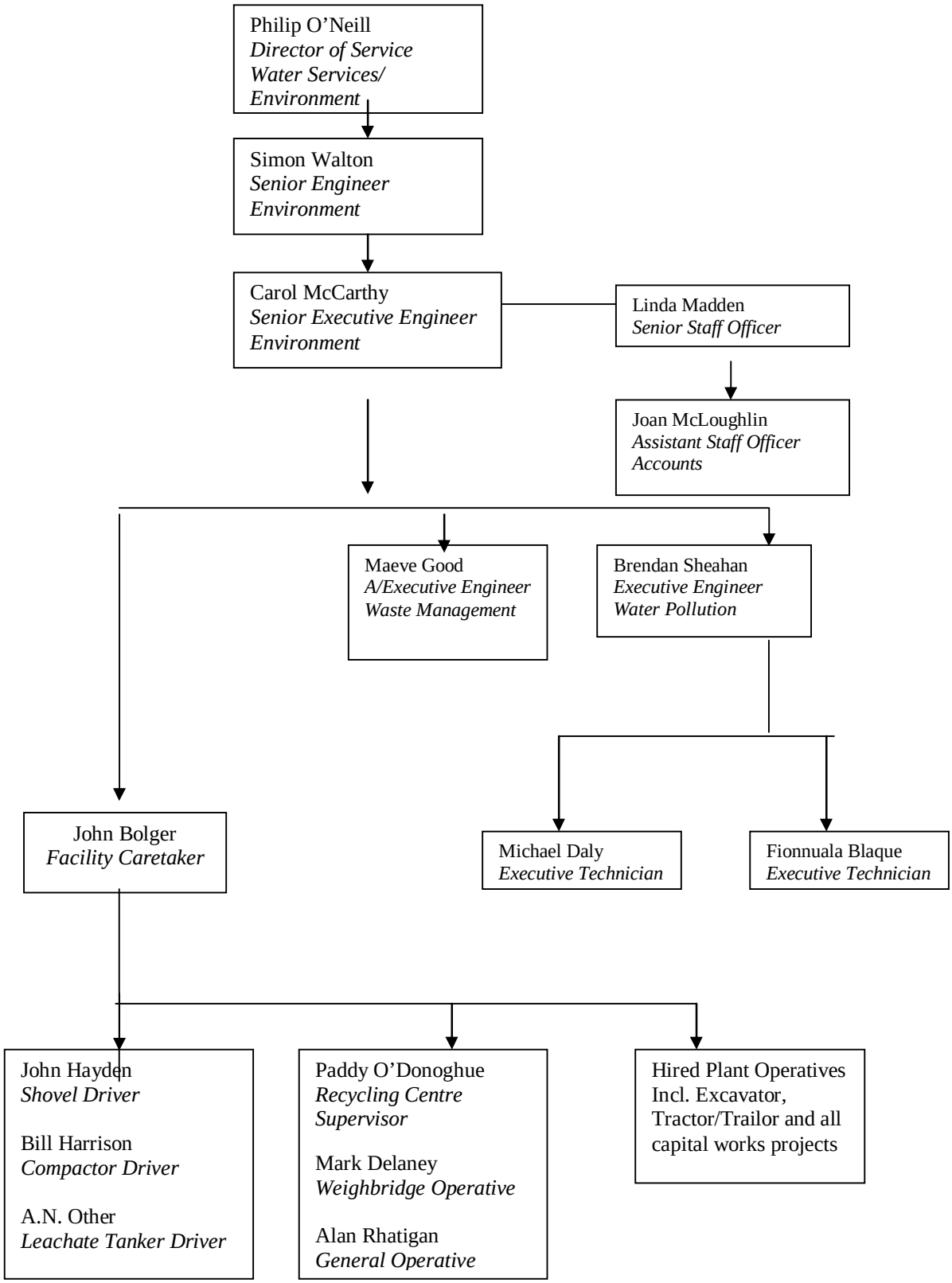
Jeremy Nicholson
Managing Director
Bird Control Ireland Ltd

Tel: 00 353 58 52302 Fax: 00 353 58 52892 e-mail: bci@eircom.net
Directors: Jeremy Nicholson, Orla Nicholson - Co. Reg.: 322127

# Appendix J

Management Structure

## Staff Structure – Dunmore Landfill



# Appendix K

AER Returns Worksheet

Environmental Protection Agency

# AER Returns Worksheet

Version 1.1.10

| | |
|---|---|
| **REFERENCE YEAR** | 2009 |

**1. FACILITY IDENTIFICATION**

| | |
|---|---|
| Parent Company Name | Kilkenny County Council |
| Facility Name | Dunmore Landfill |
| PRTR Identification Number | W0030 |
| Licence Number | W0030-02 |

Waste or IPPC Classes of Activity

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

| | |
|---|---|
| Address 1 | Dunmore |
| Address 2 | Co. Kilkenny |
| Address 3 | |
| Address 4 | |
| | |
| | |
| Country | Ireland |
| Coordinates of Location | -7.26476 52.6946 |
| River Basin District | IESE |
| NACE Code | 3821 |
| Main Economic Activity | Treatment and disposal of non-hazardous waste |
| **AER Returns Contact Name** | Joe Scully |
| **AER Returns Contact Email Address** | joseph.scully@kilkennycoco.ie |
| **AER Returns Contact Position** | A/Senior Executive Engineer |
| **AER Returns Contact Telephone Number** | 056 7794000 |
| **AER Returns Contact Mobile Phone Number** | 087 9405712 |
| **AER Returns Contact Fax Number** | 056 7767859 |
| **Production Volume** | 0.0 |
| **Production Volume Units** | |
| **Number of Installations** | 0 |
| **Number of Operating Hours in Year** | 0 |
| **Number of Employees** | 0 |
| **User Feedback/Comments** | |
| **Web Address** | |

**2. PRTR CLASS ACTIVITIES**

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

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

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