SILLIOT HILL INTEGRATED WASTE MANAGEMENT FACILITY, KILCULLEN, COUNTY KILDARE

WASTE LICENCE REF. W0014-01

ANNUAL ENVIRONMENTAL REPORT – 2008

ORIGINAL

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FEHILY TIMONEY & COMPANY

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Abstract: This report presents the monitoring results for Silliot Hill Integrated Waste Management Facility to the Environmental Protection Agency. The report covers the annual reporting period of 2008.

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1. INTRODUCTION

The Environmental Protection Agency issued Kildare County Council a waste licence for their integrated waste management facility located at Silliot Hill, Kilcullen, County Kildare, on 17th May 2002. The waste licence reference number is W0014-01. Kildare County Council retained Fehily Timoney & Company (FTC) to assist in the implementation of the conditions of the licence and to submit the required reports to the Agency. This report addresses Condition 11.6 of the waste licence for the facility which states:

> Within six months of the date of grant of this licence, the licensee shall:
>
> *(i) Submit to the Agency for its agreement, by 31st December 2002 and within one month of the end of each year thereafter, an Annual Environmental Report (AER)*
> *(ii) The AER shall include as a minimum the information specified in Schedule G: Content of Annual Environmental Report of this licence and shall be prepared in accordance with any relevant written guidance issued by the Agency.*

This report addresses the items listed in Schedule G (Content of the Annual Environmental Report) of the waste licence for the facility. This AER covers the reporting period from 1st January 2008 up to 31st December 2008.

2. SITE DESCRIPTION AND ACTIVITIES

2.1. Waste Activities carried out at the Facility

Waste activities at Silliot Hill Integrated Waste Management Facility (IWMF) are restricted to those outlined in *Part 1 - Activities Licensed* of the Waste Licence.

County Council vehicles, private contractors and members of the public access the facility. In summary, the site is divided into three active areas; the waste transfer station, civic waste facility and in-vessel composting area. The landfill and sludge treatment facility make up the forth and fifth components. The activities carried out at each area are described in the subsections below.

2.1.1. Waste Transfer Station

The waste transfer station commenced operation in 2001. Construction of the enclosure of this transfer station commenced in October 2005 and was completed in June 2006. The facility is currently in use. It comprises an open floor area, where vehicles enter from the east of the area and deposit waste material in dedicated areas with bunker walls.

These dedicated areas in the waste transfer station collect timber, bulky material, green material and metal. All mixed municipal waste is deposited in a single area.

There is a shredder in the transfer station. Green waste is shredded on-site and stockpiled for disposal off-site. Timber waste is also shredded on-site and stockpiled until removal off-site. Bulky waste is shredded on-site and mixed with municipal waste prior to off-site disposal.

Members of the public are not permitted in the transfer station area.

2.1.2. Civic Waste Facility

The activities in the civic waste facility are licensed under Classes 3, 4 and 13 of the Fourth Schedule of the Waste Management Act 1996.

The operation of the civic waste facility is described as follows:

Recycling, baling and shredding of paper, cardboard and plastics takes place in a building at the north of the site. A hard-standing area has been provided for the storage of these materials prior to their packaging within the building. Adjacent to the site access road, a concrete hard-standing area is used for the deposition, collection and handling of bulky goods including green waste, white goods, glass and tyres. An area for the storage of household hazardous waste is located adjacent to this area. Members of the public can deposit waste at a designated area provided at the civic amenity facility.

The "polluter pays" principle operates at the site whereby household recyclables are not tolled. These items include glass bottles, plastic bottles, cans and paper. Household electronic goods are also disposed of free of charge under the WEEE Regulations. Commercial white goods are charged. Bulky recyclables are tolled at a reduced rate. These items include tyres and scrap metal. Residual waste taken to the transfer station is charged at full toll.

Construction of the re-organisation of the civic waste facility commenced in August 2005 and was completed in mid-2006. The facility opened to the public in February 2007.

2.1.3. Greenstar In-Vessel Composting Area

Kildare County Council entered into a contract with SITA Recycling Ltd (now Greenstar) for the operation of a pilot in-vessel composting facility. These activities are licensed under Classes 6, 7 and 13 of the Third Schedule and Classes 2, 10, 11 and 13 of the Fourth Schedule of the Waste Management Act, 1996. The system was brought to site in April 2002 and was located adjacent to the waste transfer station. The pilot in-vessel composting unit was relocated in September 2004 to a dedicated area including a composting building and yard area. The building and yard were completed in September 2004 and the newly relocated system was subsequently commissioned.

The technology used in the vertical compost units (VCUs) are of modular construction. There are 4 units in operation at Silliot Hill, each with a capacity of 25 m^3, giving a total capacity of 100 m^3. Each module can be operated and monitored independently of the others. With a 14-day cycle, the units can process 115 tonnes of food waste in that period (or 3,000 tonnes of food waste per annum).

Currently this composting facility is not in operation, and has not been functioning since 2007. As such, no results are reported here.

2.1.4. Old Landfill Site

The landfill site is located in an area previously used as an old gravel quarry. Landfilling operations ceased at the site in March 2002 following the commissioning of the waste transfer

station. The landfill is no longer licensed by the Agency. Landfilling commenced in the early 1980s, with the opening of a 'dilute and disperse' type landfill (referred to as Phase 1).

Phase 1 covers an area of approximately 79,000 m^2. Waste thickness is approximately 18 m. Lined cells were constructed in 1997 (referred to as Phase 2). Phase 2 covers an area of approximately 24,000 m^2. Waste thickness in Phase 2 is also approximately 18 m.

Phase 1 was capped in 1997/1998 with over 1 m of low permeability clay and 300 mm of topsoil. The phase 1 area is divided into Phase 1a (the large area to the east of the transfer station) and Phase 1b (the isolated area to the north of the transfer station).

Phase 1a was generally found to have a significant clay cap, and the EPA have agreed that this cap provides adequate protection to groundwater, provided that localised areas receive augmented clay capping material, and grading to control surface water runoff. Re-grading and augmentation of clay cap and insulation of gas and leachate infrastructure and other associated infrastructure, was completed during 2008. 47 No. 1 m diameter were installed during 2008 throughout Phase 1A and Phase 2 and connected into the facility's gas extraction system, to further improve gas extraction.

Phase 1B received a fully engineered capping system inclusive of an integrated landfill gas extraction infrastructure, this was completed in early 2008.

Construction of a fully engineered capping system commenced in Phase 2 in mid 2008. Substantial progress has been made, and the work will be completed in March 2009. The outstanding works are adding topsoil and grass seeding of Phase 2 cap.

Activities at the landfill area are now limited to the capping and restoration, collection of landfill gas, collection of leachate from Phase 1 and Phase 2 and the monitoring of environmental media.

2.1.5.Sludge Treatment Facility

The sludge treatment facility has ceased the intake of sludge since November 2002. The facility was constructed for the composting of stabilised sludge from Osberstown and Leixlip WWTPs.

Planning permission was granted to TEG Environmental in 2005 for the composting of food waste at the facility. This composting facility is complete, but not being used at present, and there is no commitment from the operators to return to the facility.

3. WASTE QUANTITIES AND COMPOSITION

The quantity and composition of material received for recovery at the facility from 1999 to the end of the 2008 reporting period is outlined in Table 3.1.

Table 3.1: Summary of Recyclables Recovered (Tonnes) from Facility (1999-2008)

Material	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Shredded Greens	103.62	103.49	58.23	72.2	29.48	--	--	--	-	339.34
Scrap Metal	382.74	653.96	392.9	472.9	448.31	522.94	428.48	570.88	427	415.54
Bottles	8.57	16.08	15.5	46.01	69.26	93.31	108.83	107.16	109	112.58
Cans	--	--	--	--	8.54	16.38	14.68	12.42	9.428	3.62
Batteries	2.36	4.55	7.8	12.1	17.27	19.46	21.9	21.9	25.28	16.94
Glass Flat	--	4.32	19.26	8.09	30.79	45.43	38.11	30.84	27	15.86
Cardboard	69.06	168.74	158.37	187.99	216.91	294.5	297.5	274.58	349	278.66
Newsprint	--	47.01	51	39.57	125.71	153.17	135.2	115.76	129	128.36
Shredded Paper	--	--	--	--	237.77	133.83	120.5	114.14	30	41.56
Waste Oil & Filters	8.17	3.91	1.9	3.5	6.28	6.37	5.77	7.38	4	2.86
Electrical Goods	--	0.22	63.86	201.55	303.17	306.12	424.04	433.8	320.487	458.88
Gas Bottles	--	2.03	0.1	0.69	7.92	3.02	3.62	1.4	0	1.08
Clothes	--	4.61	--	4.28	7.74	10.46	17.69	31.64	46	47.22
Household Hazardous	--	--	--	--	12.93	23.96	24.44	30.18	36.28	29.76
Plastics	--	--	--	--	20.72	47.79	55.21	41.66	19	27.66
Ink Cartridges	--	--	--	--	0.04	--	--	0	0	0
Tyres	--	0.71	--	--	--	4.9	15.01	0	8.28	19.53
Fluorescent Tubes								0.38	0.28	0.34
Polystyrene										2.52
Gypsum								8.64	20.6	14.18
Totals	**574.52**	**1,009.63**	**738.92**	**1,048.88**	**1,542.84**	**1,681.64**	**1,710.98**	**1,793.74**	**1,560.635**	**1956.48**

Table 3.2: Summary of Waste Recovered and Disposed (Tonnes) from Silliot Hill Waste Transfer Station 2008

Waste Type	January	February	March	April	May	June	July	August	Sept	October	Nov	Dec	TOTALS
Green Waste Out	0	0	0	0	0	0	0	0	0	293.56	0	45.78	**339.34**
Scrap Metal	26.96	40.78	27.04	49.58	39.42	28.64	42.44	29.78	57.26	25.92	29.64	18.08	**415.54**
Bottles	13.52	10.62	6.86	12.82	6.42	12.84	6.84	12.98	0	6.2	11.08	12.4	**112.58**
Waste Oil	0	0	1.04	0	0	1.04	0	0	0.78	0	0	0	**2.86**
Batteries	1.2	0.54	1.26	0	2.2	1.78	2.5	0	1.82	1.26	3.18	1.2	**16.94**
Bulk to KTK	232.56	242.54	263.54	241.46	27.66	0	0		0	0	0	0	**1007.76**
Fluorescent Tubes	0	0	0	0.16	0	0.08	0	0.1	0	0	0	0	**0.34**
Tyres	0	0	0	0	12.96	0	0		0	0	6.56	0	**19.52**
Gas Bottles	0	0	0	0	0.82	0	0		0.26	0	0	0	**1.08**
Clothes	5.72	2.34	2.04	5.28	4.3	2.94	7.2	1.16	4.76	2.18	2	4	**47.22**
Flat Glass	0	6.24	0	0	5.1	0	0	0	4.52	0	0	0	**15.86**
Shredded Paper	6.2	3.58	0	5.26	0	3.5	5.3	0	6.22	6.3	4.6	0	**41.56**
Cans	0	0	0	0	0	0	0	0	0	0	0	3.62	**3.62**
Polystyrene	0	0	0	0	0	0	1.06	1.46	0	0	0	0	**2.52**
Plastics	0	0	12.58	0	6.6	0	0		0	0	0	8.48	**27.66**
Electrical	45.16	37.54	35.6	47.22	41.28	32.4	44.16	33.58	42.02	24.74	31.28	43.9	**458.88**
Household Haz.	1.32	1.44	3.54	3.36	1.32	2.48	3.86	3.28	3.82	2.58	1.56	1.2	**29.76**
Gypsum	0	0	2.16	0	2.5	0	2.14	2.84	0	0	0	4.54	**14.18**
Cardboard	20.48	41.46	15.08	24.38	31.08	18.62	24.68	12.62	24.82	13.9	31.94	19.4	**278.66**
Leachate	1154.42	757.10	868.92	772.4	73.16	294.96	416.44	999.2	639.66	923.44	693.06	602.96	**8195.72**
Newsprint	10.7	11.18	10.58	15.96	5.64	11.96	17.26	12.32	5.68	5.95	10.63	10.48	**128.36**
Compost	0	81.74	0	244.08	6.34	0	0	0.8	5.68	0	0	0	**338.64**
Waste Cooking Oil	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Waste to Baling Station	2142.76	1925.32	1828.96	1833.30	2249.46	1585.22	1818.58	1817.44	2092.22	1763.3	1834.72	1699.76	**22591.06**
Waste Direct to Thorntons	502.	278.60	247.02	148.48	0.0	0.0	0	0	0	0.00	0	0	**1176.1**
Timber	13.6	7.62	8.06	5.48	6.82	6.74	0	0	0	8.4	0	9.58	**66.3**
Tetrapak	0	0	0	0	0	0	0	0	0	0	0	0	**0**
TOTALS	**4176.60**	**3448.64**	**3334.28**	**3409.22**	**2523.08**	**2003.4**	**1945.94**	**2930.86**	**2889.52**	**3077.78**	**2660.24**	**2485.38**	**34884.94**

The figures in Table 3.1 and 3.2 above outline the trend in recovery of recyclables for the period 1999 to 2008. The total for 2008 shows an increase in overall material handled since the previous year (mainly influenced by the WEEE, shredded paper, plastics and tyre increases).

Table 3.2 details the material disposed and recovered onsite.

Bulky waste recovered from the transfer station which is unsuitable for baling is transferred to the nearby KTK landfill for disposal up until June 2008. This amounted to 1,007.76 tonnes in 2008 (from the Waste Transfer Station). From June on the newly installed shredding machine has been used to reduce particle size such that the materials are admissible at the baling station.

Approximately 12,938 m^3 of leachate was removed from the site. The leachate quantities are described in greater detail in section 5.2.

There was no waste delivered to the Greenstar In-Vessel composting facility during the reporting period. The composting facility was closed down by the Department of Agriculture and will remain closed for the foreseeable future.

All waste quantities handled at each of the areas are within the tonnages licensed for Silliot Hill.

4. SETTLEMENT AND SLOPE STABILITY

4.1. Settlement

As previously documented in submitted AERs, annual topographical surveys carried out since the granting of the Waste Licence indicate that Phase 1 has stabilised (i.e. little or no settlement is occurring).

In Phase 2, in the 15-month interval between surveys in July 2005 and October 2006, the average annual settlement rate was recorded as 190 mm/year. This number represented a decrease in the settlement level experienced at Phase 2 in 2005 which was estimated at 530 mm.

In preparation for the capping of Phase 2 and its respective gas extraction infrastructure a surcharge of clay material was installed early 2007. The purpose of the surcharge was to accelerate onsite consolidation facilitating installation of the capping works. As result of the ongoing installation of the Phase 2 capping system and the change in topographical profile, accurate settlement comparisons are not possible. On completion of the capping system a base-line topographical survey will be undertaken for the Phase 2 area enabling settlement calculations at year end.

4.2. Slope Stability

A slope stability analysis was conducted for the site in 2008. Factors of safety for potential slope failure ranged from 1.62 to 2.86. Out of the total eight case scenarios, all of the analyses have factors of safety of 1.5 or above. Factors of safety values against deep-seated failure of the landfill embankment within the waste material ranged from 1.62 to 2.83. The lengths of the potential deep-seated failures are in the range of 15 to 34 m. It is noted that the geotechnical parameters adopted are for fresh waste and are therefore considered conservative for this site. By adopting parameters for old waste, the minimum factor of safety for the slopes will increase further.

Based on the analyses, the landfill side slopes were considered stable.

The slope stability assessment is included in Appendix VI.

5. SUMMARY OF ENVIRONMENTAL MONITORING

Condition 8 and Schedule D of the waste licence specifies the environmental monitoring requirement of the facility. Conditions 8.5 to 8.11 list the parameters to be monitored. The following sections (5.1 to 5.7) discuss the results from the four quarterly monitoring and annual monitoring events during the reporting period.

5.1. Landfill Gas

The licence requires that the licensee conduct monthly monitoring in the gas boreholes/vents/wells in order to detect off-site gas migration and weekly monitoring in the site office, shed and canteen in order to detect accumulation of landfill gas. The gas is monitored using an "LMSxi" or 'GA94' automatic infra-red analyser/electrochemical cell which detect temperature, atmospheric pressure and levels of carbon dioxide, methane and oxygen.

The location of the monitoring positions is shown on Drawing 2001-114-01-003-Rev D contained in Appendix 1. The monitoring results for 2008 are outlined in Appendix II attached.

5.1.1. Interpretation of Results

Site Buildings

Kildare County Council staff monitor gas concentrations in the site buildings on a weekly basis. To date, methane and carbon dioxide levels recorded have been zero. Oxygen has been recorded at normal levels. Weekly monitoring log sheets are maintained at the site office. The Council installed automatic gas detection/alarm systems in the site offices in November 2003. No incidences have been recorded.

Gas Boreholes and Wells

Lateral migration of landfill gas at Silliot Hill has been recorded since late 1997, following the capping of Phase 1 (the unlined portion of the landfill site). Gas migration has been brought under control by the installation of an active gas abstraction system in 1998. The gas collected was used to fuel two open flare systems until November 2003. An enclosed flare which had been installed as part of a new landfill gas management programme was then brought on line and the two open flares decommissioned. This enclosed flare received the gas from the perimeter of the landfill. In March 2004, the landfill gas utilisation plant was put into operation to receive the gas from the core of the landfill. However, no gas was flared in 2008 owing to the onsite construction works.

Monthly monitoring has indicated that gas migration is occurring in a number of locations around the site. The trend of the gas migration has changed slightly since the installation of the new system in March 2004.

A period of monitoring has taken place since 5 no. landfill gas monitoring wells were installed along the Carnalway Road, to the south of the Silliot Hill IWMF boundary in July/August 2005. Results indicate landfill gas is present at depth along the southern boundary.

A number of new perimeter gas wells were bored and installed around the site during 2007 to replace some of the older existing wells which have been identified as performing poorly and some other wells that have been damaged during construction works on-site. Kildare County Council submitted a letter to the EPA requesting permission to start monitoring these new wells as replacements for older poor performing and destroyed wells, and are awaiting feedback from the Agency. If the new monitoring regime is agreed to the number of gas wells will reduce from 55 to 44.

During the 2008 reporting period the areas of significance are:

1. Southern Boundary wells. Gas levels above the trigger level are most prevalent at gas wells along the southern boundary of the landfill. Persistent raised methane levels have been recorded, at the TEG building and close to the entrance to KTK landfill at G105, G106(s), G104(s), G104(d) and G105. Carbon dioxide was recorded predominantly in G103, G106, G108 and G77.
2. One well, G85 opposite the entrance to KTK Landfill, has exceeded the acceptable methane levels on a number of occasions throughout the year. This well has been found to flood on occasion during sampling and has very restricted flow. This suggests that the well is not getting a representative sample of gas from the area and sampling is only analysis standing gas in the well.
3. On the Northern edge of the site G74 was the well that exceeded the trigger level more than any other, on five occasions.

Continued monitoring of G25, G84 and G85 have been discussed in communication between KCC and the Agency requesting a change to the monitoring infrastructure.

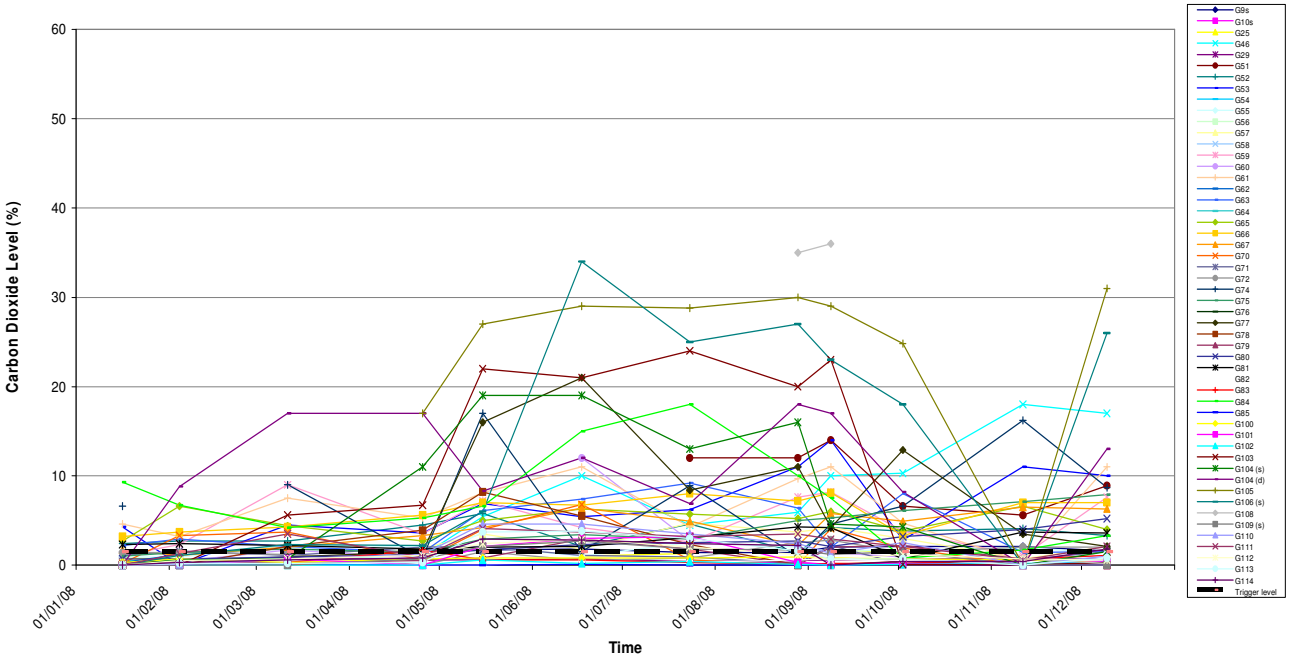


Figure 5.1: Methane readings at perimeter gas wells (2008)

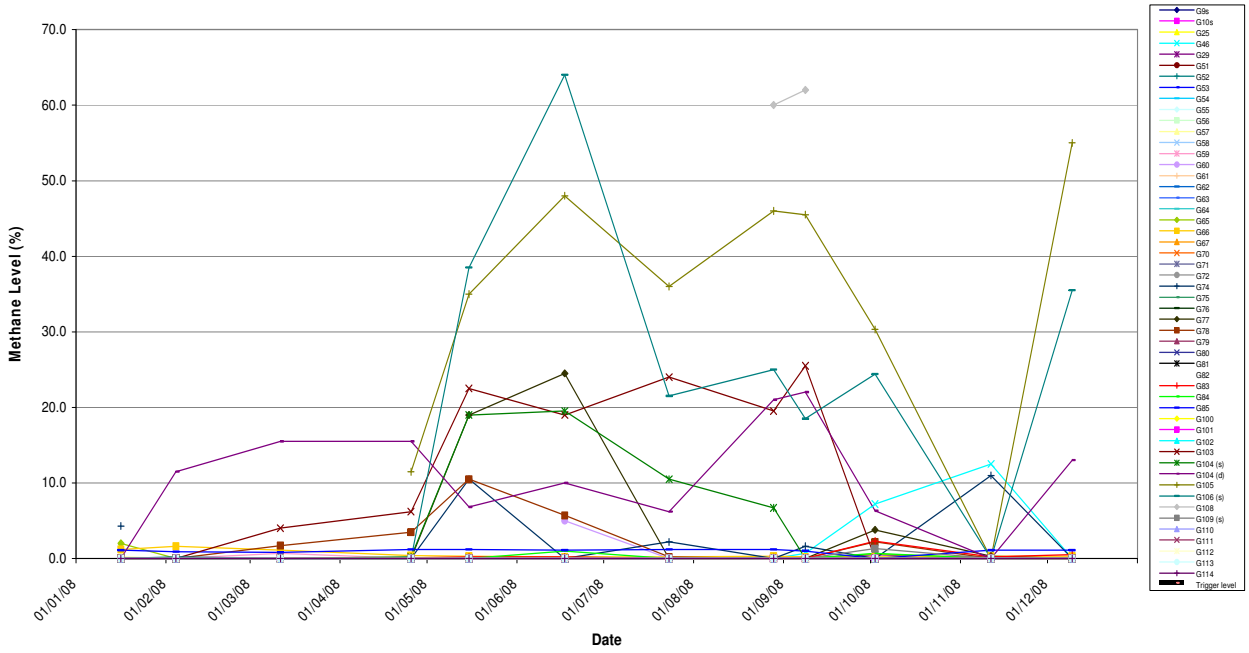


Figure 5.2: Carbon Dioxide readings at perimeter gas wells (2008)

5.2. Surface Water

Surface water monitoring was carried out at the seven locations (SW1 to SW7) as outlined in Table 5.1 and shown on Drawing 2001-114-01-003, Rev. D. SW5 was found to be dry during every site visit in 2008. The results of the monitoring are presented in Appendix II.

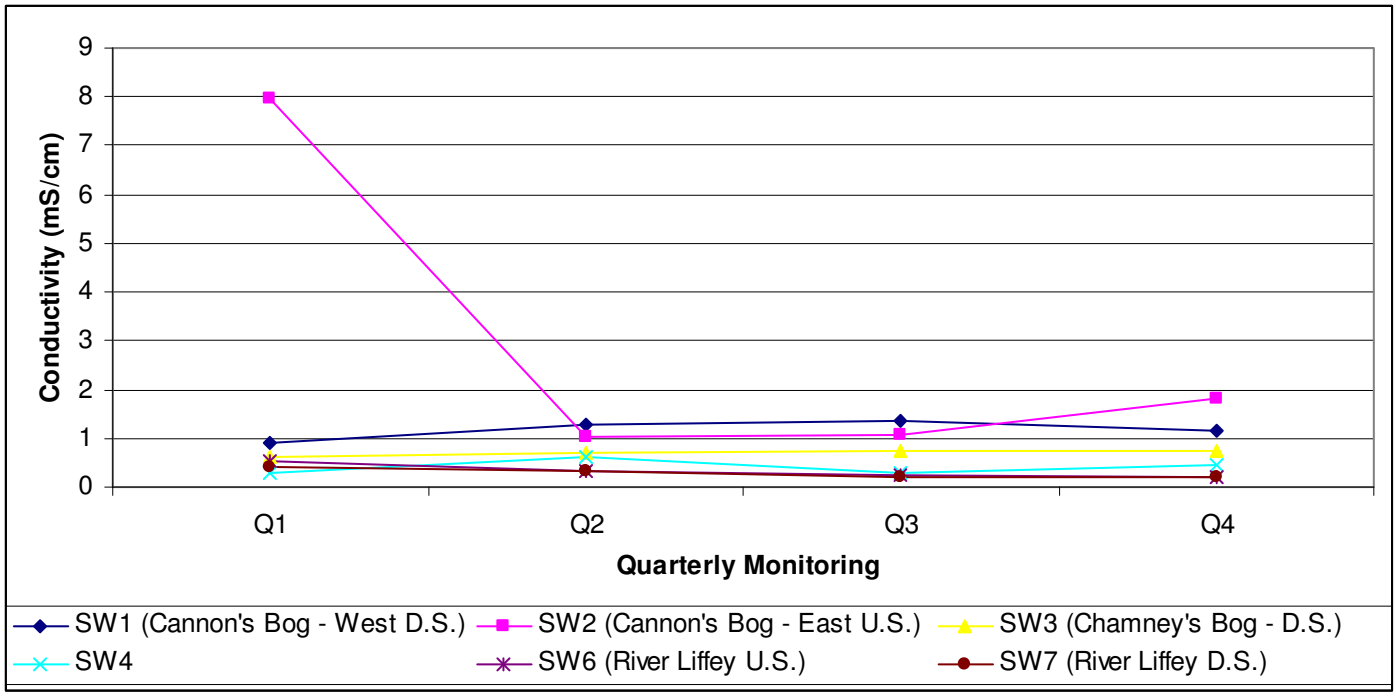
Table 5.1: Surface Water Monitoring Locations

Station	Easting	Northing	Location
SW1	285216	210323	Westerly drain from Cannon's Bog
SW2	285368	210422	Drain downgradient of SW5
SW3	285835	210674	Drain downgradient of SW4
SW4	285789	211010	Drain nearest the site –200m
SW5	285444	210963	Drain near the site – 250m
SW6	285690	210079	Upgradient in River Liffey
SW7	285278	210178	Downgradient in River Liffey

5.2.1. Interpretation of Results

The surface water results have been compared to limits as outlined in the Surface Water Regulations, 1989, for comparative purposes only. It can be seen from the results that over the course of the year, several parameters were in above the trigger level as specified in the regulations. List I/II organic compounds were not detected in any of the samples.

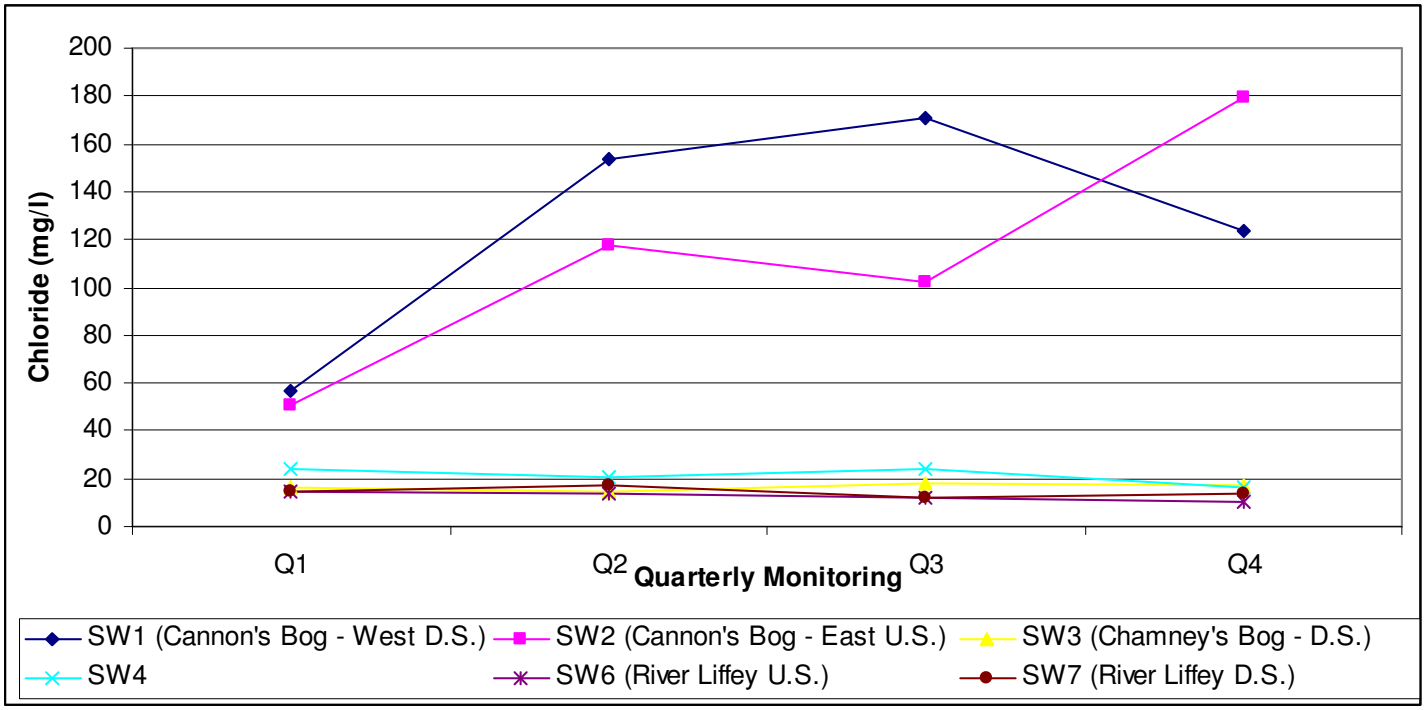
SW1 and SW2 have higher indicator values than those of SW3, SW4, SW6 and SW7. Two of these parameters, conductivity and chloride are plotted for quarterly data in Figures 5.3 and 5.4 respectively. These parameters were chosen because they are indicators of leachate impact, but they also may demonstrate impact by other sources, such as sewage or industrial effluent.



Note: U.S. – Upstream D.S. – Downstream

Figure 5.3: Conductivity at Surface Water Monitoring Points (2008)

The above figure indicates a possible impact from the landfill for SW1 and SW2. However, these surface water channels are known to receive inputs from an industrial estate outside Kilcullen which is upstream of the landfill and thus may have contributed to the quality downstream. There is no discernable deterioration of the River Liffey at the downstream monitoring point SW7.



Note: U.S. – Upstream D.S. – Downstream

Figure 5.4: Chloride at Surface Water Monitoring Points (2008)

The elevated levels of Chloride are caused by the same pollution sources as those that raise the conductivity.

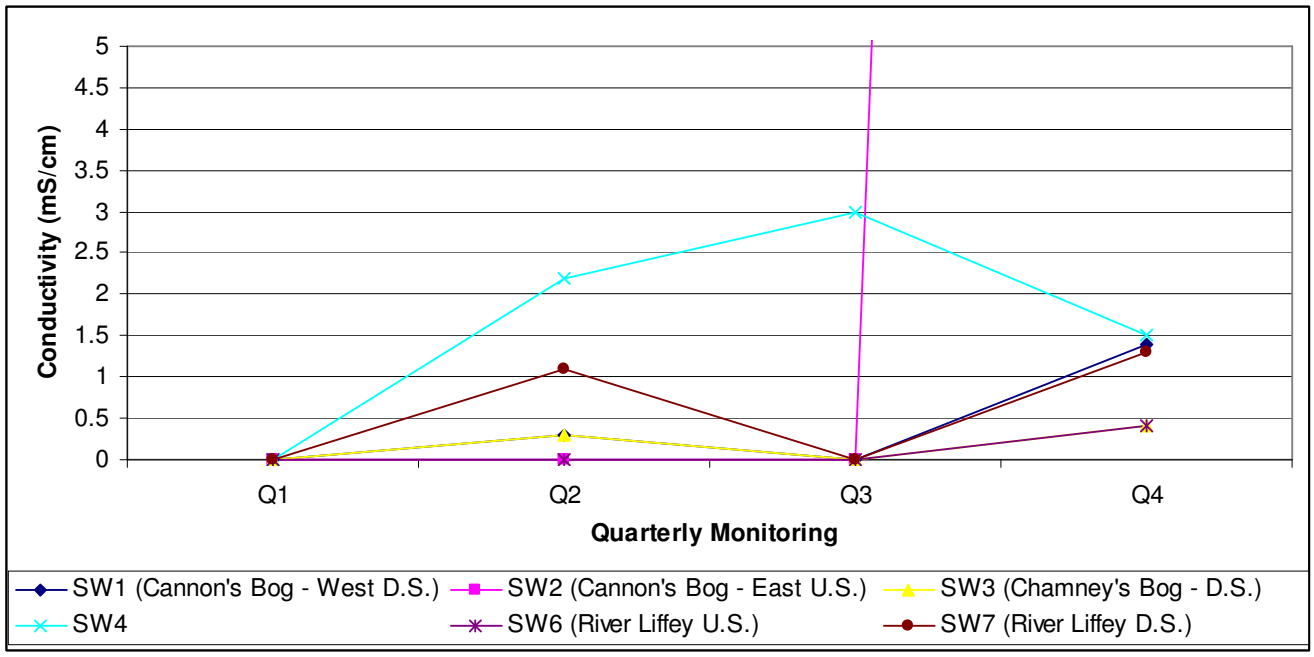


Figure 5.5: Ammoniacal Nitrogen at Surface Water Monitoring Points (2008)

Levels of ammoniacal nitrogen as an indicator of pollution were also examined over the year. In contrast to 2007 surface water has shown levels of ammoniacal nitrogen above the MAC of 0.23 mg/l. The raised levels at location SW4 is likely to be owing to the high organic content of the water at this site. The raised level at SW7 is from an unknown source.

There was an excursion at SW2 in Q4. No cause has been attributed to this and it is being monitored in 2009, it is however upstream of the landfill and therefore the cause is unlikely to be the landfill.

5.3. Groundwater Quality

Groundwater monitoring is carried out at the locations outlined in Table 5.2. New monitoring infrastructure is awaiting sign off as well, and this would increase the number of groundwater wells monitored from 18 to 20.

Table 5.2: Groundwater Monitoring Locations

Station	Easting	Northing	Location
BH1	285823	211804	Upgradient
BH2	286040	211673	Adjacent
BH3	285591	211719	Adjacent
BH4	285739	211445	Down gradient
KTK20	285663	211082	Down gradient
BH9D	285797	211904	Upgradient - Dry
BH10D	285422	211548	Down gradient
BH11D	285136	211307	Down gradient
BH12D	285125	211743	Upgradient – Dry
BH13D	285956	211756	Upgradient – Dry
BH14D	285940	211977	Upgradient – Buried
BH15	285770	211800	Upgradient – Dry
BH16(R)	285902	211404	Down gradient
PW2	285769	212262	Upgradient
PW4	285603	211798	Upgradient
PW9	285940	210264	Down gradient
PW11	285495	210638	Down gradient
PW15	285663	211835	Upgradient

These groundwater monitoring locations are illustrated on Drawing 2001-114-01-003 Rev D (Appendix I). It is noteworthy that all on-site wells upgradient of the landfill (i.e. BH9D, BH15, BH12D and BH13D), have been dry, or had insufficient water to purge and sample during groundwater monitoring events. BH14D was found to have been buried by resurfacing works at a neighbouring truck yard resulting in an absence of data for this borehole from October 2004 onwards.

5.3.1. Interpretation of Results

The groundwater results have been compared with the relevant Interim Guideline Value (IGV) set out in the EPA report '*Towards Setting Guideline Values for the Protection of Groundwater in Ireland'.*

Groundwater upgradient of the site is impacted upon by agricultural and septic tank point sources as demonstrated by elevated levels of total coliforms at all wells, and faecal coliforms in PW15. Throughout the year ammoniacal nitrogen and chloride at PW2, PW4 and PW15 substantiate this interpretation.

Groundwater beneath the landfill and directly downgradient of it shows impact from the unlined portion of the landfill. BH1, BH2, BH3 and BH4 all have elevated levels of leachate indicator parameters including ammoniacal nitrogen, chloride, magnesium, potassium and faecal and total coliforms.

BH16R also has indicator parameters, however the well often has insufficient water volumes present to purge properly and it is considered that standing water in the well, rather than a representative sample for the area is sampled in this well.

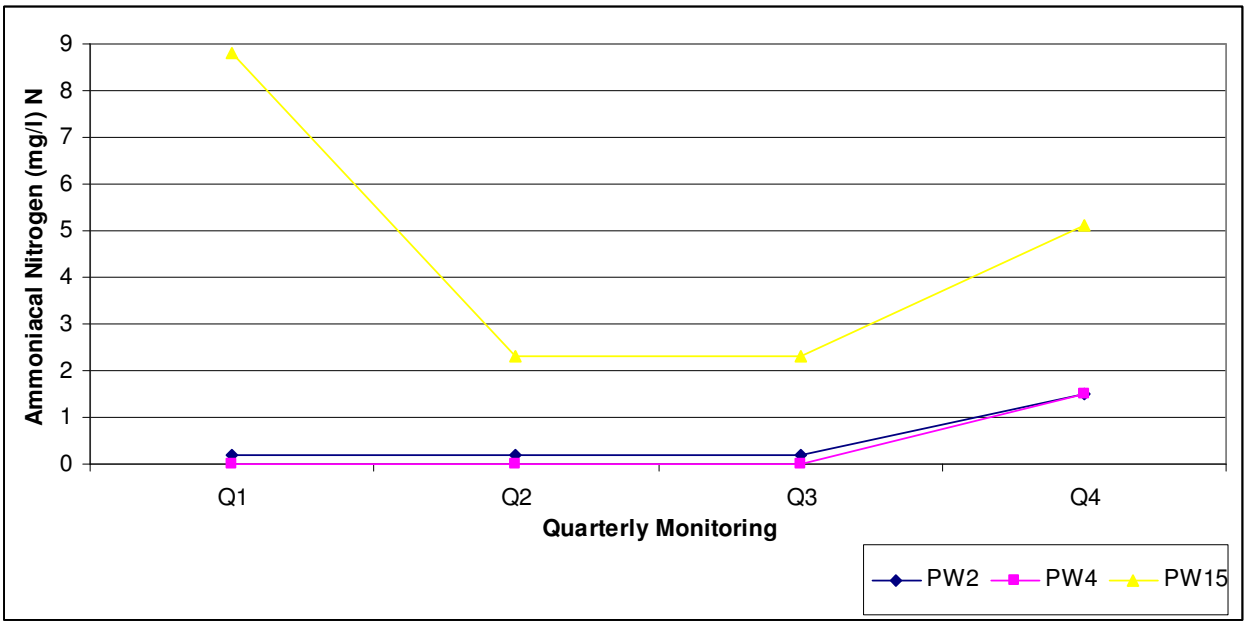


Figure 5.6: Ammoniacal Nitrogen Levels at Upgradient Groundwater Monitoring Points (2008)

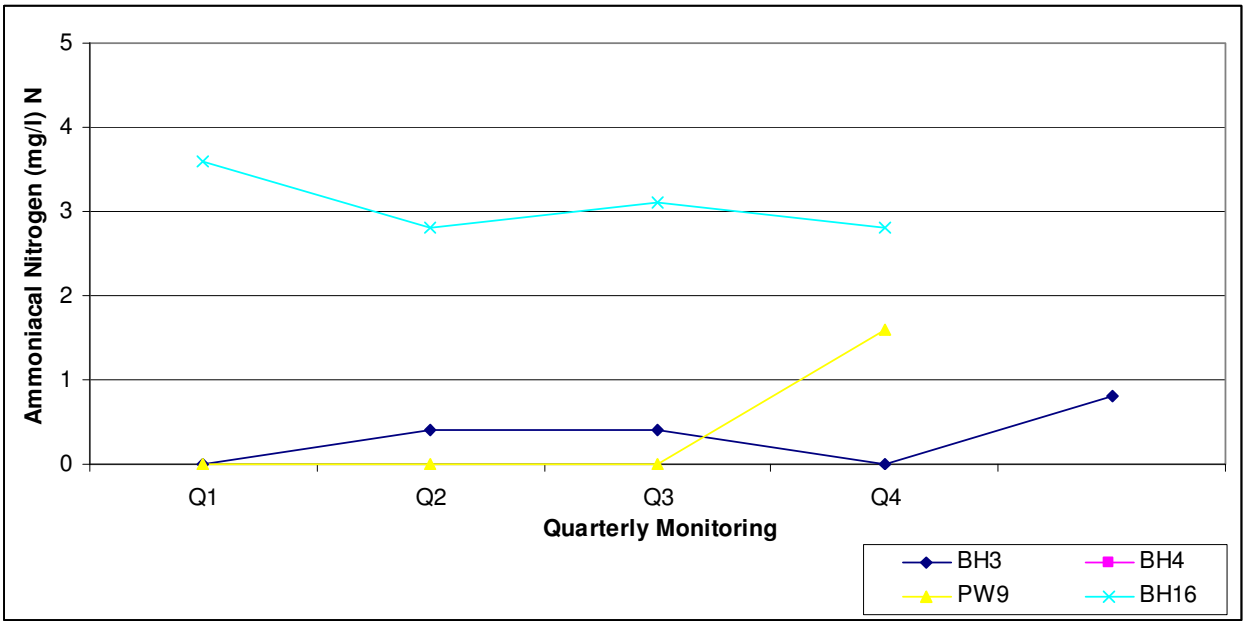


Figure 5.7: Ammoniacal Nitrogen Levels at Downgradient Groundwater Monitoring Points (2008)

The contamination resulting from the unlined portion of the landfill does not extend a significant distance from the landfill, as shown by the results from Quarter 1 recorded in the well BH11D which is located greater than 100m south of the landfill.

Construction works at KTK Landfill have restricted the access to KTK20 from Quarter 2. Regaining access has been completed and sampling will restart in Quarter 1, 2009.

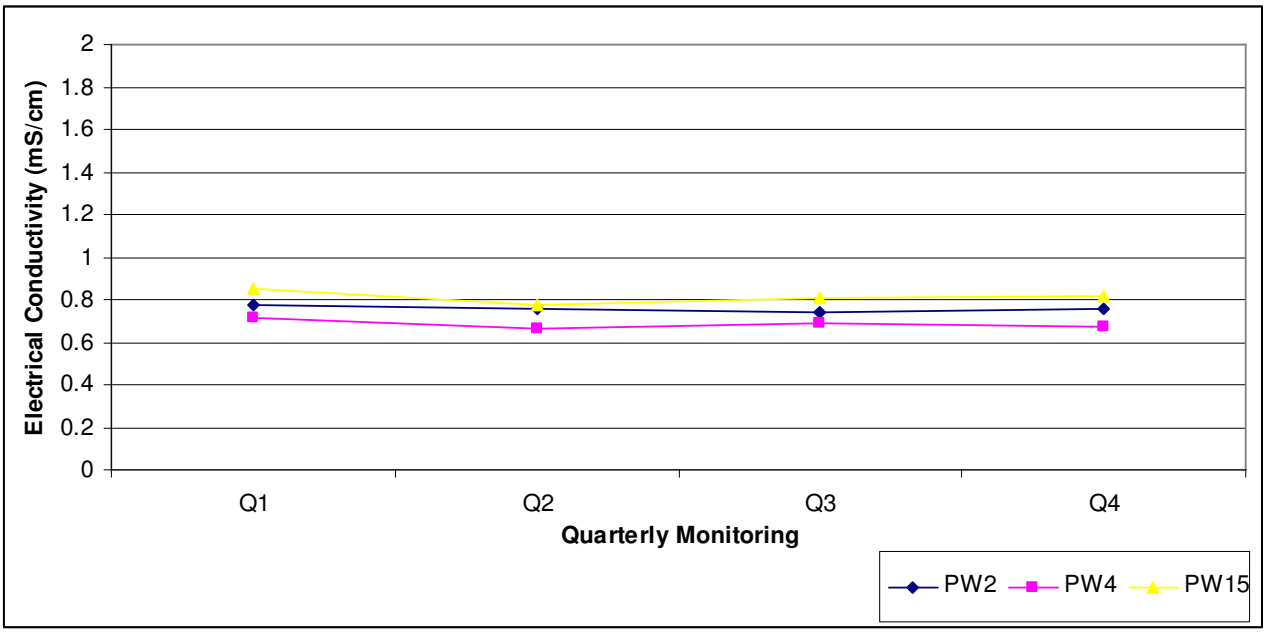


Figure 5.8: Conductivity Levels at Upgradient Groundwater Monitoring Points (2008)

None of the private wells down gradient appear to be affected by the landfill (see the results for PW9 to PW11 in Appendix II), though there instances of high coliform counts and failure of other water quality standards. Local sources of contamination (farmyards, septic tanks or poor well protection, etc.) are believed to be the causes of this microbiological and physio-chemical contamination.

New and replacement groundwater wells have been installed on-site and the surrounding area. The new wells were installed for assessment of the groundwater quality around the site, as referred to in section 5.1.1 above and illustrated in Environmental Monitoring Point Location Map; 2006-114-01-003 (Appendix 1) which was sent to the Agency by KCC.

Some of the new and replacement wells have been sampled as part of a recent Groundwater Assessment study undertaken by FTC on behalf of Kildare County Council to address the ongoing risk to groundwater from the landfill at Silliot Hill. The results of the monitoring for the new and replacement wells are included in the Groundwater & Landfill Gas Risk Assessment Study. This report was submitted to the Agency in July 2008.

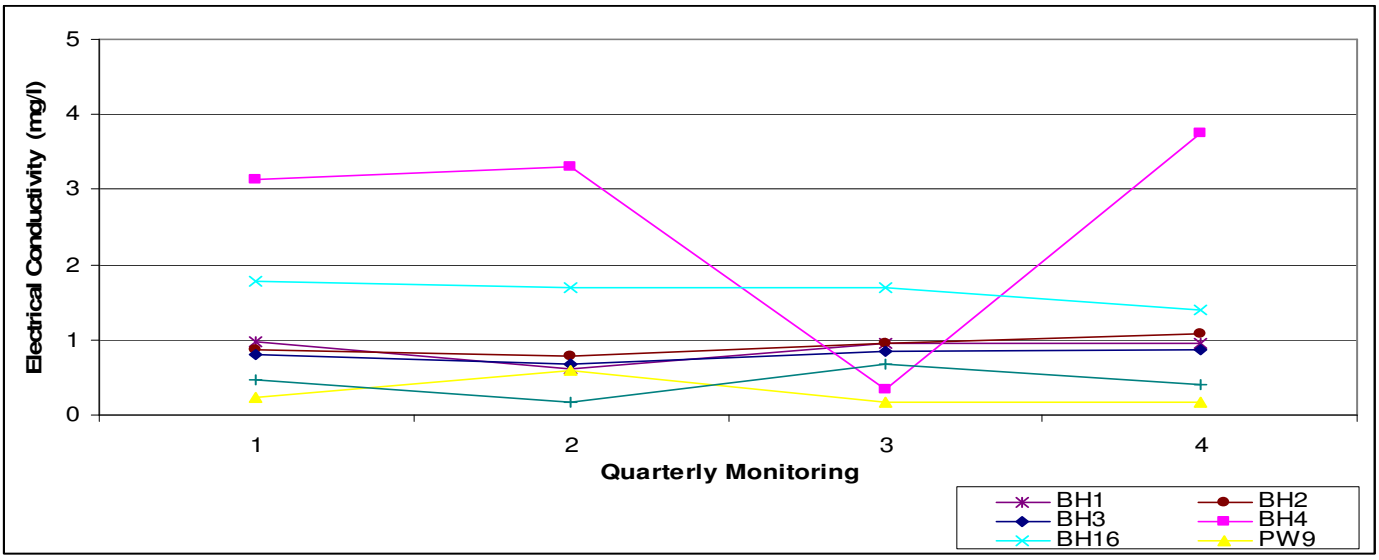


Figure 5.9: Conductivity Levels at Downgradient Groundwater Monitoring Points (2008)

5.4. Leachate

Leachate monitoring was carried out at the six locations (L1 to L6) outlined in Table 5.3 and shown on Drawing 2001-114-01-003 Rev D in Appendix I. The results of the monitoring are presented in Appendix II.

Table 5.3: Leachate Monitoring Locations

Location	Eastings	Northings
L1	285607	211587
L2	285775	211483
L3	285750	211685
L4	285717	211753
L5	285747	211664
L6	285834	211587

L4 was not sampled during the year owing to the well being dry. L5 and L6 are also dry and have been damaged during the recent capping works. L2 has frequently been inaccessible owing to the capping work.

5.4.1. Interpretation of Results

Figure 5.9 shows the levels of conductivity measured at leachate wells throughout the year and these are typical concentrations for leachate. Construction works on the landfill cap interfered with the performance of L2, L5 and L6. This work has prevented a complete set of samples being taken.

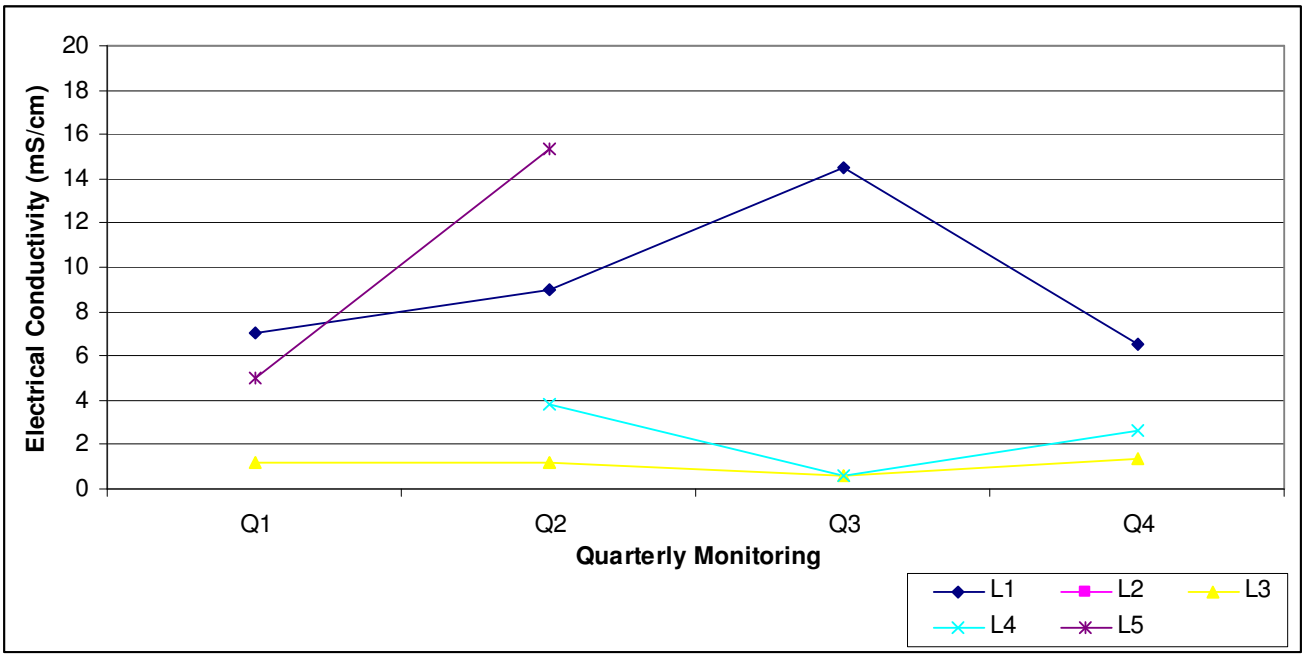


Figure 5.10: Conductivity Levels at Leachate Monitoring Points (2008)

The results for L3 & L4 indicate a more attenuated leachate than that found at the other leachate monitoring points. L3 also has a high total coliform count.

L1 has a high faecal coliform count because it receives wastewater pumped up from L3. For this reason, the leachate in L1 (from the Phase 2 area, as well as the hard-standing and foul areas) is also relatively attenuated compared to that from L2, which is from the Phase 2 area only.

L1 results show an increase in conductivity levels during the summer months. This is probably owing to less storm water being present in the system during drier weather, and consequently less dilution of the more concentrated leachate from Phase 2.

5.4.2. Leachate Level Results

Leachate levels are monitored on a monthly basis at L1 and L2, to assess the head of leachate above the liner at these locations. Condition 5.9.2 of the Waste Licence states that *'leachate levels in the waste shall not exceed a level of 1.0 m over the top of the liner at the base of the landfill in Phase 2'*. Figure 5.10 illustrates the levels of leachate at L1 and L2 from 2006 to 2008.

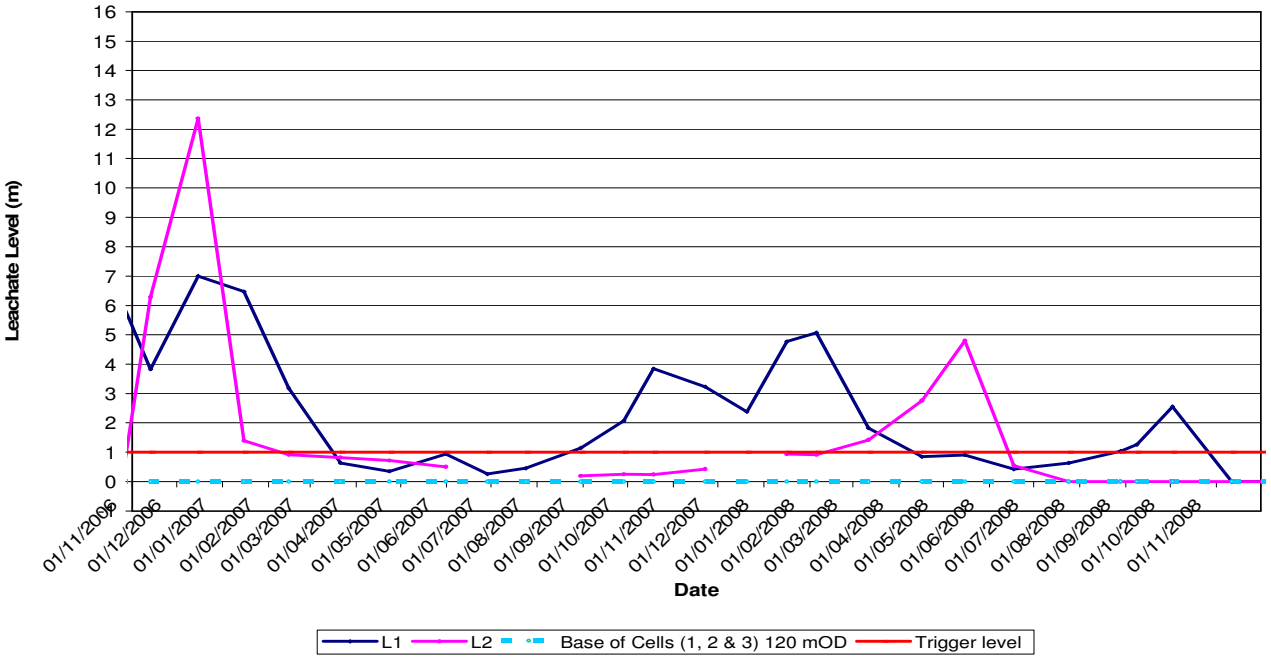


Figure 5.11: Leachate Levels at L1 and L2 (2006 – 2008)

Leachate levels recorded at L1 in December 2006 are decreasing slightly by approximately 5 mOD compared to the levels recorded in December 2008. However L2 leachate levels have decreased by approximately 3 mOD since December 2006.

High temperatures (typically in the region of greater than 20°C) in the leachate sump results in high condensate levels. The combination of high temperatures and humidity in the leachate sumps, producing high levels of condensate causes interference with the monitoring equipment producing "false" readings. Even with high dip levels, leachate pumps are frequently noted pumping dry from the sumps, suggesting that the sumps are empty. Additionally the leachate sumps are suspected to be at slight angles, owing to subsidence in the landfill. If the dip meter hits the side wall of the sump as a result of the angle with the levels of condensate in the sump, false readings can also be produced.

The false readings give the impression that the leachate levels are higher in the landfill than they are in reality. This was confirmed during the year by the use of CCTV in the leachate well, which demonstrated the true level of the leachate in the wells.

A SCADA system has been installed during 2008. This system automatically and continuously monitors the levels of leachate in the L1 and L2 sumps. The leachate extraction pumps are connected to the SCADA system and cut in automatically to ensure the level of leachate in the landfill system is maintained at the required level presented in Condition 5.9.2 of the Waste Licence. During capping works the SCADA system has been off. In 2009 it is expected that the system will be fully commissioned and operational on a full-time basis.

5.5. Noise

Noise monitoring was carried out at the seven locations (N1 to N7) outlined in Table 5.4 and shown on Drawing 2001-114-01-003 Rev D. Noise measurements were taken for 30 minutes at each location. A summary of the monitoring results are presented in Table 5.5.

Table 5.4: Noise Monitoring Locations

Location	Eastings	Northings
N1	285651	211809
N2	285930	211815
N3	286083	211704
N4	285938	211554
N5	285838	211494
N6	285540	211617
N7	285633	211489

5.5.1. Interpretation of Results

Six of the seven noise stations monitored had levels recorded above the EPA limit of 55 dB (A) for daytime noise. With the exception of N1, the dominant sources of noise at these locations were not caused by activities at the Silliot Hill facility. Traffic on the R448, and to and from the KTK landfill are the main contributors to noise levels in the area. The dominant noise source at N4, N5 and N7 were vehicles on the Carnalway Road and those accessing KTK landfill.

All the L_{AF90} readings are under the EPA limit for dB. This indicates that the intermittent noise for less than 10% of the monitoring period caused the greatest impact. Traffic sounds would normally fall into the L_{AF10} range.

5.6. Assessment of Tonal Components

All noise measurements were subject to a one-third octave band analysis to identify tonal components within the noise measured and the raw results of this analysis are presented in Appendix 2. Below the decibel level is plotted against frequency as the output of the tonal analysis. Tonal noise was recorded only at monitoring N2 at 100Hz. The cause of this noise was not identified during the monitoring event, and it is a low noise. It could be audible, but is not in the range where the human ear is most sensitive.

At monitoring point N3 the noise was all below the range for the Octave Band Analysis. This demonstrates that the sound was predominantly lower than 39.8 dB(A).

Table 5.5: Noise Results

Location	Date	Time	2006 $L(A)_{EQ}$	2007 $L(A)_{EQ}$	2008 $L(A)_{EQ}$	2008 $L(A)F_{10}$	2008 $L(A)F_{90}$	Noise Source
N1	11/12/08	08:35	**63**	**62**	**65**	69	51	Traffic on R448 is the dominant noise source at this location. On site noise from traffic in the civic amenity area and distant traffic on the cap could be heard in the background.
N2	11/12/08	11:55	52	**57**	**58**	55	45	Construction vehicles at the capping works is the Dominant noise. There is a persistent hum from the electricity pylons, traffic and birdsong in the background
N3	11/12/08	12:30	51	49	47	48	40	Dominant noise is the electricity pylon. Background noise is from traffic on the Carnalway Road and capping works (including reversing sirens) and birdsong.
N4	11/12/08	13.45	**66**	**63**	**59**	55	45	Dominant noise is traffic on the R448 and traffic accessing KTK landfill. Background is coming from the gas extractor at KTK, some birdsong and heavy plant operating at the capping works at Silliot Hill.
N5	11/12/08	09:45	**62**	**67**	**66**	61	44	Dominant noise was traffic on the Carnalway Road to KTK Landfill and Silliot Hill capping works (27 no.) with traffic on the R448 providing persistent background noise. Noise of plant working at SIlliot Hill capping was audible.
N6	11/12/08	09:10	**58**	**62**	**57**	59	49	Traffic on R448, with some background birdsong. Noise from the capping works were audible: reversing sirens, JCB bucket banging, engines revving.
N7	11/12/08	10:50	**63**	**60**	**62**	64	47	Traffic on the Carnalway Road to KTK Landfill and on R448 provide the dominant noise sources. Some noise from construction vehicles on the cap. Background noise came from birds and the electricity pylons.

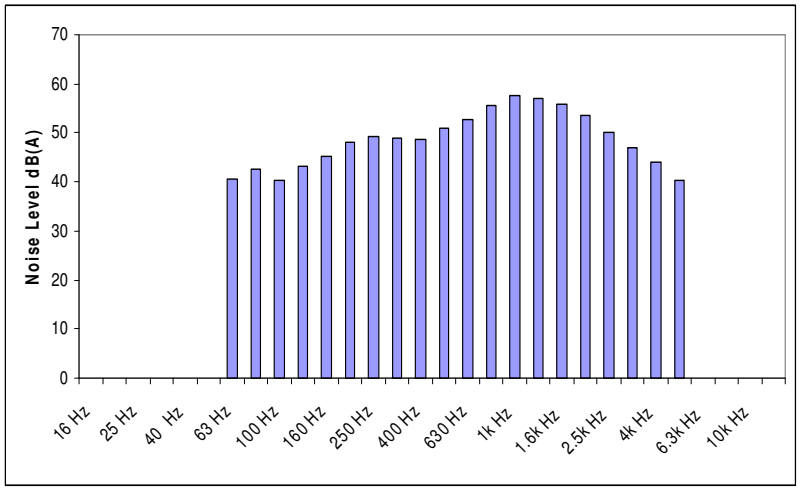


Figure 5.12: N1: 1/3 Octave Band Analysis

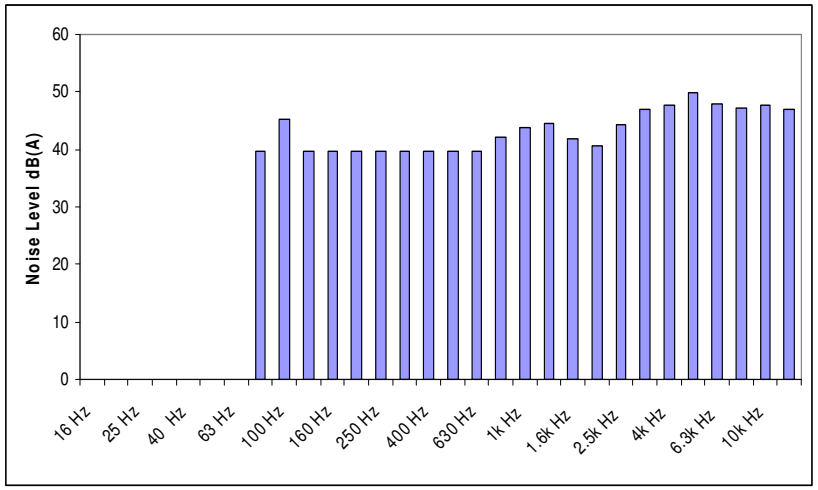


Figure 5.13: N2: 1/3 Octave Band Analysis

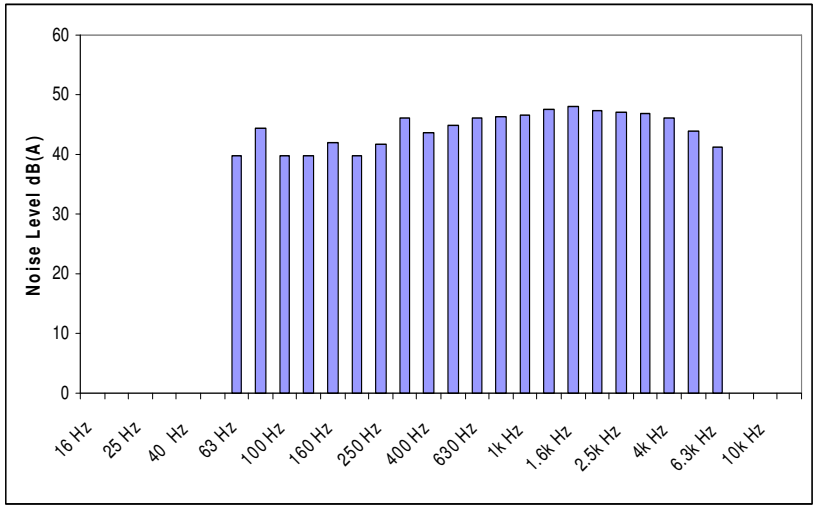


Figure 5.14: N4: 1/3 Octave Band Analysis

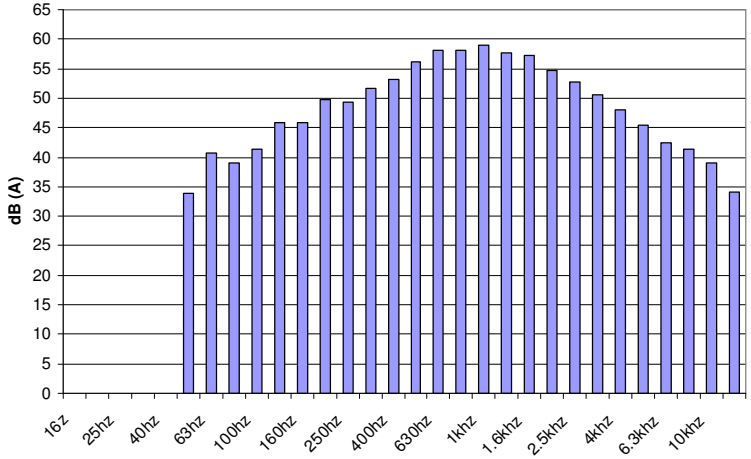


Figure 5.15: N5: 1/3 Octave Band Analysis

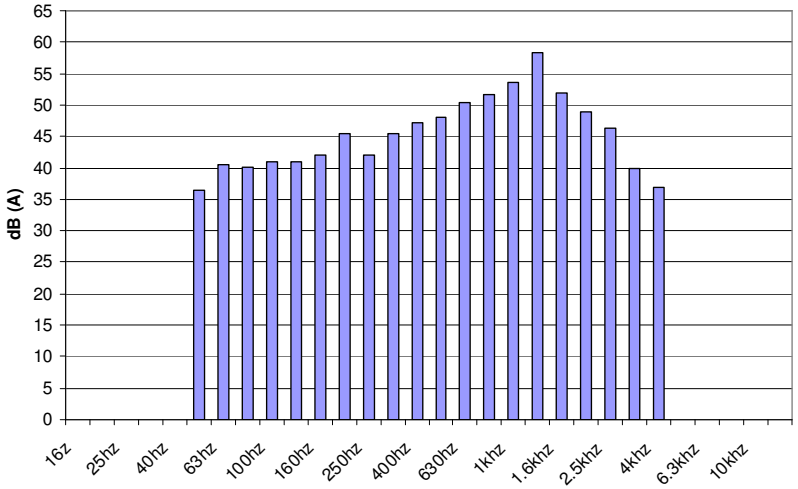


Figure 5.16: N6: 1/3 Octave Band Analysis

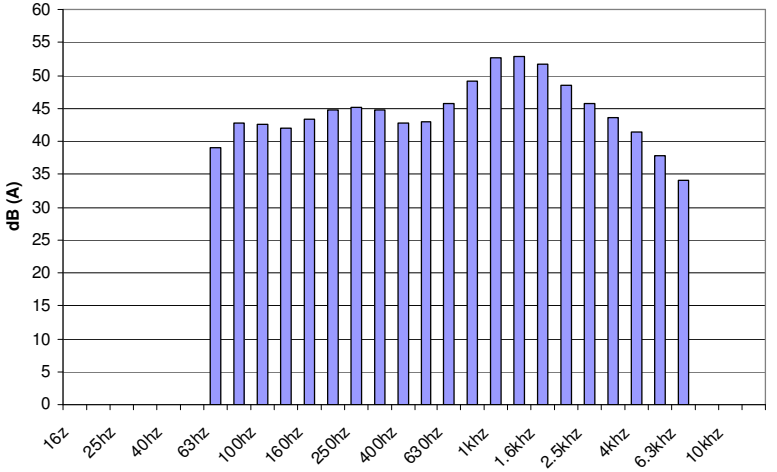


Figure 5.17: N7: 1/3 Octave Band Analysis

5.7. Dust Deposition and PM_{10} Monitoring

Dust monitoring was carried out in accordance with the licence at the six locations (D1 to D4 & D6-D7) as outlined in Table 5.6 and shown on Drawing 2001-114-01-003 Rev D. The results of the monitoring are presented in Appendix II.

On completion of the works the D5 monitoring location will also be reinstated and monitoring will re-commence.

Table 5.6: Dust Monitoring Locations

Station	Easting	Northing	Location
D1/PM_{10}1	285707	211809	Entrance to facility
D2	285931	211815	Northern perimeter of facility
D3	286083	211704	NE perimeter of old (Phase 1) landfill
D4	285938	211554	Eastern perimeter of old (Phase 1) landfill
D5	285838	211494	SE perimeter of old (Phase 1) landfill
D6/PM_{10}2	285540	211617	Western perimeter of Phase 2 landfill
D7/PM_{10}3	285633	211489	Southern perimeter of landfill.

5.7.1. Interpretation of Results

Dust standards (350 mg/m^2/day) were not exceeded at any stage during the 2008 monitoring period (June or July or August 2008).

All PM_{10} results were within the 50 µg/m^3 limit as recommended in the Air Quality Standards Regulations (S.I. No. 271 of 2002).

5.8. Compost

No waste material was taken into the site for composting during the monitoring period. Consequently compost quality has not been analysed during this year and the composting facility remains closed for the foreseeable future.

5.9. Climate

The annual rainfall figures recorded at Casement Aerodrome are presented in table 5.7, and a bar chart is included as Figure 5.18.

Table 5.7: Monthly Rainfall, Evapotranspiration and Temperature data – 2008

Month	Rainfall (KTK) (mm)	Evapotranspiration (Casement) (mm)	Evaporation (Casement) (mm)	Average Monthly Temperature (KTK) (°C)
January	129.8	15	4.6	6.55
February	22.0	26	11.1	6.80
March	115.5	43	21.6	6.68
April	31.5	56	46.7	9.30
May	16.6	89	79.6	13.42
June	70.8	83	61.6	13.47
July	100.4	81	71.6	15.64
August	153	63	70.0	15.51
September	91.2	43	30.1	13.03
October	110.6	27	17.7	9.59
November	74.8	11	3.2	7.25
December	46.2	13	5.6	5.35
Total	**962.4**	**550**	**423.4**	**10.21 (Tot. Av)**

Evapotranspiration for the site is estimated to be approximately 550 mm (based on a 25 year average of potential evapotranspiration records for Casement Aerodrome).

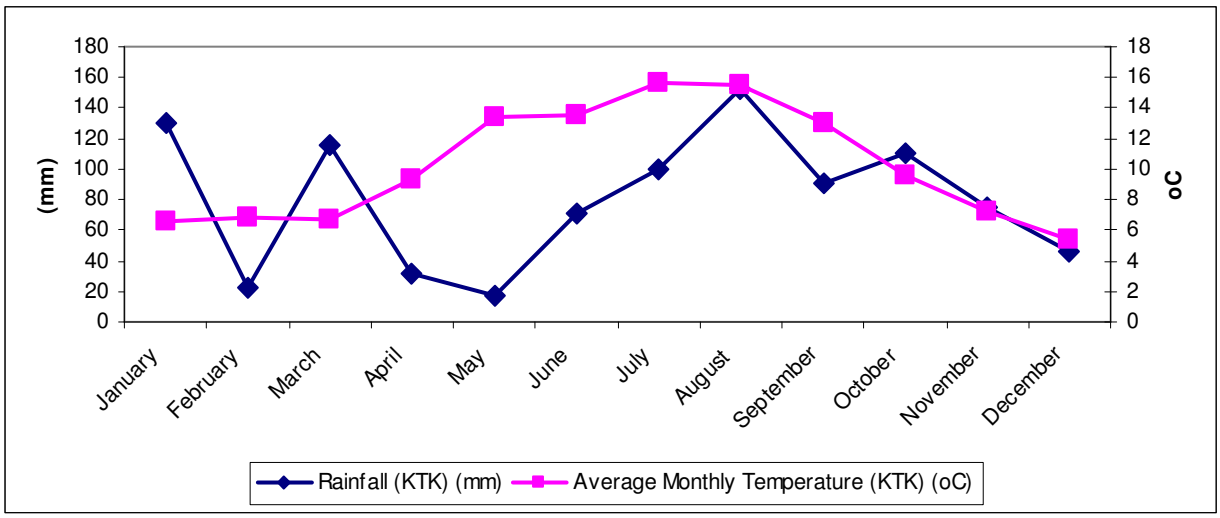


Figure 5.18: 2008 Rainfall and Temperature

6. EMISSIONS

6.1. Landfill Gas Quantities

A landfill gas management plan was submitted to the Agency on the 12th November 2002. The plan contained a review on the controls on landfill gas, migration from the site and a gas prediction model. It also outlines the proposed augmentation of gas control infrastructure. Table 6.1 below summarises the methane generation estimates from the site from 1999 to 2008.

Table 6.1: Landfill Gas Generation Estimates from Phases 1 and 2

YEAR	PHASE 1		PHASE 2	
	Landfill Gas Rate m^3/yr	Methane (m^3/yr)	Landfill Gas Rate m^3/yr	Methane (m^3/yr)
1999	5.44×10^6	2.72×10^6	7.50×10^5	3.75×10^5
2000	5.23×10^6	2.62×10^6	1.27×10^6	6.37×10^5
2001	5.03×10^6	2.51×10^6	1.74×10^6	8.71×10^5
2002	4.83×10^6	2.42×10^6	2.22×10^6	1.11×10^6
2003	4.64×10^6	2.32×10^6	2.13×10^6	1.06×10^6
2004	4.46×10^6	2.23×10^6	2.05×10^6	1.02×10^6
2005	4.28×10^6	2.14×10^6	1.97×10^6	9.83×10^5
2006	4.12×10^6	2.06×10^6	1.89×10^6	9.44×10^5
2007	3.95×10^6	1.98×10^6	1.81×10^6	9.07×10^5

Irish Power Systems installed a gas collection system in 2003. This consisted of a gas utilisation plant and an enclosed gas flare. The enclosed gas flare was put into operation in October 2003 and the gas utilisation plant was commissioned and opened in March 2004.

Owing to landfill capping works on-site the flare did not run during the 2008 monitoring period. As a result there is insufficient data available at the time of writing to update and re-run the landfill gas generation model. It is anticipated that with the completion of the on-site cap and the newly installed gas infrastructure, which will be operational in 2009, the collation of more accurate date will enable the revision of the existing landfill gas generation in the future.

Using the LandGEM model for the site it is estimates that 3.33 $x10^6$ m^3 of landfill gas was generated in 2008. Assuming that 30% of the landfill gas is methane gives an estimate of 1.0 $x10^6$ m^3 methane emitted in 2008.

6.2. Leachate Quantities

Leachate produced on-site is currently removed by tanker to Athy Wastewater Treatment works daily. The design of a leachate rising main from the facility to connect into the existing sewerage scheme for Kilcullen is currently underway.

The Kilcullen sewerage scheme is linked, via a rising main, to Osberstown WWTP. Construction of the leachate rising main which will discharge to the Kilcullen sewer is complete and it was commissioned during Quarter 2, 2007. Leachate has been put through the new system manually since November 2007 and it is expected to be completely automated by March 2009.

The volumes removed from the site monthly are provided in Table 6.2.

Table 6.2: Quantity of Leachate Tankered Off-Site – 2008

MONTH	QUANTITY (tonnes)	MONTH	QUANTITY (tonnes)
January	1154.	**July**	416.44
February	757.	**August**	999.20
March	868.92	**September**	936.66
April	772.40	**October**	923.44
May	73.16	**Nov**	693.06
June	294.96	**Dec**	602.96
		Total	**8195.72**

The total amount of leachate removed from site in 2008 (8,195.72 m^3) compares favourably to a figure of 12,938.24 m^3 in 2007, 12,625 m^3 in 2006, 9,788 m^3 in 2005 and a figure of 8,831 m^3 in 2004, indicating capping works are preventing rainwater infiltration at the site.

6.3. Indirect Emissions to Groundwater

Volumes of rainfall entering Phase 1 have been minimised in the past 5 years following the installation of a capping system, comprising at least 1 m of boulder clay and 300 mm of topsoil, and the directing of the surface water away from the waste body. Since then there has been a significant decrease in the volume of leachate being generated, from an estimated 66,260 m^3 per annum in 1997 (based on long-term monthly mean rainfall values) to 4,440 m^3 per annum in 2008. Groundwater quality beneath and down-gradient of the site is being closely monitored to assess trends.

The following section sets out a water balance calculation for the site as a whole. However, it is important to state at the outset the assumptions being used in these calculations:

- Waste placed in Phase 1 of Silliot Hill landfill was deposited in a disused quarry. This area did not receive an artificial lining system with the result that leachate can enter the local groundwater. Leachate generated from all other areas of the facility is collected and tankered to Athy Wastewater Treatment Plant for treatment. It has therefore been assumed for the purposes of these calculations that indirect emissions to groundwater from the facility are generated only from Phase 1 of the landfill.
- It should be noted that evapotranspiration was not taken into account for the purposes of the calculations for the intermediately capped areas, in accordance with the recommendations made in the EPA Manual on Landfill Site Design. Evapotranspiration was included for the calculations completed for the infiltration through the permanent cap.
- A quantity of leachate percolates into manhole L3 from Phase 1. The volumes removed have been included in the figures provided in the table.

The calculated volume of leachate generated from Phase 1 in 2008 has been estimated at 4,440 m^3. 8,195.72 m^3 was collected and tankered off-site for treatment from the lined portion of the site. In unlined areas the leachate dilutes and disperses in the subsurface environment.

6.4. Monthly Water Balance Calculations

The monthly water balance calculations have been calculated as outlined in Appendix III. The results are summarised in Table 6.3. The predicted amount of leachate can be compared with the actual amount tankered off-site for each month.

Water balance calculations were carried out for the different elements of the facility, as follows:

- Phase 1 – unlined portion of landfill
- Phase 2 – lined portion of landfill
- Waste transfer station
- Civic amenity facilities
- Others; septic tank etc.

6.4.1. Phase 1 – Unlined Portion of Landfill

Phase 1 of the landfill relies on the dilute and disperse method for dealing with leachate. The area received a final cap in 1997. Recent augmentation works to improve the clay cap was completed mid 2008. The water balance calculations carried out for Phase 1 assumed that 10% of the incident rainfall percolated through this final cap into the waste body. Potential evapotranspiration (PE) is also taken into account.

6.4.2. Phase 2 – Lined Portion of Landfill

Phase 2 of the landfill accepted waste from October 1997 to March 2002. The cells received a 300 mm. intermediate cap of clay following their closure. They received a final cap during 2007 and 2008. The water balance calculation for this area assumed that 10% of the incident rainfall percolated through the synthetic cap into the waste body. All of this leachate was collected in the lined cells and pumped into the tankers prior to removal for treatment at Athy WWTP. Potential Evapotranspiration was not taken into account to provide a safety factor, as per the guidelines given in the EPA Manual on Landfill Site Design.

6.4.3. Waste Transfer Station

Runoff from the entire area of the waste transfer station is collected into the leachate collection network. The leachate is collected into a pump sump and is pumped to leachate abstraction point L1.

6.4.4. Civic Amenity Centres

All rainfall incidents on the civic amenity area are directed to a soak pit located at the northern corner of the facility and therefore does not affect leachate levels.

6.4.5. Septic Tank

Leachate is also generated from the septic tank facilities on site. The volumes generated are

negligible when compared with other elements of the facility.

6.4.6. Sludge Treatment Facility

Leachate is not generated by the activities associated with the composting facility, which was inactive for the 2008 monitoring period.

6.4.7. Leachate Volumes

The following table outlines the predicted and actual volumes of leachate generated at the facility.

Table 6.3: Leachate Volumes for 2008

Location	Leachate Generated (m^3)
Phase 1 Landfill Area	4,440
Phase 2 Landfill Area	2,366
Waste Transfer Station	2,416
Total Predicted Volume of Leachate (Excluding Phase 1)	**9,222 (4,440)**
Predicted Total Volume of Leachate Removed	**4,782**

The volume of leachate removed in 2008 (8,195.72 m^3) is compared to 4,782 m^3 (predicted volume of leachate generated for the site, less that predicted for Phase 1). This is a difference of 3,414 m^3. This may mean that the Phase 2 of the landfill is producing more leachate than predicted.

6.5. Site Development Works during 2008

- Phase 2 has been capped during 2008. A fully engineered cap with wells for gas extraction has been installed.
- 47 number of 1 m diameter wells have been installed in both Phase 2 and Phase 1A
- The staff car park has been upgraded and resurfaced
- The leachate and gas extraction infrastructure in Phase 2 have been completed and hooked up.

6.5.1. Gas Management Infrastructure

The gas collection system is being upgraded in conjunction with the restoration of the landfill. 47 No. large 1 meter diameter gas bore-holes have been drilled and placed into the body of the landfill. These new wells will be used for the extraction of landfill gas and they are connected into the landfill gas utilisation system.

A number of new perimeter landfill gas (LFG) monitoring wells were drilled and installed around the site during the 2007. These new wells, referred to in section 5.1.1 above served as new or replacement perimeter LFG monitoring wells. The new LFG wells bored during 2007 were to replace some older existing wells, which have been identified as performing poorly, and some other wells that have been damaged during construction works on-site. Kildare County Council submitted a letter to the EPA requesting permission to start monitoring these new wells as replacements for the older poorly performing wells and the destroyed wells. A response is awaited from the Agency to begin monitoring the new wells.

6.5.2. Leachate Management

Continuous monitoring of the levels of leachate in the two leachate sumps, L1 and L2 ensure that the leachate levels in the system are maintained as low as possible. The abstracted leachate is collected and taken off site for treatment.

The leachate pumps were replaced during 2007 and are inspected and serviced to ensure that they operate to their optimum.

Leachate dip levels from these two leachate sumps indicated levels of leachate which contrast with the information provided from leachate pumps. The leachate pumps run dry although the dip meter suggests greater levels of leachate in the system.

To address this conflicting data during 2007 KCC undertook a Close Circuit Television (CCTV) survey of the two leachate sumps to investigate the true levels of the leachate in the sumps at that time. The CCTV confirmed deeper depths to the leachate than the pumps were presenting.

The CCTV also highlighted the amount of humidity and condensate in the sumps. A copy of the results of the CCTV survey has already been presented to the EPA.

KCC have commenced putting the leachate through the new system manually and expect to be completely automated by March 2009.

6.5.3. Groundwater risk assessment

A risk assessment report, based on the source-pathway-receptor methodology and incorporating a quantitative risk assessment model for the site was completed and submitted to the Agency during 2008.

6.5.4. Site Survey

Focus Surveys Ltd. carried out the annual topographical survey during 2008.

6.5.5. Civic Waste Facility

No upgrades took place during 2008.

6.6. Proposed Development Works for 2009

- Completion of topsoiling of the new cap, on Phase 2 and seeding of this will be carried out in 2009.
- A new and updated gas model of the site will be generated this year.
- The LFG infrastructure is now ready for a full site balancing in March 2009.
- Commissioning of the existing leachate treatment facility will be carried out in 2009.
- Connection to the leachate rising main is completed, but leachate removal is expected by March 2009.

6.6.1. Leachate Management

The construction of a leachate rising main for Silliot Hill to the Kilcullen Sewerage Scheme is completed. The site is now awaiting an ESB connection to operate the pumps such that this main will be operational. Leachate will continue to be removed by tanker in the interim.

An on-site leachate treatment facility is being commissioned and leachate will be piped into this. The leachate treatment facility will strip methane from the leachate.

When finalised, in 2009, the permanent cap for Phase 2 will further reduce the volume of leachate being generated.

As previously referred to in section 5.4.2 a new SCADA system was installed on-site during 2008. Once commissioned this system will automatically and continuously monitor the levels of leachate in L1 and L2 sumps. The system will operate at all times and will be connected so the information can be viewed at the site offices. The leachate extraction pumps will be connected to the SCADA system and will cut in automatically to ensure the level of leachate in the landfill system is maintained at the required level presented in Condition 5.9.2 of the waste licence.

6.6.2. Landfill Site Restoration

The restoration plan for the entire site is as follows:

- Phase 1 B
  No further restoration of this area is planned,
- Phase 1 A
  No further restoration of this area is planned,
- Phase 2
  The cap will be completed during 2009.

7. ENVIRONMENTAL TARGETS

In compliance with Condition 2.3 of the waste licence, an Environmental Management Programme (EMP) has been established for the facility.

The EMP includes the timescale for achieving the Objectives and Targets and the designation of responsibility for achieving the Objectives and Targets.

7.1. Proposed Objectives & Targets

The Objectives and Targets proposed for 2009 are:

1 Increase the throughput of domestic customers where possible at the Civic amenity site.
2 Increase awareness in recycling by more advertising and pamphlets.
3 Continue School Tour programme and increases numbers where possible.
4 Continue efforts to source new markets for recyclable products.
5 Build a garden made from recyclable materials for display purposes.
6 Increase recycling rates where possible.
7 To endeavour to reduce energy consumption
8 Start monitoring the newly installed groundwater and perimeter landfill gas wells.
9 Commissioning of the existing leachate treatment facility in 2009.
10 Final commission of the new SCADA to record levels of leachate in the landfill.
11 Connection to the leachate rising main is completed, but leachate removal by the rising main is expected to be fully operational by March 2009.
12 Completion of topsoiling of the new engineered cap, on Phase 2 and seeding and landscaping of this will be carried out in 2009.
13 The LFG infrastructure is now ready for a full site balancing in March 2009
14 A new and updated Gas Model of the site will be generated this year.

Table 7.1: Objectives and Targets 2008

Objective/Target	Progress during 2007
Increase the throughput of domestic customers where possible	On-going
Increase awareness in recycling by more advertising and pamphlets	
Continue out School Tour programme and increases numbers where possible	On-going
Continue efforts to source new markets for recyclable products	On-going
Build a garden made from recyclable materials for display purposes	Postponed due to the intensive capping works which were undertaken during the monitoring period
Increase out recycling rates where possible	On-going
Start monitoring the newly installed groundwater and perimeter landfill gas wells	Submitted request to monitor to the Agency
Present and deliver Groundwater risk assessment	Completed and Presented to the Agency
Connect up the new SCADA system to L1 and L2 to record levels of leachate in .the landfill	Installed and connected. Awaiting final commissioning
Complete the Phase B gas extraction system works	Completed
Complete the augmentation of clay cap and insulation of gas and leachate infrastructure and other associated infrastructure, including landscaping for Phase 1 A	On-going. Due for completion early 2009
Finish the drilling and the instillation of the new 1 meter in-waste gas wells in Phase 1 B and Phase 2	Completed
Finish the construction of engineered cap and associated infrastructure, including landscaping to commence for Phase 2	On-going. Due for completion early 2009

7.2. Site Procedure & Forms

There have been no changes to the forms used on-site, as provided in the 2004 AER.

8. MISCELLANEOUS

8.1. Energy Consumption and Generation

The figures for energy use in 2008 are as follows:

- Electricity : 176,442 kW/hr (approximate)
- Fuel: 47,416 litres (approximate)
- Water: 1,000 m^3 (approximate)

8.2. Incidents & Complaints Summaries

The facility manager records all site incidents and complaints on a register, which is held at the site office. The facility manager has reported 12 incidents of breaches of landfill gas trigger levels to the Agency. No landfill gas has been detected in the onsite buildings in 2008.

A copy of the letter sent to the Agency regarding the incident is included in Appendix IV.

One complaint was received from persons regarding the facility. The complaint was regarding the operation of the Civic Amenity area of the IWMF.

The complaint is contained in Appendix IV.

8.3. Financial Provision

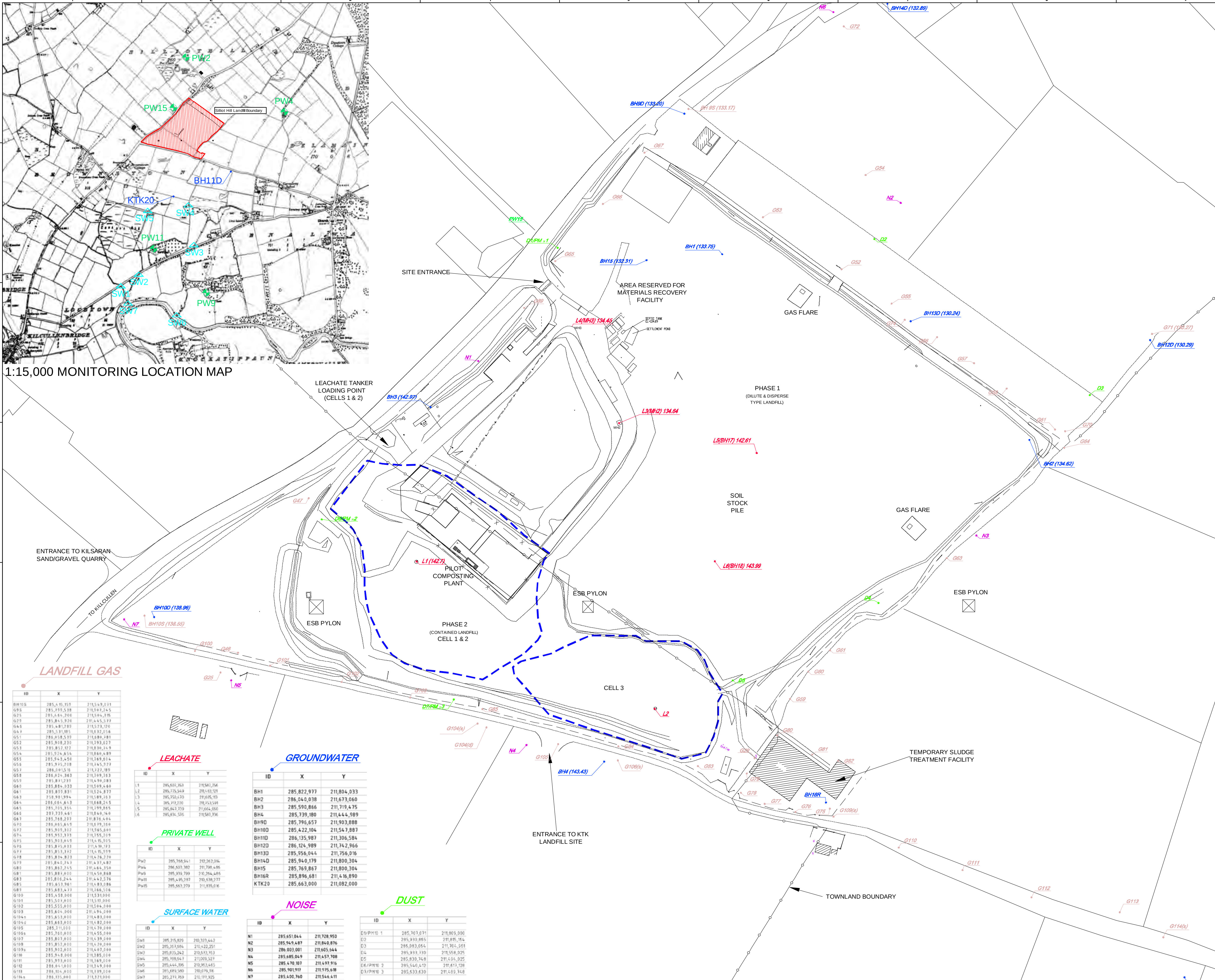
As part of the waste licence for the facility, Kildare County Council pays an annual contribution of € 21,669 towards the cost of monitoring the facility.

8.4. Management & Staffing Structure

The Management & Staffing Structure has been included in Appendix V.

Appendix I

Drawings



LANDFILL GAS

ID	X	Y
BH10S	285,415,159	211,549,031
G95	285,799,538	211,907,245
G25	285,464,200	211,504,315
G29	285,845,920	211,445,577
G46	285,481,289	211,573,120
G47	285,531,185	211,632,056
G51	286,058,539	211,680,781
G52	285,908,230	211,793,627
G53	285,857,122	211,830,349
G54	285,924,654	211,860,489
G55	285,943,450	211,769,604
G56	285,975,208	211,745,927
G57	286,001,516	211,727,189
G58	286,024,363	211,709,363
G59	285,871,239	211,490,083
G60	285,884,033	211,509,460
G61	285,899,831	211,524,877
G63	258,981,994	211,589,363
G64	286,064,643	211,668,245
G65	285,705,354	211,799,865
G66	287,739,461	211,840,140
G67	285,768,297	211,876,404
G70	286,065,649	211,679,360
G72	285,909,302	211,965,601
G74	285,952,373	211,755,209
G75	285,903,049	211,415,905
G76	285,875,033	211,410,173
G77	285,853,372	211,415,999
G78	285,834,823	211,426,220
G79	285,840,747	211,437,487
G80	285,862,245	211,464,350
G81	285,887,000	211,450,868
G83	285,806,244	211,442,576
G85	285,653,961	211,483,086
G89	285,683,477	211,766,506
G100	285,458,000	211,531,000
G101	285,507,000	211,517,000
G102	285,555,000	211,504,000
G103	285,604,000	211,494,000
G104s	285,653,000	211,483,000
G104d	285,663,000	211,482,000
G105	285,711,000	211,470,000
G106s	285,760,000	211,455,000
G107	285,807,000	211,439,000
G108	285,857,000	211,420,000
G109s	285,902,000	211,407,000
G110	285,948,000	211,385,000
G111	285,993,000	211,369,000
G112	286,041,000	211,349,000
G113	286,104,000	211,339,000
G114s	286,135,000	211,321,000

LEACHATE

ID	X	Y
L1	285,607,353	211,587,256
L2	285,775,549	211,483,121
L3	285,750,470	211,685,113
L4	285,717,220	211,753,591
L5	285,847,739	211,664,060
L6	285,834,576	211,583,736

PRIVATE WELL

ID	X	Y
PW2	285,768,941	212,262,014
PW4	286,603,382	211,798,486
PW9	285,939,799	210,264,486
PW11	285,495,287	210,638,277
PW15	285,663,279	211,835,016

SURFACE WATER

ID	X	Y
SW1	285,215,829	210,323,442
SW2	285,367,684	210,422,251
SW3	285,835,242	210,673,763
SW4	285,788,647	211,009,527
SW5	285,444,196	210,963,465
SW6	285,689,580	210,079,116
SW7	285,277,769	210,177,925

GROUNDWATER

ID	X	Y
BH1	285,822,977	211,804,033
BH2	286,040,038	211,673,060
BH3	285,590,866	211,719,475
BH4	285,739,180	211,444,989
BH9D	285,796,657	211,903,888
BH10D	285,422,104	211,547,887
BH11D	286,135,987	211,306,584
BH12D	286,124,989	211,742,966
BH13D	285,956,044	211,756,016
BH14D	285,940,179	211,800,304
BH15	285,769,867	211,800,304
BH16R	285,896,681	211,416,890
KTK20	285,663,000	211,082,000

NOISE

ID	X	Y
N1	285,651,044	211,728,950
N2	285,949,487	211,840,876
N3	286,003,001	211,605,644
N4	285,685,049	211,457,708
N5	285,470,107	211,497,916
N6	285,901,917	211,975,618
N7	285,400,760	211,546,411

DUST

ID	X	Y
D1/PM10 1	285,707,071	211,809,000
D2	285,930,865	211,815,164
D3	286,083,064	211,704,961
D4	285,933,730	211,558,025
D5	285,830,748	211,494,025
D6/PM10 2	285,540,412	211,617,128
D7/PM10 3	285,633,630	211,489,748

Rev.	Drawn	Chk'd	Appr'd	Date	Description
D	J.O'D	O.H	C.M	21.11.05	ISSUE FOR INFORMATION
C	SK			15.09.03	ISSUE FOR WASTE LICENCE COMPLIANCE
B	JC			04.11.02	ISSUED FOR WASTE LICENCE COMPLIANCE
A	DM	DK	GOS	14.08.2002	ISSUED FOR WASTE LICENCE COMPLIANCE

Name of Client
KILDARE COUNTY COUNCIL

Name of Job
SILLIOT HILL LANDFILL

Title of Drawing
ENVIRONMENTAL MONITORING POINT LOCATION MAP

Scales Used
1:1250, 1:15,000

Dwg. No.
2001-114-01-003

Rev.
D

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Appendix II

Monitoring Results

LANDFILL GAS MONITORING FORM						
Site Name:	Silliot Hill Landfill			**Date:**	January 16 2008	
Operator:	Kildare County Council			**Monitoring Personnel:**	Declan Duff & Nicola Hoare	
Site Address:	Silliot Hill,			**Instrument Used:**	LMS xi	
	Kilcullen, Co. Kildare			**Next Calibration:**		
Grid Reference:	E2116 N2858			**Normal Analytical Range:**	0 - 100%	
Site Status:	Landfill Restored			**Weather:**	Cold and wet	

Sample Station	CH_4 (% v/v)	CO_2 (% v/v)	O_2 (% v/v)	Temp. °C	Pressure mbar	Comments
G9s	0.0	0	21.3	5.4	978	
G10s						No tap
G25	0.0	0.8	19.6	4.9	986	
G29	0.0	0.5	19.2	5.2	982	
G46	0.0	0.5	20.2	5.2	986	
G29	0.0	0.5	19.2	5.2	982	
G51						Removed/ Destroyed
G52	0.0	2.4	14.5	5.5	983	Tap broken
G53	0.0	4.3	12.5	5.9	985	
G54						Tap broken
G55	0.0	0.9	19.5	5.2	984	
G56						Tap broken
G57	0.2	0.7	20.1	5.1	984	
G58						Removed/ Destroyed
G59	0.0	1.1	19.5	5.1	983	
G60	0.0	0.0	20.9	5.1	982	
G61	0.0	4.6	17.2	5.3	983	
G62	0.0	0.3	19.9	5.3	983	Restricted Flow-well damaged
G63	0.0	2.2	18.2	5.2	984	
G64						Tap broken
G65	2.0	2.7	16.4	6.7	982	
G66	1.2	3.2	7.1	6.1	982	Very restricted flow
G67	0.0	1.7	15.6	5.9	982	
G70	0.0	0.2	20.8	5.8	984	
G71	0	1.1	17	5.3	984	
G72	0.0	1.4	18.9	5.9	978	
G74	4.3	6.6	13.2	5.1	984	
G75	0	1	19.6	5.1	982	Repaired
G76						Buried
G77	0.0	0.2	20.9	5.2	983	
G78	0.0	0.0	20.7	5.2	983	
G79	0.0	0.3	20.0	5	983	
G80	0.0	0.7	18.3	5.6	983	
G81	0.0	2.3	17.5	4.9	982	
G82	0.0	0.1	20.5	5.3	983	
G83	0.0	0.0	20.6	5.2	984	Tap loose
G84	0.0	9.3	1.6	4.8	984	
G85	1.1	0.0	2.6	4.8	985	Restricted Flow-sounds of water in well
G88	2.0	5.3	13.2	4.1	984	Well repaired-first time monitoring
G100	0.0	0.3	20.4	4.8	984	
G101	0.0	0.0	20.9	4.7	984	
G102	0.0	0.0	20.8	4.8	985	
G103	0.0	0.0	20.8	4.8	984	
G104 (s)	0.0	0.0	20.9	4.5	984	Cap cracked - venting
G104 (d)	0.0	0.0	20.9	4.5	984	
G105						Flooded
G106 (s)	0	0	20.7	4.8	984	
G108						Flooded
G109 (s)	0.0	0.0	20.9	5.1	984	Cap cracked - venting
G110	0.0	0.0	20.9	5.1	984	
G111	0.0	0.0	20.8	4.8	984	
G112	0.0	0.0	20.9	5	984	
G113	0.0	0.0	20.9	4.9	984	Negative pressure at well
G114	0.0	0.0	20.9	5.0	984	

Exceedences of 1% Limit for CH_4 this period:	**5**
Exceedences of 1.5% Limit for CO_2 this period:	**11**

LANDFILL GAS MONITORING FORM

Site Name:	Silliot Hill Landfill	**Date:**	February 4, 2008
Operator:	Kildare County Council	**Monitoring Personnel:**	Declan Duff + Nicola Hoare
Site Address:	Silliot Hill, Kilcullen, Co. Kildare	**Instrument Used:**	LMX si
		Next Calibration:	
Grid Reference:	E2116 N2858	**Normal Analytical Range:**	0 - 100%
Site Status:	Landfill Restored	**Weather:**	Dry, bright & cool

Sample Station	CH_4 (% v/v)	CO_2 (% v/v)	O_2 (% v/v)	Temp. °C	Pressure mbar	Comments
G9s	0.0	1.3	19.0	7.1	980	
G10s						No tap
G25	0.0	0.7	19.9	6.4	979	
G46						Missed
G29	0.0	0.5	17.8	7.1	979	
G51						Removed/destroyed
G52	0.0	2.7	12.2	6.6	980	
G53	0.0	0.0	21.2	6.9	980	
G54						Tap broken
G55	0.0	0.9	19.5	6.5	981	
G56						Tap broken
G57	0.0	0.3	20.8	7.0	981	
G58						Destroyed/removed
G59	0.0	2.3	15.5	6.9	978	
G60	0.0	0.4	2.7	7.1	978	
G61	0.0	3.2	15.0	7.1	978	
G62	0.0	1.2	16.4	7.0	979	Restricted Flow
G63	0.0	2.9	17.8	6.8	979	
G64						Tap broken
G65	0.0	6.6	10.7	7.6	980	
G66	1.6	3.7	2.9	8.3	980	Slight restricted flow to well. H2S= 34.8
G67	0.0	1.1	16.6	7.4	980	Restricted Flow
G70	0.0	3.3	12.3	6.9	980	
G71	0.0	1.6	18.3	7.2	980	
G72	0.0	1.4	19.6	9.8	977	
G74						Didn't locate
G75	0.0	1.4	18.9	6.9	978	
G76						Buried
G77	0.0	0.5	20.5	6.7	978	
G78	0.0	0.0	20.9	6.5	978	
G79	0.0	0.2	20.4	6.6	978	
G80	0.0	0.7	18.5	7.1	978	
G81	0.0	2.4	17.3	6.7	978	
G82	0.0	0.0	20.7	6.6	978	
G83						Covered/destroyed
G84	0.0	6.7	3.7	6.6	978	N = 89.5
G85	0.9	0.0	2.8	6.5	978	Restricted Flow, flooded, N = 96.2
G88	3.8	6.8	11.4	6.1	979	
G100	0.0	0.7	18.6	6.1	979	
G101	0.0	0.0	21.3	6.3	979	
G102	0.0	0.0	20.8	6.1	979	
G103	0.0	0.0	21.0	6.3	979	
G104 (s)	0.0	0.6	20.4	6.3	979	
G104 (d)	11.5	8.8	8.3	6.3	979	N = 71.5
G105						Flooded, orange growth on tap
G106 (d)	0.2	1.1	19.5	6.9	978	
G106 (s)						
G108						Flooded
G109 (s)	0.0	0.0	21.0	6.7	978	
G110	0.0	0.1	20.8	6.6	978	
G111	0.0	1.3	18.8	6.3	978	
G112	0.0	0.5	20.8	6.4	978	
G113	0.0	0.2	19.3	6.4	978	
G114	0.0	0.3	20.5	6.3	978	

Exceedences of 1% Limit for CH_4 this period:	**3**
Exceedences of 1.5% Limit for CO_2 this period:	**12**

LANDFILL GAS MONITORING FORM						
Site Name:	Silliot Hill Landfill			**Date:**	March 11 2008	
Operator:	Kildare County Council			**Monitoring Personnel:**	Nicola Hoare	
Site Address:	Silliot Hill,			**Instrument Used:**	LMS xi	
	Kilcullen, Co. Kildare			**Next Calibration:**		
Grid Reference:	E2116 N2858			**Normal Analytical Range:**	0 - 100%	
Site Status:	Landfill Restored			**Weather:**	Cold and heavy showers	

Sample Station	CH_4 (% v/v)	CO_2 (% v/v)	O_2 (% v/v)	Temp. °C	Pressure mbar	Comments
G9s						Missed
G10s						No tap
G25						Missed
G29	0.0	0.7	15.9	5.2	965	
G46	0.0	0.8	19.6	6.6	966	
G51						Removed/ Destroyed
G52	0.0	2.7	15.7	8.4	966	Tap broken
G53	0.0	4.5	17.7	8.8	966	
G54						Tap broken
G55	0.0	2.2	18.4	8.3	967	
G56						Tap broken
G57	0.0	0.6	20.1	8.1	967	
G58						Removed/ Destroyed
G59	0.7	9.0	8.4	5.7	965	N2=81.9
G60	0.0	1.7	19.0	5	965	
G61	0.0	7.5	11.6	4.8	965	
G62						Tap broken
G63	0.0	2.1	19.0	4.4	967	
G64						Tap broken
G65	0.0	4.4	13.8	9.2	965	
G66	1.1	4.3	1.2	10.4	965	Tap damaged,N2=93.2
G67	0.0	2.0	16.7	9.7	965	
G70	0.0	3.7	8.4	7.9	966	N2=87.8
G71	0.0	1.1	19.6	6.6	967	
G72	0.0	1.2	19.8	10.4	966	
G74	0.0	9	9.4	8.2	967	
G75	0.0	1.8	18.2	7.5	965	
G76						Buried
G77	0.0	0.9	20.3	6.6	965	
G78	1.7	2.1	17.7	6.3	965	
G79	0.0	0.3	20.1	6.6	965	
G80	0.0	0.9	18.5	5.1	965	
G81	0.0	2.2	17.5	5.3	965	
G82	0.0	0.0	20.8	5.6	965	
G83	0.1	0.3	19.6	12.5	965	Tap loose
G84	0.0	4.2	5.4	8.1	965	
G85	0.8	0.1	1.8	7.4	965	N2=97.1
G88						Water in tap
G100	0.0	0.3	20.4	6.9	967	
G101	0.0	0.7	19.2	7.1	966	
G102	0.0	0.0	20.9	7.2	966	
G103	4.0	5.6	15.1	7.2	965	
G104 (s)	0.0	0.7	19.9	7.1	965	Cap cracked - venting
G104 (d)	15.5	17.0	1.2	6.7	965	N2=66.2
G105						Flooded
G106 (s)	0	2.3	17.4	10.1	965	
G108						Flooded
G109 (s)	0.0	0.0	21.0	7.1	965	
G110	0.0	0.7	19.8	7	965	
G111	0.0	3.5	15.9	6.9	965	
G112	0.0	0.7	20.0	7.1	965	
G113	0.0	0.2	20.2	7.4	965	Negative pressure at well
G114	0.0	0.6	19.9	7.7	967	

Exceedences of 1% Limit for CH_4 this period:	**4**
Exceedences of 1.5% Limit for CO_2 this period:	**20**

LANDFILL GAS MONITORING FORM						
Site Name:	Silliot Hill Landfill			**Date:**		April 25 2008
Operator:	Kildare County Council			**Monitoring Personnel:**		Nicola Hoare
Site Address:	Silliot Hill,			**Instrument Used:**		LMS xi
	Kilcullen, Co. Kildare			**Next Calibration:**		
Grid Reference:	E2116 N2858			**Normal Analytical Range:**		0 - 100%
Site Status:	Landfill Restored			**Weather:**		mild with rain

Sample Station	CH_4 (% v/v)	CO_2 (% v/v)	O_2 (% v/v)	Temp. °C	Pressure mbar	Comments
G9s	0.0	1.6	19.3	9.5	1007.0	
G10s						Gas tap missing
G25						Neighbour not present
G29	0.0	1.1	12.5	9.1	1005.0	
G46	0.0	0.6	20.0	10.5	1005.0	
G51						Missed
G52	0.0	4.5	14.3	9.7	1007.0	
G53	0.0	3.6	16.3	9.7	1007.0	
G54						Missed
G55	0.0	2.1	18.2	9.9	1007.0	
G56						Cap missing
G57	0.0	1.9	16.9	10.8	1007.0	
G58						Removed
G59	0.0	3.5	16.9	9.5	1006.0	
G60	0.0	0.8	19.9	9.5	1005.0	
G61	0.0	5.3	13.4	9.5	1006.0	
G62						Cap missing
G63	0.0	1.4	19.2	9.6	1007.0	
G64						Tap broken
G65	0.0	2.7	18.5	10.3	1007.0	
G66	0.4	5.6	0.0	10.3	1007.0	N2=93.9, H2S=27.1
G67	0.0	3.3	12.9	9.9	1007.0	H2S=2.9
G70	0.0	0.6	20.1	10.1	1007.0	
G71	0.0	2.0	18.3	9.9	1007.0	
G72	0.0	0.0	21.4	9.7	1008.0	
G74	0.0	0.8	19.9	9.9	1007.0	
G75	0.0	1.4	19.1	9.4	1005.0	
G76						Buried
G77	0.0	1.5	19.5	9.7	1005.0	
G78	3.5	3.9	16.9	9.2	1005.0	
G79	0.0	0.5	19.7	9.4	1005.0	
G80	0.0	1.2	18.6	8.9	1005.0	
G81	0.0	1.8	18.8	9.1	1005.0	
G82	0.0	0.0	20.6	9.2	1005.0	
G83	0.1	1.7	13.8	9.6	1005.0	Tap broken
G84	0.0	5.3	4.9	9.6	1005.0	N2=89.8
G85	1.2	0.0	1.1	9.6	1005.0	N2=97.8, restricted Flow
G88	0.0	5.5	12.9	9.5	1005.0	Water in tap
G100	0.0	0.7	19.3	10.9	1005.0	
G101	0.0	0.0	20.7	9.6	1005.0	
G102	0.0	0.0	20.8	9.7	1005.0	
G103	6.2	6.7	14.3	9.6	1005.0	Vented 2mins.Ch4=16, CO2=16, O2=5.5
G104 (s)	0.2	11.0	3.3	10.0	1005.0	
G104 (d)	15.5	17.0	2.8	10.0	1005.0	N2=64.6
G105	11.5	17.0	2.6	9.8	1005.0	N2=67.8
G106 (s)	0.0	2.2	18.3	8.4	1005.0	
G108						Flooded
G109 (s)	0.0	0.7	19.4	9.7	1005.0	Cracked
G110	0.0	1.2	19.9	9.7	1005.0	
G111	0.0	0.9	19.5	9.7	1005.0	
G112	0.0	1.1	19.9	9.6	1005.0	
G113	0.0	0.3	20.1	9.7	1005.0	
G114	0.0	0.8	19.5	9.6	1005.0	

Exceedences of 1% Limit for CH_4 this period:	**5**
Exceedences of 1.5% Limit for CO_2 this period:	**21**

LANDFILL GAS MONITORING FORM						
Site Name:	Silliot Hill Landfill			**Date:**		May 15 2008
Operator:	Kildare County Council			**Monitoring Personnel:**		Nicola Hoare & Declan Duff
Site Address:	Silliot Hill,			**Instrument Used:**		LMS xi
	Kilcullen, Co. Kildare			**Next Calibration:**		
Grid Reference:	E2116 N2858			**Normal Analytical Range:**		0 - 100%
Site Status:	Landfill Restored			**Weather:**		warm & sunny

Sample Station	CH_4 (% v/v)	CO_2 (% v/v)	O_2 (% v/v)	Temp. °C	Pressure mbar	Comments
G9s	0.0	1.7	19.0	15.3	996	
G10s						Tap broken
G25						No access
G29	0.0	5.4	4.7	16.3	994	
G46	0.0	0.6	20.0	15.0	994	
G51						Tap broken
G52	0.0	5.8	16.2	19.8	996	
G53	0.0	6.9	9.8	18.9	996	N2=83.4
G54						Destroyed
G55	0.0	2.1	18.0	20.5	996	
G56						Tap missing
G57	0.0	3.5	17.5	19.0	996	
G58						Destroyed
G59	0.0	7.2	9.9	16.4	994	
G60						Missed
G61	0.0	8.1	9.4	16.7	994	Vented for 2mins, same high results
G62	0.0	0.0	20.7	15.9	994	
G63	0.0	6.1	12.2	15.8	994	
G64						Tap broken
G65	0.0	5.0	14.8	17.2	996	
G66	0.3	7.0	0.0	18.4	996	N2=92.7, tap bent, restricted flow
G67	0.0	4.2	13.1	22.5	996	
G70	0.0	4.0	13.3	17.1	996	
G71	0.0	2.1	17.7	17.6	996	
G72	0.0	1.5	20.2	20.1	997	
G74	10.5	17.0	1.4	19.5	996	
G75	0.0	2.9	16.0	16.5	994	
G76						Buried
G77	19.0	16.0	2.5	16.3	994	N2=62.4, vented for 1min same high results
G78	10.5	8.2	14.4	18.7	994	
G79	0.0	0.8	16.6	19.0	994	
G80	0.0	1.7	17.1	14.6	994	
G81	0.0	2.0	17.7	14.0	994	
G82	0.0	0.0	20.5	13.3	994	
G83	0.2	0.6	18.6	15.8	994	
G84	0.0	6.6	4.9	16.9	994	N2=88.4
G85	1.2	0.0	1.9	18.6	994	N2=96.6, restricted flow
G88	4.5	15.0	0.8	17.1	994	
G100	0.0	0.8	18.5	16.9	994	
G101	0.0	2.1	15.4	16.4	994	
G102	0.0	0.6	20.1	17.7	994	
G103	22.5	22.0	0.0	17.5	994	N2=55.9
G104 (s)	19.0	19.0	0.0	20.4	994	N2=61.9, tap cracked
G104 (d)	6.8	8.3	10.9	19.4	994	
G105	35.0	27.0	0.0	22.7	994	N2=37.2
G106 (d)	38.5	6.0	0.0	16.1	994	N2=33.9, H2S=11.9
G108						Flooded
G109 (s)	0.0	2.1	17.0	15.1	994	
G110	0.0	4.6	14.4	15.8	994	
G111	0.0	4.1	14.3	14.8	994	
G112	0.0	2.4	16.2	14.1	994	
G113	0.0	3.7	12.0	13.5	994	
G114	0.0	2.9	15.7	13.5	994	

Exceedences of 1% Limit for CH_4 this period:	**10**
Exceedences of 1.5% Limit for CO_2 this period:	**34**

LANDFILL GAS MONITORING FORM						
Site Name:	Silliot Hill Landfill			**Date:**		June 17 2008
Operator:	Kildare County Council			**Monitoring Personnel:**		Nicola Hoare
Site Address:	Silliot Hill,			**Instrument Used:**		LMS xi
	Kilcullen, Co. Kildare			**Next Calibration:**		
Grid Reference:	E2116 N2858			**Normal Analytical Range:**		0 - 100%
Site Status:	Landfill Restored			**Weather:**		cool & damp

Sample Station	CH_4 (% v/v)	CO_2 (% v/v)	O_2 (% v/v)	Temp. °C	Pressure mbar	Comments
G9s	0.0	1.8	18.7	12.8	992	
G10s						No tap
G25	0.0	1.0	19.6	16.0	991	
G29	0.0	10.0	4.0	13.4	991	
G46	0.0	0.7	19.6	15.1	991	
G51						Tap broken
G52	0.0	2.1	19.3	14.1	992	
G53	0.0	5.4	14.7	13.6	992	
G54						Destroyed
G55	0.0	1.0	19.8	13.9	993	
G56						No tap
G57	0.0	1.8	19.5	14.4	993	
G58						Destroyed
G59	0.0	4.2	15.2	14.8	991	
G60	5.0	12.0	3.1	16.1	992	
G61	0.1	11.0	5.4	14.3	991	Tap open, sampled after 140secs
G62						Tap broken
G63	0.0	7.4	12.1	13.8	992	
G64						Tap broken
G65	0.0	6.3	11.3	13.0	992	
G66	0.2	6.7	0.0	20.7	992	Restricted flow
G67	0.0	6.4	11.6	14.9	992	
G70	0.0	6.8	9.2	14.7	993	
G71	0.0	1.1	19.6	14.1	992	
G72	0.0	0.5	20.8	18.4	990	
G74	0.0	1.5	18.1	14.5	993	
G75	0.0	3.4	15.2	13.2	990	
G76						Buried
G77	24.5	21.0	3.8	13.7	990	
G78	5.7	5.5	16.3	14.8	990	
G79	0.0	2.9	13.4	13.9	990	
G80	0.0	2.3	15.3	13.4	991	
G81	0.0	2.1	17.3	13.9	990	
G82	0.0	0.5	20.0	14.0	990	
G83	0.2	0.6	19.5	14.1	991	Tap loose
G84	1.0	15.0	0.0	16.6	990	
G85	1.1	0.1	0.0	21.0	990	Restricted flow
G88	0.4	14.0	0.9	14.1	990	
G100	0.0	0.8	18.4	15.1	990	
G101	0.0	3.0	13.3	18.5	990	
G102	0.0	0.2	20.5	21.8	990	
G103	19.0	21.0	0.0	20.3	990	
G104 (s)	19.5	19.0	0.0	25.2	990	Tap cracked
G104 (d)	10.0	12.0	6.6	26.0	990	
G105	48.0	29.0	0.0	16.9	990	Orange growth, sheen visible
G106 (d)	64.0	34.0	0.0	17.2	990	Gas haze visible from top of well
G108						Flooded
G109 (s)	0.0	2.7	15.5	13.4	990	
G110	0.0	4.6	14.2	14.5	990	
G111	0.0	3.7	15.0	15.4	991	
G112	0.0	2.9	15.7	15.0	991	
G113	0.0	3.8	12.0	17.5	991	
G114	0.0	2.8	16.2	15.1	992	

Exceedences of 1% Limit for CH_4 this period:	**9**
Exceedences of 1.5% Limit for CO_2 this period:	**33**

LANDFILL GAS MONITORING FORM						
Site Name:	Silliot Hill Landfill			**Date:**		July 23 2008
Operator:	Kildare County Council			**Monitoring Personnel:**		Nicola Hoare & Rose Lloyd
Site Address:	Silliot Hill,			**Instrument Used:**		LMS xi
	Kilcullen, Co. Kildare			**Next Calibration:**		
Grid Reference:	E2116 N2858			**Normal Analytical Range:**		0 - 100%
Site Status:	Landfill Restored			**Weather:**		warm and dry

Sample Station	CH_4 (% v/v)	CO_2 (% v/v)	O_2 (% v/v)	Temp. °C	Pressure mbar	Comments
G9s	0.0	1.4	19.5	22.1	1007	
G10s	0.0	0.3	19.4	23.1	1003	Broken tap
G25	0.0	1.3	19.0	22.8		
G29	0.0	4.5	13.8	23.3	1003	
G46	0.0	0.4	19.9	22.1	1003	
G47	0.0	12.0	7.6	21.8	1003	
G51						Broken tap
G52	0.0	4.6	16.4	27.0	1005	Broken tap
G53	0.0	6.2	13.7	25.5	1005	
G54						Destroyed
G55	0.0	2.5	18.1	27.0	1005	
G56						Tap missing
G57	0.0	4.7	16.0	26.6	1005	
G58						Destroyed
G59	0.0	2.6	17.5	23.4	1003	
G60	0.0	2.7	16.8	22.5	1003	
G61	0.0	4.3	16.2	22.3	1003	Tap open
G62	0.0	0.0	20.3	22.8	1003	Broken tap
G63	0.0	9.2	9.0	25.9	1003	
G64						Broken tap
G65	0.0	5.7	15.4	25.4	1005	
G66	0.2	8.0	0.0	25.2	1005	Restricted flow
G67	0.0	4.9	11.3	24.8	1005	
G70	0.0	0.6	19.7	26.6	1005	
G71	0.0	0.9	19.2	23.8	1005	
G72	0.0	0.8	19.9	22.7	1004	
G74	2.2	8.9	8.1	25.9	1005	
G75	0.0	2.9	16.2	23.2	1003	
G76						Buried
G77	0.0	8.4	8.3	24.9	1003	
G78	0.2	2.3	17.4	24.4	1003	
G79	0.0	1.8	17.0	22.8	1003	
G80	0.0	2.5	16.0	22.8	1003	
G81	0.0	3.1	15.7	22.8	1003	
G82	0.0	0.3	19.5	23.3	1003	
G83	0.0	0.3	19.9	23.1	1003	Tap loose
G84	0.0	18.0	1.5	24.1	1003	
G85	1.2	0.0	0.0	23.9	1003	
G100	0.0	0.8	18.5	23.8	1003	
G101	0.0	3.2	12.9	23.3	1003	
G102	0.0	0.4	20.3	24.4	1003	
G103	24.0	24.0	0.0	25.1	1003	
G104 (s)	10.5	13.0	5.2	25.1	1003	Tap cracked
G104 (d)	6.2	6.9	12.3	26.2	1003	
G105	36.0	28.8	0.0	23.9	1003	
G108						Flooded
G109 (s)	0.0	1.8	16.0	22.1	1003	
G110	0.0	3.5	16.2	22.9	1003	
G111	0.0	3.2	16.4	22.9	1003	
G112	0.0	2.0	17.3	22.6	1003	
G113	0.0	3.0	14.3	22.2	1003	
G114	0.0	2.4	16.8	22.0	1003	

Exceedences of 1% Limit for CH_4 this period:	**6**
Exceedences of 1.5% Limit for CO_2 this period:	**32**

LANDFILL GAS MONITORING FORM						
Site Name:	Silliot Hill Landfill			**Date:**		August 28 2008
Operator:	Kildare County Council			**Monitoring Personnel:**		Rose Lloyd
Site Address:	Silliot Hill,			**Instrument Used:**		LMS xi
	Kilcullen, Co. Kildare			**Next Calibration:**		
Grid Reference:	E2116 N2858			**Normal Analytical Range:**		0 - 100%
Site Status:	Landfill Restored			**Weather:**		warm, drizzle clearing to dry

Sample Station	CH_4 (% v/v)	CO_2 (% v/v)	O_2 (% v/v)	Temp. °C	Pressure mbar	Comments
G9s	0.0	1.4	18.9	20.6	1005	
G10s	0.0	0.3	19.6	25.0	1003	Broken tap
G25						No access
G29	0.0	5.9	3.9	20.4	1003	
G46	0.0	0.5	19..6	23.0	1003	
G47	0.0	12.0	7.0	23.1	1003	
G51						Broken tap
G52	0.0	1.4	18.9	25.3	1005	Broken tap
G53	0.0	11.0	8.3	22.1	1005	
G54						Destroyed
G55	0.0	2.0	18.4	27.8	1005	
G56						Tap missing
G57	0.0	3.7	15.7	24.6	1005	
G58						Destroyed
G59	0.0	7.6	10.6	20.6	1003	Tap open
G60						Missed
G61	0.0	9.7	8.9	20.7	1003	
G62						Broken tap
G63	0.0	6.4	14.1	22.3	1004	
G64						No tap
G65	0.0	5.2	16.6	21.0	1005	
G66	0.3	7.2	0.0	21.7	1005	Restricted flow
G67	0.0	2.2	18.9	22.2	1005	
G70	0.0	0.0	20.6	25.5	1003	
G71	0.0	0.2	20.1	20.9	1005	
G72	0.0	2.5	18.4	23.3	1004	
G74	0.0	0.9	19.4	22.7	1004	
G75	0.0	5.0	13.0	21.1	1003	
G76						Buried
G77	0.1	11.0	9.3	20.8	1003	
G78	0.0	0.0	20.4	26.9	1003	
G79	0.0	0.0	15.8	22.0	1003	
G80	0.0	2.7	12.2	20.3	1003	
G81	0.0	4.3	14.0	20.4	1003	
G82	0.0	0.6	19.9	20.6	1003	
G83	0.0	0.1	20.3	27.4	1003	Tap loose
G84	0.0	10.0	3.2	22.8	1003	
G85	1.2	0.0	0.2	25.2	1003	Restricted flow
G100	0.0	0.9	17.7	23.2	1003	
G101	0.0	0.3	19.7	24.2	1003	
G102	0.0	0.1	20.3	24.4	1003	
G103	19.5	20.0	2.1	25.2	1003	
G104 (s)	6.7	16.0	0.4	24.2	1003	Tap cracked
G104 (d)	21.0	18.0	0.1	22.7	1003	
G105	46.0	30.0	0.0	23.1	1003	
G108	60.0	35.0	0.0	23.8	1003	Flooded, drained before measuring
G109 (s)	0.0	1.7	15.9	22.5	1003	
G110	0.0	2.4	17.6	22.8	1003	
G111	0.0	3.5	16.3	22.1	1003	
G112	0.0	1.2	18.8	22.1	1003	
G113	0.0	1.6	16.1	22.1	1003	
G114	0.0	2.2	16.8	21.8	1003	

Exceedences of 1% Limit for CH_4 this period:	**6**
Exceedences of 1.5% Limit for CO_2 this period:	**27**

LANDFILL GAS MONITORING FORM						
Site Name:	Silliot Hill Landfill			**Date:**		8th September 2008
Operator:	Kildare County Council			**Monitoring Personnel:**		Rose Lloyd
Site Address:	Silliot Hill,			**Instrument Used:**		LMS xi
	Kilcullen, Co. Kildare			**Next Calibration:**		
Grid Reference:	E2116 N2858			**Normal Analytical Range:**		0 - 100%
Site Status:	Landfill Restored			**Weather:**		warm, dry & bright

Sample Station	CH_4 (% v/v)	CO_2 (% v/v)	O_2 (% v/v)	Temp. °C	Pressure mbar	Comments
G9s	0.0	2.0	18.0	11.2	996	
G10s	0.0	0.1	20.7	15.7	995	Broken tap
G25	0.0	1.7	18.4	14.7	995	
G29	0.7	10.0	0.2	12.0	994	
G46	0.0	0.6	19.8	14.3	995	
G47	0.0	14.0	3.7	15.5	994	
G51						Broken tap
G52	0.0	4.2	15.3	11.8	996	Broken tap
G53	0.2	14.0	0.0	12.0	996	
G54						Destroyed
G55	0.0	1.5	19.1	11.8	996	
G56						Tap missing
G57	0.0	4.2	13.7	11.5	996	
G58						Destroyed
G59	0.0	8.2	12.0	12.8	994	
G60	0.0	1.4	18.4	12.6	995	
G61	0.0	11.0	7.5	12.2	995	
G62						Broken tap
G63	0.0	2.0	18.2	11.7	996	
G64						No tap
G65	0.0	6.0	14.8	11.0	996	
G66	0.2	8.1	0.4	12.1	996	Restricted flow
G67	0.0	5.8	13.7	11.7	996	
G70	0.0	4.1	11.2	11.8	996	
G71	0.0	2.2	15.5	11.1	996	
G72	0.0	2.8	17.7	25.2	993	
G74	1.6	4.6	13.9	12.0	996	
G75	0.0	5.3	12.8	12.2	994	
G76						Buried
G77	0.0	4.2	16.1	12.0	994	
G78	0.0	0.1	20.3	12.5	994	
G79	0.0	2.0	16.9	15.4	994	
G80	0.0	2.1	11.1	11.8	994	
G81	0.0	4.2	14.6	11.8	994	
G82	0.0	0.7	18.9	11.8	994	
G83	0.0	0.2	20.4	13.1	994	Tap loose
G84	0.0	7.5	5.5	14.2	994	
G85	1.0	0.0	2.1	14.1	994	Restricted flow
G100	0.0	0.8	19.0	14.3	995	
G101	0.0	0.0	20.5	15.4	995	
G102	0.0	0.0	20.8	15.4	994	
G103	25.5	23.0	0.0	15.3	995	
G104 (s)	0.0	4.6	13.5	14.6	994	Tap cracked
G104 (d)	22.0	17.0	0.2	15.8	995	
G105	45.5	29.0	0.7	14.8	994	
G108	62.0	36.0	0.0	18.4	994	Flooded, drained before measuring
G109 (s)	0.0	1.2	18.1	14.4	994	
G110	0.0	1.3	19.3	12.9	994	
G111	0.0	2.9	17.5	12.5	994	
G112	0.0	0.6	19.8	13.0	994	
G113	0.0	0.7	18.6	13.8	994	
G114	0.0	0.0	20.7	12.7	994	

Exceedences of 1% Limit for CH_4 this period:	**5**
Exceedences of 1.5% Limit for CO_2 this period:	**29**

LANDFILL GAS MONITORING FORM						
Site Name:	Silliot Hill Landfill			**Date:**	2nd Oct 2008	
Operator:	Kildare County Council			**Monitoring Personnel:**	Rose Lloyd & N Hoare	
Site Address:	Silliot Hill,			**Instrument Used:**	GA94 Analyser	
	Kilcullen, Co. Kildare			**Next Calibration:**		
Grid Reference:	E2116 N2858			**Normal Analytical Range:**	0 - 100%	
Site Status:	Landfill Restored			**Weather:**	Cool, dry, bright	

Sample Station	CH_4 (% v/v)	CO_2 (% v/v)	O_2 (% v/v)	Temp. °C	Pressure mbar	Comments
G9s	0.0	2.1	19.1		990	
G10s	0.0	0.1	20.4		987	Broken tap
G25	0.0	1.4	19.3		989	
G29	7.2	10.3	9.3		987	
G46	0.5	0.7	19.8		988	
G47	0.0	6.6	13.0		989	
G51						Broken tap
G52	0.0	3.8	18.0		989	Broken tap
G53	0.0	2.8	18.9		991	
G54						Destroyed
G55	0.0	1.7	19.4		990	
G56						Tap missing
G57	0.0	3.0	18.6		989	
G58						Destroyed
G59	0.0	3.8	17.1		988	
G60	0.0	0.9	20.1		988	
G61	0.0	4.7	15.5		988	Tap open
G62						Broken tap
G63	0.0	8.0	13.8		988	
G64						No tap
G65	0.6	3.8	17.0		989	
G66	0.2	3.3	14.6		990	Restricted flow
G67	0.0	4.9	13.5		990	
G70	0.0	1.9	19.6		990	
G71	0.0	0.1	20.4		989	
G72	0.0	1.4	20.2		991	
G74	0.0	6.6	17.0		990	
G75	0.0	6.1	13.2		987	
G76						Buried
G77	3.8	12.9	12.5		987	
G78	2.2	0.4	19.9		988	
G79	0.0	2.2	17.8		988	
G80	0.0	3.2	15.3		987	
G81	0.0	0.7	17.7		987	
G82	0.0	0.5	20.1		987	
G83	2.3	0.2	20.2		988	Tap loose
G84	0.7	0.8	18.6		988	
G85	0.0	0.1	13.6		987	Restricted flow
G100	0.0	0.7	18.4		988	
G101	0.0	0.2	20.2		988	
G102	0.0	0.1	20.2		988	
G103	0.0	0.1	20.1		988	
G104 (s)	0.0	4.3	17.2		988	Tap cracked
G104 (d)	6.3	8.2	12.0		988	
G106 (d)	24.4	18.0	11.7		988	
G105	30.3	24.8	6.8		988	
G108						Flooded, couldn't drain to measure
G109 (s)	1.3	1.5	18.3		987	
G110	0.0	2.5	18.6		987	
G111	0.0	2.1	18.2		987	
G112	0.0	1.2	18.2		987	
G113	0.0	0.7	19.1		988	
G114	0.0	1.4	18.9		987	

Exceedences of 1% Limit for CH_4 this period:	**8**
Exceedences of 1.5% Limit for CO_2 this period:	**25**

LANDFILL GAS MONITORING FORM						
Site Name:	Silliot Hill Landfill			**Date:**	November 11, 2008	
Operator:	Kildare County Council			**Monitoring Personnel:**	Rose Lloyd	
Site Address:	Silliot Hill,			**Instrument Used:**	LMS Gas Analyser	
	Kilcullen, Co. Kildare			**Next Calibration:**	Sep-09	
Grid Reference:	E2116 N2858			**Normal Analytical Range:**	0 - 100%	
Site Status:	Landfill Restored			**Weather:**	Cool, dry, bright	

Sample Station	CH_4 (% v/v)	CO_2 (% v/v)	O_2 (% v/v)	Temp. °C	Pressure mbar	Comments
G9s	0.0	2.1	18.0	7.9	992	
G10s	0.0	0.0	20.7	9.4	992	
G25						No Access
G29	12.5	18.0	0.0	6.6	990	
G46	0.0	0.7	19.5	8.1	992	
G47	0.0	5.6	12.5	7.4	991	
G51						Broken tap
G52	0.0	4.1	15.1	8.9	992	Broken tap
G53	0.0	11.0	7.1	7.7	992	
G54						Destroyed
G55	0.0	1.9	19.3	7.4	992	
G56						Tap missing
G57	0.0	0.7	20.2	6.7	992	
G58						Destroyed
G59	0.0	1.0	19.6	7.6	990	
G60	0.0	0.0	20.7	8.2	990	
G61	0.0	0.4	19.7	7.6	990	Tap open
G62						Broken tap
G63	0.0	1.4	17.3	7.0	991	
G64						No tap
G65	0.0	6.6	11.2	6.4	992	
G66	0.3	7.0	0.0	8.7	991	Restricted flow
G67	0.0	6.5	8.5	11.3	991	
G70	0.0	0.0	20.8	6.3	992	
G71	0.0	0.6	19.2	6.3	992	Tap open
G72	0.0	2.0	18.8	10.9	992	
G74	11.0	16.2	2.9	7.4	992	
G75	0.2	7.1	9.8	7.1	990	
G76						Buried
G77	0.3	3.5	19.0	6.6	990	
G78	0.0	0.0	20.4	7.0	990	
G79	0.0	0.7	19.3	7.0	990	Tap cracked
G80	0.0	4.0	4.0	6.6	990	
G81	0.0	3.7	13.8	6.1	990	
G82	0.0	0.3	20.5	6.6	990	
G83	0.2	0.7	18.9	7.3	990	Tap loose
G84	0.0	1.7	9.2	7.8	990	
G85	1.1	0.0	0.1	8.1	991	Restricted flow, tap open
G100	0.0	0.6	18.5	7.6	992	
G101	0.0	0.1	20.6	8.2	991	
G102	0.0	0.2	20.3	9.9	991	
G103	0.0	0.0	20.6	9.3	991	Tap open
G104 (s)	0.0	0.0	20.6	7.0	991	Tap cracked
G104 (d)	0.0	0.0	20.6	7.1	991	Tap cracked
G106 (d)	0.0	0.0	20.6	7.9	990	Tap open
G105	0.0	0.0	20.6	7.0	990	Tap open
G108	0.0	0.7	19.3	7.0	990	drained to measure, & tap open
G109 (s)	0.0	0.0	20.6	9.7	990	Tap open
G110	0.0	0.0	20.7	7.9	990	Tap open
G111	0.0	0.6	19.8	7.4	990	
G112	0.0	0.7	20.1	7.4	990	
G113	0.0	0.0	20.6	7.4	990	
G114	0.0	0.4	20.2	6.9	992	

Exceedences of 1% Limit for CH_4 this period:	**3**
Exceedences of 1.5% Limit for CO_2 this period:	**16**

LANDFILL GAS MONITORING FORM						
Site Name:	Silliot Hill Landfill			**Date:**	December 9, 2008	
Operator:	Kildare County Council			**Monitoring Personnel:**	Rose Lloyd	
Site Address:	Silliot Hill,			**Instrument Used:**	LMS Gas Analyser	
	Kilcullen, Co. Kildare			**Next Calibration:**	Sep-09	
Grid Reference:	E2116 N2858			**Normal Analytical Range:**	0 - 100%	
Site Status:	Landfill Restored			**Weather:**	Cold, dry, bright	

Sample Station	CH_4 (% v/v)	CO_2 (% v/v)	O_2 (% v/v)	Temp. °C	Pressure mbar	Comments
G9s	0.0	1.6	18.7	2.4	1012	
G10s	0.0	0.0	20.7	2.0	1011	
G25	0.0	1.1	19.1	2.9	1011	
G29	0.0	17.0	3.9	2.5	1011	
G46	0.0	0.7	19.9	2.7	1011	
G47	0.0	8.9	9.7	2.1	1011	
G51						Broken tap
G52	0.0	3.3	16.2	2.5	1013	
G53	0.0	10.0	6.0	2.5	1013	
G54						Destroyed
G55	0.0	1.4	19.3	2.4	1013	
G56						Tap missing
G57	0.0	2.1	17.4	2.6	1013	
G58						Destroyed
G59	0.0	7.6	12.4	2.6	1011	
G60	0.0	0.5	20.3	2.6	1011	
G61	0.0	11.0	11.4	2.5	1011	Tap open
G62						Broken tap
G63	0.0	1.5	19.0	2.9	1013	
G64						No tap
G65	0.0	4.0	16.4	2.3	1012	
G66	0.3	7.0	0.0	2.3	1012	Restricted flow
G67	0.0	6.3	7.4	2.3	1012	
G70	0.0	0.0	20.7	2.6	1013	
G71	0.0	1.5	18.8	2.4	1013	
G72	0.0	2.0	19.0	8.7	1013	
G74	0.0	8.7	12.3	2.7	1013	
G75	0.0	7.9	10.2	2.6	1011	
G76						Buried
G77	0.0	2.1	18.5	2.5	1011	
G78	0.0	0.0	20.3	2.8	1011	
G79	0.0	0.0	2.8	2.7	1011	Tap cracked
G80	0.0	5.2	5.7	2.4	1011	
G81	0.0	3.6	14.3	2.2	1011	
G82	0.0	0.4	20.1	2.4	1011	
G83	0.5	1.1	18.3	2.1	1009	Tap loose
G84	0.0	3.3	7..4	2.3	1009	
G85	1.1	0.0	2.6	2.3	1010	Restricted flow
G100	0.0	0.3	19.9	2.1	1011	
G101	0.0	0.4	20.2	2.2	1011	
G102	0.0	0.3	20.4	2.4	1011	
G103	0.0	0.3	20.5	2.6	1011	
G104 (s)	0.0	1.5	19.6	2.4	1011	Tap cracked
G104 (d)	13.0	13.0	6.0	2.8	1011	Tap cracked
G106 (d)	35.5	26.0	4.4	2.2	1009	
G105	55.0	31.0	0.0	2.0	1009	
G108	0.0	0.2	20.7	3.0	1011	Tap open
G109 (s)	0.0	0.0	21.2	3.4	1009	
G110	0.0	1.0	20.5	2.6	1009	
G111	0.0	2.1	19.0	2.4	1009	
G112	0.0	0.6	20.6	2.2	1009	
G113	0.0	0.8	19.1	2.2	1009	
G114	0.0	1.8	18.7	2.2	1009	

Exceedences of 1% Limit for CH_4 this period:	**4**
Exceedences of 1.5% Limit for CO_2 this period:	**23**

1/3 Octave Band Analysis

Hz	16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400
ID															
N1	<39.8	<39.8	<39.8	<39.8	<39.8	<39.8	40.5	42.7	40.4	43.3	45.1	48.1	49.2	49.0	48.7
N2	<39.8	<39.8	<39.8	<39.8	<39.8	<39.8	<39.8	<39.8	45.2	<39.8	<39.8	<39.8	<39.8	<39.8	<39.8
N3	<39.8	<39.8	<39.8	<39.8	<39.8	<39.8	<39.8	<39.8	<39.8	<39.8	<39.8	<39.8	<39.8	<39.8	<39.8
N4	<39.8	<39.8	<39.8	<39.8	<39.8	<39.8	<39.8	44.4	<39.8	<39.8	42	<39.8	41.7	46.2	43.7
N5	<39.8	<39.8	<39.8	<39.8	<39.8	<39.8	<39.8	47.9	43.3	41.3	45.3	47.8	49.7	49.2	50.5
N6	<39.8	<39.8	<39.8	<39.8	<39.8	<39.8	<39.8	<39.8	<39.8	<39.8	<39.8	<39.8	<39.8	<39.8	<39.8
N7	<39.8	<39.8	<39.8	<39.8	<39.8	<39.8	<39.8	40.9	<39.8	40.2	41.7	41.8	43.3	44.0	43.3

Hz	500	630	800	1k	1.2k	1.6k	2k	2.5k	3.1k	4k	5k	6.3k	8k	10k	12k
ID															
N1	50.9	52.8	55.5	57.6	57.1	55.8	53.5	50.2	47.0	44.0	40.3	<39.8	<39.8	<39.8	<39.8
N2	<39.8	<39.8	42.1	43.9	44.4	41.9	40.6	44.2	47.0	47.7	49.9	47.9	47.2	47.7	46.9
N3	<39.8	<39.8	<39.8	<39.8	<39.8	<39.8	<39.8	<39.8	<39.8	<39.8	<39.8	<39.8	<39.8	<39.8	<39.8
N4	44.9	46.0	46.4	46.7	47.6	48.1	47.4	47.0	46.9	46.0	43.8	41.3	<39.8	<39.8	<39.8
N5	54.6	56.1	57.4	57.7	56.8	56.7	54.3	53.4	52.5	51.4	49.3	46.7	43.3	39.9	<39.8
N6	40.3	44.3	47.0	49.3	49.5	48.3	45.6	42.4	<39.8	<39.8	<39.8	<39.8	<39.8	<39.8	<39.8
N7	46.6	49.0	52.1	53.9	53.9	53.2	51.6	50.4	49.2	47.9	46.0	43.2	<39.8	<39.8	<39.8

southern scientific services ltd.

ANALYSIS REPORT

CUSTOMER:	**FEHILY TIMONEY & COMPANY**	**SAMPLE TYPE:**	**BERGERHOFF DUST GAUGE**
ADDRESS:	Floor 2, Mill House, Ashtown Gate, Navan Road, Dublin 15	**CONDITION OF SAMPLE ON RECEIPT:**	Satisfactory
		DATE SAMPLED:	17 June – 24 July 2008
REPORT TO:	**NICOLA HOARE**	**DATE RECEIVED:**	28 July 2008
SAMPLED BY:	NICOLA HOARE	**DATE ANALYSED:**	29 – 31 July 2008
SAMPLING PT:	**SILLIOT HILL**	**DATE REPORTED:**	31 July 2008
ORDER NO:	3895	**WORK NO.:**	20262 C

TABLE OF RESULTS

Method:	LAB REF:	YOUR REF:	TOTAL PARTICULATES mg/m²/day	ORGANIC PARTICULATES mg/m²/day	INORGANIC PARTICULATES mg/m²/day
TA Luft VDI 2119	C08-Jul 428	D1	271	71	200
TA Luft VDI 2119	C08-Jul 429	D2	167	81	86
TA Luft VDI 2119	C08-Jul 430	D3	173	109	64
TA Luft VDI 2119	C08-Jul 431	D4	219	84	135
TA Luft VDI 2119	C08-Jul 432	D6	70	60	<10
TA Luft VDI 2119	C08-Jul 433	D7	112	74	38

Jennifer Keane
Chemistry Laboratory

FEHILY TIMONEY & CO.
DUBLIN OFFICE
Received by: NH
Distribution
06 AUG 2008
Action:
Job No: DE06-114-01
Correspondence No: /
Comment

- *The results relate only to the items tested.*
- *The analysis report shall not be reproduced except in full without written approval of the laboratory.*

DE OG - 114 - 01.

southern scientific services ltd.

OUR REF: RP 2008 / FEHILY TIMONEY & CO. / DUBLIN / 15

ANALYSIS REPORT

CUSTOMER:	**FEHILY TIMONEY & COMPANY**	**SAMPLE TYPE:**	**BERGERHOFF DUST GAUGE**
ADDRESS:	Floor 2, Mill House, Ashtown Gate, Navan Road, Dublin 15	**CONDITION OF SAMPLE ON RECEIPT:**	Satisfactory
		DATE SAMPLED:	24 July ~ 28 August 2008
REPORT TO:	**ROSE LLOYD**	**DATE RECEIVED:**	02 September 2008
SAMPLED BY:	ROSE LLOYD	**DATE ANALYSED:**	04 ~ 11 September 2008
SAMPLING PT:	**SILLIOT HILL [DE0611401]**	**DATE REPORTED:**	11 September 2008
ORDER NO:	-	**WORK NO.:**	**20455 C**

TABLE OF RESULTS

Method:	LAB REF:	YOUR REF:	TOTAL PARTICULATES mg/m²/day	ORGANIC PARTICULATES mg/m²/day	INORGANIC PARTICULATES mg/m²/day
TA Luft VDI 2119	C08-Sep 031	D1	**149**	**113**	**36**
TA Luft VDI 2119	C08-Sep 032	D2	**142**	**120**	**22**
TA Luft VDI 2119	C08-Sep 033	D3	**211**	**178**	**33**
TA Luft VDI 2119	C08-Sep 034	D4	**137**	**89**	**48**
TA Luft VDI 2119	C08-Sep 035	D6	**77**	**40**	**37**
TA Luft VDI 2119	C08-Sep 036	D7	**66**	**56**	**<10**

Jennifer Keane

Jennifer Keane
Chemistry Laboratory

FEHILY TIMONEY & CO
DUBLIN OFFICE
Received by: RL
Distribution
15 SEP 2008
Action:
Job No:
Correspondence No: 7

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DE06-114-01

southern scientific services ltd.

ANALYSIS REPORT

CUSTOMER:	**FEHILY TIMONEY & COMPANY**	**SAMPLE TYPE:**	**BERGERHOFF DUST GAUGE**
ADDRESS:	Floor 2, Mill House, Ashtown Gate, Navan Road, Dublin 15	**CONDITION OF SAMPLE ON RECEIPT:**	Satisfactory
		DATE SAMPLED:	35 Days
REPORT TO:	**NICOLA HOARE**	**DATE RECEIVED:**	20 June 2008
SAMPLED BY:	Nicola Hoare	**DATE ANALYSED:**	23 – 25 June 2008
SAMPLING PT:	**SILLIOT HILL [DE-06-114-01]**	**DATE REPORTED:**	25 June 2008
ORDER NO:		**WORK NO.:**	**20069 C**

TABLE OF RESULTS

Method:	LAB REF:	YOUR REF:	TOTAL PARTICULATES mg/m²/day	ORGANIC PARTICULATES mg/m²/day	INORGANIC PARTICULATES mg/m²/day
TA Luft VDI 2119	C08-Jun 381	D1	**99**	**32**	**67**
TA Luft VDI 2119	C08-Jun 382	D2	**34**	**24**	**<10**
TA Luft VDI 2119	C08-Jun 383	D3	**84**	**74**	**<10**
TA Luft VDI 2119	C08-Jun 384	D4	**<10**	**<10**	**<10**
TA Luft VDI 2119	C08-Jun 385	D6	**86**	**40**	**46**
TA Luft VDI 2119	C08-Jun 386	D7	**83**	**41**	**42**

pp Jennifer Keane.

Tuulia Inkinen
Chemistry Laboratory

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ANALYSIS REPORT

CUSTOMER:	FEHILY TIMONEY & COMPANY	SAMPLE TYPE:	PM_{10} FILTER
ADDRESS:	Floor 2, Mill House, Ashtown Gate, Navan Road, Dublin 15	CONDITION OF SAMPLE ON RECEIPT:	Satisfactory
		DATE SAMPLED:	05 February 2008
REPORT TO:	DECLAN DUFF	DATE RECEIVED:	14 February 2008
SAMPLED BY:	Declan Duff	DATE ANALYSED:	17-20 February 2008
SAMPLING PT:	PM2	DATE REPORTED:	20 February 2008
ORDER NO:		WORK NO.:	19357 C

TABLE OF RESULTS

Method:	LAB REF:	YOUR REF:	PM_{10}, $\mu g/m^3$
SCP 033	C08-Feb 284	PM2	8.3

Karen Lavery
Chemistry Laboratory

FEHILY TIMONEY & CO
DUBLIN OFFICE
Received by: DD
Distribution
25 FEB 2008
Action:
Job No:
Correspondence No: 3
Comment

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registered in ireland no 323196 | vat reg no IE 6343196 M

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services ltd.

ANALYSIS REPORT

CUSTOMER:	**FEHILY TIMONEY & COMPANY**	**SAMPLE TYPE:**	**PM_{10} FILTER**
ADDRESS:	Floor 2, Mill House, Ashtown Gate, Navan Road, Dublin 15	**CONDITION OF SAMPLE ON RECEIPT:**	Satisfactory
		DATE SAMPLED:	01 ~ 02 October 2008
REPORT TO:	**ROSE LLOYD**	**DATE RECEIVED:**	08 October 2008
SAMPLED BY:	ROSE LLOYD	**DATE ANALYSED:**	08 ~ 14 October 2008
SAMPLING PT:	**SILLIOT HILL**	**DATE REPORTED:**	20 October 2008
ORDER NO:	-	**WORK NO.:**	**20671 C**

TABLE OF RESULTS

Method:	**LAB REF:**	**YOUR REF:**	**PM_{10}, $\mu g/m^3$**
SCP 033	C08-Oct 162	PM1	**22.2**
SCP 033	C08-Oct 163	PM3	**12.5**

Jennifer Keane
Jennifer Keane
Chemistry Laboratory

FEHILY TIMONEY & CO
DUBLIN OFFICE
Received by: RL
Distribution
23 OCT 2008
Action:
Job No:
Correspondence No: 2
Comment

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ALcontrol Laboratories (Dublin)

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Fax: +353 (0) 1 8829895

CERTIFICATE OF ANALYSIS

Client: Fehily Timoney & Company (Dublin)

Floor 2
Mill House
Ashtowngate
Navan Road
Dublin 15

Attention: Declan Duff

Date: 29 February, 2008

Our Reference: 08-B00727/01

Your Reference: 2006-114-07

Location: SILLIOT HILL WASTE LICENCE IMPLEMENTATION

A total of 9 samples was received for analysis on Tuesday, 5 February 2008 and authorised on Friday, 29 February 2008. Accredited laboratory tests are defined in the log sheet, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation. We are pleased to enclose our final report, it was a pleasure to be of service to you, and we look forward to our continuing association.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Signed

Lorraine Mc Namara

Lorraine McNamara
Laboratory Technical Manager

Compiled By

Paul Barry

Paul Barry

UKAS TESTING
1291

GROUP

ALcontrol Laboratories Ireland

Test Schedule Summary

Ref Number: **08-B00727/01** **Sample Type:** **WATER**
Client: Fehily Timoney & Company (Dublin) Location: SILLIOT HILL WASTE LICENCE IMPLEMENTATION
Date of Receipt: 05/02/2008 Client Contact: Declan Duff
Client Ref: 2006-114-07

* SUBCONTRACTED TO OTHER LABORATORY / ** SAMPLES ANALYSED AT THE CHESTER LABORATORY

SCHEDULE	METHOD	TEST NAME	TOTAL
X	5 DAY ATU	BOD Unfiltered	3
X	Calculation	Total Oxidised Nitrogen	8
X	Filtration	Faecal Coliforms*	6
X	Filtration	Total Coliforms*	6
X	FLAME PHOTO	Potassium	6
X	FLAME PHOTO	Sodium	6
X	GRAVIMETRIC	Total Suspended Solids	2
X	HPLC	Speciated Phenols by HPLC	6
X	ICP MS	Dissolved Iron Low Level	6
X	IR	Total Organic Carbon	6
X	KONE	Chloride	8
X	METER	Dissolved Oxygen	7
X	METER	Electrical Conductivity @ 25C	9
X	METER	pH (Liquid)	9
X	SPECTRO	Ammoniacal Nitrogen	9
X	SPECTRO	COD Unfiltered	3

☐ Interim

☑ Validated

ALcontrol Laboratories Ireland

Table Of Results

Ref Number: 08-B00727/01

Client: Fehily Timoney & Company (Dublin)

Date of Receipt: 05/02/2008

(of first sample)

Sample Type: WATER

Location: SILLIOT HILL WASTE LICENCE IMPLEMENTATION

Client Contact: Declan Duff

Client Ref: 2006-114-07

	Detection Method	5 DAY ATU	Calculation	Filtration	Filtration	FLAME PHOTO	FLAME PHOTO	GRAVIMETRIC	HPLC	HPLC	HPLC	HPLC	HPLC	HPLC	HPLC	HPLC
	Method Detection Limit	<2mg/l	<0.3mg/l	<1cfu/100ml	<1cfu/100ml	<0.2mg/l	<0.2mg/l	<10mg/l	<0.01mg/l	<0.01mg/l	<0.01mg/l	<0.01mg/l	<0.01mg/l	<0.01mg/l	<0.01mg/l	<0.01mg/l
UKAS Accredited [Testing Laboratory] No. 1291		✓	✓			✓	✓	✓								
ALcontrol Reference	Sample Identity	Other ID	BOD Unfiltered	Total Oxidised Nitrogen as N	Faecal Coliforms*	Total Coliforms*	Sodium	Potassium	Total Suspended Solids	1 Naphthol	2- Isopropyl Phenol	2,3,5 -Trimethyl Phenol	Catechol	Phenol	Resorcinol	Total Cresols	Total Phenols
			mg/l	mg/l	cfu/100ml	cfu/100ml	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
08-B00727-S0001	BH1	UNKNOWN	-	3.8	<1	200	24.5	1.5	-	<0.01	<0.01	<0.01	<0.01	0.03	<0.01	<0.01	0.03
08-B00727-S0002	BH2	UNKNOWN	-	<0.3	<1	<1	30.0	4.4	-	<0.01	<0.01	<0.01	<0.01	0.03	<0.01	<0.01	0.03
08-B00727-S0003	BH3	UNKNOWN	-	1.5	<1	<1	9.0	1.2	-	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	0.02
08-B00727-S0004	BH4	UNKNOWN	-	<0.3	<1	<1	340.0	89.0	-	<0.01	<0.01	<0.01	<0.01	0.03	<0.01	<0.01	0.03
08-B00727-S0005	BH16	UNKNOWN	-	<0.3	<1	49000	465.0	6.8	43	<0.01	<0.01	<0.01	<0.01	0.03	<0.01	<0.01	0.03
08-B00727-S0006	PW11	UNKNOWN	-	2.0	300	1700	25.5	5.1	-	<0.01	<0.01	<0.01	<0.01	0.03	<0.01	<0.01	0.03
08-B00727-S0007	L1	UNKNOWN	7	1.8	-	-	-	-	-	-	-	-	-	-	-	-	-
08-B00727-S0008	L2	UNKNOWN	295	<0.3	-	-	-	-	-	-	-	-	-	-	-	-	-
08-B00727-S0009	SW4	UNKNOWN	3	-	-	-	-	-	61	-	-	-	-	-	-	-	-

Notes : METHOD DETECTION LIMITS ARE NOT ALWAYS ACHIEVABLE DUE TO VARIOUS CIRCUMSTANCES BEYOND OUR CONTROL.

NDP = NO DETERMINATION POSSIBLE

Checked By : Paul Barry

* SUBCONTRACTED TO OTHER LABORATORY / ** SAMPLES ANALYSED AT THE CHESTER LABORATORY

☐ Interim

☑ Validated

ALcontrol Laboratories Ireland

Table Of Results

Ref Number: 08-B00727/01

Client: Fehily Timoney & Company (Dublin)

Date of Receipt: 05/02/2008

(of first sample)

Sample Type: WATER

Location: SILLIOT HILL WASTE LICENCE IMPLEMENTATION

Client Contact: Declan Duff

Client Ref: 2006-114-07

	Detection Method	HPLC	ICP MS	IR	KONE	METER	METER	METER	SPECTRO	SPECTRO							
	Method Detection Limit	<0.01mg/l	<2ug/l	<2mg/l	<1mg/l	<0.1mg/l	<0.014mS/cm	napH Units	<0.2mg/l	<15mg/l							
UKAS Accredited [Testing Laboratory] No. 1291			✓	✓	✓		✓	✓	✓	✓							
ALcontrol Reference	**Sample Identity**	**Other ID**	**Total Xylenols**	**Dissolved Iron Low Level**	**Total Organic Carbon**	**Chloride**	**Dissolved Oxygen**	**Electrical Conductivity @ 25C**	**pH**	**Ammoniacal Nitrogen as N**	**COD Unfiltered**						
			mg/l	ug/l	mg/l	mg/l	mg/l	mS/cm	pH Units	mg/l	mg/l						
08-B00727-S0001	BH1	UNKNOWN	<0.01	<2	<2	76	5.5	0.979	7.45	<0.2	-						
08-B00727-S0002	BH2	UNKNOWN	<0.01	<2	5	22	6.1	0.860	7.72	2.0	-						
08-B00727-S0003	BH3	UNKNOWN	<0.01	<2	<2	16	6.9	0.802	7.43	0.4	-						
08-B00727-S0004	BH4	UNKNOWN	<0.01	<2	30	377	5.7	3.135	7.21	141.3	-						
08-B00727-S0005	BH16	UNKNOWN	<0.01	11	11	-	5.7	1.782	8.96	3.6	-						
08-B00727-S0006	PW11	UNKNOWN	<0.01	<2	<2	8	5.9	0.465	7.92	0.2	-						
08-B00727-S0007	L1	UNKNOWN	-	-	-	568	-	7.000	7.69	517.9	449						
08-B00727-S0008	L2	UNKNOWN	-	-	-	2758	-	30.000	8.07	2950.2	4241						
08-B00727-S0009	SW4	UNKNOWN	-	-	-	24	5.1	0.285	7.22	<0.2	60						

Notes : METHOD DETECTION LIMITS ARE NOT ALWAYS ACHIEVABLE DUE TO VARIOUS CIRCUMSTANCES BEYOND OUR CONTROL.

NDP = NO DETERMINATION POSSIBLE

Checked By : Paul Barry

* SUBCONTRACTED TO OTHER LABORATORY / ** SAMPLES ANALYSED AT THE CHESTER LABORATORY

Validated ☑
Preliminary ☐

ALcontrol Laboratories Analytical Services
Table Of Results

[#] ISO 17025 accredited
[M] MCERTS accredited
* Subcontracted test
» Shown on prev. report

Job Number: 08/09578/02/01 **Matrix:** LIQUID
Client: ALcontrol Geochem Ireland **Location:** SILLIOT HILL
Client Ref. No.: 08-B03055/01 **Client Contact:** Ireland Co-ordinators

Sample Identity	2357559-60	2357570-71	2357581-82	2357592-93	2357603-04	2357614-15	2357625-26	2357649	2357658-59	Method Code	LoD/Units
Depth (m)	-	-	-	-	-	-	-	-	-		
Sample Type	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID		
Sampled Date	28.05.08	28.05.08	28.05.08	28.05.08	28.05.08	28.05.08	28.05.08	28.05.08	28.05.08		
Sample Received Date	27.05.08	27.05.08	27.05.08	27.05.08	27.05.08	27.05.08	27.05.08	27.05.08	27.05.08		
Batch	1	1	1	1	1	1	1	1	1		
Sample Number(s)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**		
Ammoniacal Nitrogen as N	<0.2	3.3	0.4	170	<0.2	2.8	<0.2	<0.2	<0.2	TM099[#]	<0.2 mg/l

Date 02.06.2008

Validated ✓
Preliminary

ALcontrol Laboratories Analytical Services
Table Of Results

[#] ISO 17025 accredited
[M] MCERTS accredited
[*] Subcontracted test
» Shown on prev. report

Job Number: 08/09578/02/01 **Matrix:** LIQUID
Client: ALcontrol Geochem Ireland **Location:** SILLIOT HILL
Client Ref. No.: 08-B03055/01 **Client Contact:** Ireland Co-ordinators

Sample Identity	2357672-73	2357686-67	2357756							Method Code	LoD/Units
Depth (m)	-	-	-								
Sample Type	LIQUID	LIQUID	LIQUID								
Sampled Date	28.05.08	28.05.08	28.05.08								
Sample Received Date	27.05.08	27.05.08	27.05.08								
Batch	1	1	1								
Sample Number(s)	**10**	**11**	**12**								
Ammoniacal Nitrogen as N	<0.2	2.3	<0.2							TM099[#]	<0.2 mg/l

Date 02.06.2008

ALcontrol Laboratories Analytical Services
Table Of Results - Appendix

Job Number: 08/09578/02/01
Client: ALcontrol Geochem Ireland
Client Ref. No.: 08-B03055/01

Report Key :

Results expressed as (e.g.) 1.03E-07 is equivalent to 1.03×10^{-7}

NDP	No Determination Possible	*	Subcontracted test
NFD	No Fibres Detected	»	Result previously reported (Incremental reports only)
#	ISO 17025 accredited	M	MCERTS Accredited
PFD	Possible Fibres Detected	EC	Equivalent Carbon (Aromatics C8-C35)

Note: Method detection limits are not always achievable due to various circumstances beyond our control.

Summary of Method Codes contained within report :

Method No.	Reference	Description	ISO 17025 Accredited	MCERTS Accredited	Wet/Dry Sample [1]	Surrogate Corrected
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser	✓		NA	

[1] Applies to Solid samples only. **DRY** indicates samples have been dried at 35°C. **NA** = not applicable.

ALcontrol Laboratories Analytical Services
Table Of Results - Appendix

Job Number: 08/09578/02/01
Client: ALcontrol Geochem Ireland
Client Ref. No.: 08-B03055/01

Summary of Coolbox temperatures

Batch No.	Coolbox Temperature (°C)
1	10

ALcontrol Laboratories (Dublin)

18a Rosemount Business Park,
Ballycoolin,
Dublin 11
Ireland
Tel: +353 (0) 1 8829893
Fax: +353 (0) 1 8829895

CERTIFICATE OF ANALYSIS

Client: Fehily Timoney & Company (Dublin)

Floor 2
Mill House
Ashtowngate
Navan Road
Dublin 15

Attention: Nicola Hoare

Date: 25 March, 2008

Our Reference: 08-B01544/01

Your Reference: 2006-114-01

Location: SILLIOT HILL

A total of 1 samples was received for analysis on Tuesday, 11 March 2008 and authorised on Tuesday, 25 March 2008. Accredited laboratory tests are defined in the log sheet, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation. We are pleased to enclose our final report, it was a pleasure to be of service to you, and we look forward to our continuing association.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Signed

Lorraine Mc Namara

Lorraine McNamara
Laboratory Technical Manager

Compiled By

Paul Barry

Paul Barry

UKAS TESTING
1291
GROUP

☐ Interim
☑ Validated

ALcontrol Laboratories Ireland

Table Of Results

Ref Number: 08-B01544/01

Client: Fehily Timoney & Company (Dublin)

Date of Receipt: 11/03/2008
(of first sample)

Sample Type: WATER

Location: SILLIOT HILL

Client Contact: Nicola Hoare

Client Ref: 2006-114-01

	Detection Method	5 DAY ATU	Calculation	KONE	METER	SPECTRO	SPECTRO
	Method Detection Limit	<2mg/l	<0.3mg/l	<1mg/l	<0.014mS/cm	<0.2mg/l	<15mg/l
UKAS Accredited [Testing Laboratory] No. 1291		✓	✓	✓	✓	✓	✓
ALcontrol Reference	Sample Identity	Other ID	BOD Unfiltered	Total Oxidised Nitrogen as N	Chloride	Electrical Conductivity @ 25C	Ammoniacal Nitrogen as N	COD Unfiltered
			mg/l	mg/l	mg/l	mS/cm	mg/l	mg/l
08-B01544-S0005	L3	UNKNOWN	6	6.0	77	1.171	27.8	45

Notes : METHOD DETECTION LIMITS ARE NOT ALWAYS ACHIEVABLE DUE TO VARIOUS CIRCUMSTANCES BEYOND OUR CONTROL.

NDP = NO DETERMINATION POSSIBLE

Checked By : Paul Barry

Printed at 12:22 on 26/03/2008

* SUBCONTRACTED TO OTHER LABORATORY / ** SAMPLES ANALYSED AT THE CHESTER LABORATORY

ALcontrol Laboratories (Dublin)

18a Rosemount Business Park,
Ballycoolin,
Dublin 11
Ireland
Tel: +353 (0) 1 8829893
Fax: +353 (0) 1 8829895

CERTIFICATE OF ANALYSIS

Client: Fehily Timoney & Company (Dublin)

Floor 2
Mill House
Ashtowngate
Navan Road
Dublin 15

Attention: Nicola Hoare

Date: 19 June, 2008

Our Reference: 08-B03055/01

Your Reference: 2006-114-01

Location: Silliot Hill

A total of 23 samples was received for analysis on Friday, 16 May 2008 and authorised on Thursday, 19 June 2008. Accredited laboratory tests are defined in the log sheet, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation. We are pleased to enclose our final report, it was a pleasure to be of service to you, and we look forward to our continuing association.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Signed

Lorraine Mc Namara

Lorraine McNamara
Laboratory Technical Manager

Compiled By Dylan Halpin

Dylan Halpin

UKAS TESTING
1291

GROUP

Printed at 11:32 on 20/06/2008

ALcontrol Laboratories Ireland

Test Schedule Summary

Ref Number: **08-B03055/01** **Sample Type:** **WATER**
Client: Fehily Timoney & Company (Dublin) Location: Silliot Hill
Date of Receipt: 16/05/2008 Client Contact: Nicola Hoare
Client Ref: 2006-114-01

* SUBCONTRACTED TO OTHER LABORATORY / ** SAMPLES ANALYSED AT THE CHESTER LABORATORY

SCHEDULE	METHOD	TEST NAME	TOTAL
X	5 DAY ATU	BOD Unfiltered	11
X	Calculation	Total Oxidised Nitrogen	17
X	Filtration	Faecal Coliforms*	3
X	Filtration	Total Coliforms*	3
X	GRAVIMETRIC	Total Suspended Solids	7
X	HPLC	Total Phenols by HPLC	12
X	ICP MS	Dissolved Iron Low Level	12
X	ICP OES	Dissolved Potassium	12
X	ICP OES	Dissolved Sodium	12
X	IR	Total Organic Carbon	12
X	KONE	Chloride	22
X	METER	Electrical Conductivity @ 25C	23
X	SPECTRO	Ammoniacal Nitrogen	11
X	SPECTRO	Ammoniacal Nitrogen Low Level**	12
X	SPECTRO	COD Unfiltered	12

☐ Interim
☑ Validated

ALcontrol Laboratories Ireland

Table Of Results

Ref Number: 08-B03055/01 **Sample Type: WATER**

Client: Fehily Timoney & Company (Dublin) Location: Silliot Hill

Date of Receipt: 16/05/2008 (of first sample) Client Contact: Nicola Hoare

Client Ref: 2006-114-01

	Detection Method		5 DAY ATU	Calculation	Filtration	Filtration	GRAVIMETRIC	HPLC	ICP MS	ICP OES	ICP OES	IR	KONE	METER	SPECTRO	SPECTRO	SPECTRO
	Method Detection Limit		<2mg/l	<0.3mg/l	<1cfu/100ml	<1cfu/100ml	<10mg/l	<0.01mg/l	<2ug/l	<0.2mg/l	<0.2mg/l	<2mg/l	<1mg/l	<0.014mS/cm	<0.01mg/l	<0.2mg/l	<15mg/l
UKAS Accredited [Testing Laboratory] No. 1291			✓	✓			✓	✓	✓			✓	✓	✓	✓	✓	✓
ALcontrol Reference	Sample Identity	Other ID	BOD Unfiltered	Total Oxidised Nitrogen as N	Faecal Coliforms*	Total Coliforms*	Total Suspended Solids	Total Phenols	Dissolved Iron Low Level	Dissolved Potassium	Dissolved Sodium	Total Organic Carbon	Chloride	Electrical Conductivity @ 25C	Ammoniacal Nitrogen Low Level as N**	Ammoniacal Nitrogen as N	COD Unfiltered
			mg/l	mg/l	cfu/100ml	cfu/100ml	mg/l	mg/l	ug/l	mg/l	mg/l	mg/l	mg/l	mS/cm	mg/l	mg/l	mg/l
08-B03055-S0001	L2	UNKNOWN	348	<0.3	-	-	-	-	-	-	-	-	335	27.820	-	2496.3	4029
08-B03055-S0002	L3	UNKNOWN	76	<0.3	-	-	-	-	-	-	-	-	78	1.200	-	65.0	49
08-B03055-S0003	L4	UNKNOWN	103	<0.3	-	-	-	-	-	-	-	-	356	3.812	-	244.8	407
08-B03055-S0004	L5	UNKNOWN	89	<0.3	-	-	-	-	-	-	-	-	3624	15.330	-	721.4	998
08-B03055-S0005	BH1	UNKNOWN	-	3.9	-	-	-	<0.01	735	1.2	27.9	<2	93	0.620	See Attached	-	-
08-B03055-S0006	BH2	UNKNOWN	-	1.8	-	-	-	<0.01	1187	6.3	52.5	5	34	0.776	See Attached	-	-
08-B03055-S0007	BH3	UNKNOWN	-	3.8	-	-	-	<0.01	4427	1.1	11.2	<2	19	0.670	See Attached	-	-
08-B03055-S0008	BH4	UNKNOWN	-	<0.3	-	-	-	<0.01	6132	110.9	394.4	32	491	3.299	See Attached	-	-
08-B03055-S0009	BH10D	UNKNOWN	-	7.5	-	-	-	<0.01	25	0.7	28.5	<2	44	0.687	See Attached	-	-
08-B03055-S0010	BH16R	UNKNOWN	-	<0.3	-	-	-	<0.01	815	7.7	494.3	9	52	1.689	See Attached	-	-
08-B03055-S0011	PW2	UNKNOWN	-	6.4	-	-	-	<0.01	4	0.3	12.1	<2	22	0.756	See Attached	-	-
08-B03055-S0012	L1	UNKNOWN	68	<0.3	-	-	-	-	-	-	-	-	815	9.000	-	769.6	587
08-B03055-S0013	BH11D	UNKNOWN	-	7.6	10	15	-	<0.01	22	1.1	11.3	<2	19	0.701	See Attached	-	-
08-B03055-S0014	PW4	UNKNOWN	-	6.3	-	-	-	<0.01	137	1.0	11.4	<2	-	0.668	See Attached	-	-
08-B03055-S0015	PW11	UNKNOWN	-	0.7	<1	<1	-	<0.01	8	0.7	7.8	<2	10	0.169	See Attached	-	-
08-B03055-S0016	PW15	UNKNOWN	-	<0.3	13	9800	-	<0.01	879	2.3	11.3	7	20	0.778	See Attached	-	-
08-B03055-S0017	SW1	UNKNOWN	3	-	-	-	<10	-	-	-	-	-	154	1.285	-	0.3	<15
08-B03055-S0018	SW2	UNKNOWN	2	-	-	-	<10	-	-	-	-	-	118	1.022	-	<0.2	<15
08-B03055-S0019	SW3	UNKNOWN	<2	-	-	-	1203	-	-	-	-	-	15	0.722	-	0.3	967
08-B03055-S0020	SW4	UNKNOWN	6	-	-	-	548	-	-	-	-	-	21	0.635	-	2.2	757

Notes : METHOD DETECTION LIMITS ARE NOT ALWAYS ACHIEVABLE DUE TO VARIOUS CIRCUMSTANCES BEYOND OUR CONTROL. **NDP** = NO DETERMINATION POSSIBLE

Checked By : Dylan Halpin

Printed at 11:32 on 20/06/2008

* SUBCONTRACTED TO OTHER LABORATORY / ** SAMPLES ANALYSED AT THE CHESTER LABORATORY

☐ Interim
☑ Validated

ALcontrol Laboratories Ireland

Table Of Results

Ref Number: 08-B03055/01
Client: Fehily Timoney & Company (Dublin)
Date of Receipt: 16/05/2008
(of first sample)

Sample Type: WATER
Location: Silliot Hill
Client Contact: Nicola Hoare
Client Ref: 2006-114-01

	Detection Method	5 DAY ATU	Calculation	Filtration	Filtration	GRAVIMETRIC	HPLC	ICP MS	ICP OES	ICP OES	IR	KONE	METER	SPECTRO	SPECTRO	SPECTRO
	Method Detection Limit	<2mg/l	<0.3mg/l	<1cfu/100ml	<1cfu/100ml	<10mg/l	<0.01mg/l	<2ug/l	<0.2mg/l	<0.2mg/l	<2mg/l	<1mg/l	<0.014mS/cm	<0.01mg/l	<0.2mg/l	<15mg/l
UKAS Accredited [Testing Laboratory] No. 1291		✓	✓			✓	✓	✓			✓	✓	✓	✓	✓	✓
ALcontrol Reference	Sample Identity	BOD Unfiltered	Total Oxidised Nitrogen as N	Faecal Coliforms*	Total Coliforms*	Total Suspended Solids	Total Phenols	Dissolved Iron Low Level	Dissolved Potassium	Dissolved Sodium	Total Organic Carbon	Chloride	Electrical Conductivity @ 25C	Ammoniacal Nitrogen Low Level as N**	Ammoniacal Nitrogen as N	COD Unfiltered
		mg/l	mg/l	cfu/100ml	cfu/100ml	mg/l	mg/l	ug/l	mg/l	mg/l	mg/l	mg/l	mS/cm	mg/l	mg/l	mg/l
08-B03055-S0021	SW6	2	-	-	-	<10	-	-	-	-	-	14	0.340	-	<0.2	<15
08-B03055-S0022	SW7	<2	-	-	-	<10	-	-	-	-	-	17	0.322	-	1.1	<15
08-B03055-S0023	PW9	-	0.9	-	-	35	<0.01	220	5.7	13.5	4	12	0.585	See Attached	-	22

Notes : METHOD DETECTION LIMITS ARE NOT ALWAYS ACHIEVABLE DUE TO VARIOUS CIRCUMSTANCES BEYOND OUR CONTROL.

NDP = NO DETERMINATION POSSIBLE

Checked By : Dylan Halpin

Printed at 11:32 on 20/06/2008

* SUBCONTRACTED TO OTHER LABORATORY / ** SAMPLES ANALYSED AT THE CHESTER LABORATORY

Validated ☑
Preliminary ☐

ALcontrol Laboratories Analytical Services
Table Of Results

ISO 17025 accredited
M MCERTS accredited
* Subcontracted test
» Shown on prev. report

Job Number: 08/09578/02/01 **Matrix:** LIQUID
Client: ALcontrol Geochem Ireland **Location:** SILLIOT HILL
Client Ref. No.: 08-B03055/01 **Client Contact:** Ireland Co-ordinators

Sample Identity	2357559-60	2357570-71	2357581-82	2357592-93	2357603-04	2357614-15	2357625-26	2357649	2357658-59	Method Code	LoD/Units
Depth (m)	-	-	-	-	-	-	-	-	-		
Sample Type	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID		
Sampled Date	28.05.08	28.05.08	28.05.08	28.05.08	28.05.08	28.05.08	28.05.08	28.05.08	28.05.08		
Sample Received Date	27.05.08	27.05.08	27.05.08	27.05.08	27.05.08	27.05.08	27.05.08	27.05.08	27.05.08		
Batch	1	1	1	1	1	1	1	1	1		
Sample Number(s)	1	2	3	4	5	6	7	8	9		
Ammoniacal Nitrogen as N	<0.2	3.3	0.4	170	<0.2	2.8	<0.2	<0.2	<0.2	TM099#	<0.2 mg/l

Date 02.06.2008

Validated ☑
Preliminary ☐

ALcontrol Laboratories Analytical Services
Table Of Results

ISO 17025 accredited
M MCERTS accredited
* Subcontracted test
» Shown on prev. report

Job Number: 08/09578/02/01 **Matrix:** LIQUID
Client: ALcontrol Geochem Ireland **Location:** SILLIOT HILL
Client Ref. No.: 08-B03055/01 **Client Contact:** Ireland Co-ordinators

Sample Identity	2357672-73	2357686-67	2357756							Method Code	LoD/Units
Depth (m)	-	-	-								
Sample Type	LIQUID	LIQUID	LIQUID								
Sampled Date	28.05.08	28.05.08	28.05.08								
Sample Received Date	27.05.08	27.05.08	27.05.08								
Batch	1	1	1								
Sample Number(s)	10	11	12								
Ammoniacal Nitrogen as N	<0.2	2.3	<0.2							TM099#	<0.2 mg/l

Date 02.06.2008

ALcontrol Laboratories (Dublin)

18a Rosemount Business Park,
Ballycoolin,
Dublin 11
Ireland
Tel: +353 (0) 1 8829893
Fax: +353 (0) 1 8829895

CERTIFICATE OF ANALYSIS

Client: Fehily Timoney & Company (Dublin)

Floor 2
Mill House
Ashtowngate
Navan Road
Dublin 15

Attention: Nicola Hoare

Date: 27 June, 2008

Our Reference: 08-B03055/02

Your Reference: 2006-114-01

Location: Silliot Hill

A total of 23 samples was received for analysis on Friday, 16 May 2008 and authorised on Friday, 27 June 2008. Accredited laboratory tests are defined in the log sheet, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation. We are pleased to enclose our final report, it was a pleasure to be of service to you, and we look forward to our continuing association.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Signed

Lorraine Mc Namara

Lorraine McNamara
Laboratory Technical Manager

Compiled By Dylan Halpin

Dylan Halpin

UKAS TESTING
1291
GROUP

Printed at 10:51 on 30/06/2008

ALcontrol Laboratories Ireland

Test Schedule Summary

Ref Number: 08-B03055/02
Client: Fehily Timoney & Company (Dublin)
Date of Receipt: 16/05/2008

Sample Type: WATER
Location: Silliot Hill
Client Contact: Nicola Hoare
Client Ref: 2006-114-01

* SUBCONTRACTED TO OTHER LABORATORY / ** SAMPLES ANALYSED AT THE CHESTER LABORATORY

SCHEDULE	METHOD	TEST NAME	TOTAL
X	5 DAY ATU	BOD Unfiltered	11
X	Calculation	Total Oxidised Nitrogen	17
X	Filtration	Faecal Coliforms*	12
X	Filtration	Total Coliforms*	12
X	GRAVIMETRIC	Total Suspended Solids	7
X	HPLC	Total Phenols by HPLC	12
X	ICP MS	Dissolved Iron Low Level	12
X	ICP OES	Dissolved Potassium	12
X	ICP OES	Dissolved Sodium	12
X	IR	Total Organic Carbon	12
X	KONE	Chloride	22
X	METER	Electrical Conductivity @ 25C	23
X	SPECTRO	Ammoniacal Nitrogen	11
X	SPECTRO	Ammoniacal Nitrogen Low Level**	12
X	SPECTRO	COD Unfiltered	12
2	KONE	Chloride	1

☐ Interim
☑ Validated

ALcontrol Laboratories Ireland

Table Of Results

Ref Number: 08-B03055/02

Client: Fehily Timoney & Company (Dublin)

Date of Receipt: 16/05/2008
(of first sample)

Sample Type: WATER

Location: Silliot Hill

Client Contact: Nicola Hoare

Client Ref: 2006-114-01

	Detection Method	5 DAY ATU	Calculation	Filtration	Filtration	GRAVIMETRIC	HPLC	ICP MS	ICP OES	ICP OES	IR	KONE	METER	SPECTRO	SPECTRO	SPECTRO
	Method Detection Limit	<2mg/l	<0.3mg/l	<1cfu/100ml	<1cfu/100ml	<10mg/l	<0.01mg/l	<2ug/l	<0.2mg/l	<0.2mg/l	<2mg/l	<1mg/l	<0.014mS/cm	<0.2mg/l	<0.2mg/l	<15mg/l
UKAS Accredited [Testing Laboratory] No. 1291		✓	✓			✓	✓	✓			✓	✓	✓	✓	✓	✓
ALcontrol Reference	Sample Identity	Other ID	BOD Unfiltered	Total Oxidised Nitrogen as N	Faecal Coliforms*	Total Coliforms*	Total Suspended Solids	Total Phenols	Dissolved Iron Low Level	Dissolved Potassium	Dissolved Sodium	Total Organic Carbon	Chloride	Electrical Conductivity @ 25C	Ammoniacal Nitrogen Low Level as N**	Ammoniacal Nitrogen as N	COD Unfiltered
			mg/l	mg/l	cfu/100ml	cfu/100ml	mg/l	mg/l	ug/l	mg/l	mg/l	mg/l	mg/l	mS/cm	mg/l	mg/l	mg/l
08-B03055-S0001	L2	UNKNOWN	348	<0.3	-	-	-	-	-	-	-	-	335	27.820	-	2496.3	4029
08-B03055-S0002	L3	UNKNOWN	76	<0.3	-	-	-	-	-	-	-	-	78	1.200	-	65.0	49
08-B03055-S0003	L4	UNKNOWN	103	<0.3	-	-	-	-	-	-	-	-	356	3.812	-	244.8	407
08-B03055-S0004	L5	UNKNOWN	89	<0.3	-	-	-	-	-	-	-	-	3624	15.330	-	721.4	998
08-B03055-S0005	BH1	UNKNOWN	-	3.9	<1	10	-	<0.01	735	1.2	27.9	<2	93	0.620	See Attached	-	-
08-B03055-S0006	BH2	UNKNOWN	-	1.8	<1	48	-	<0.01	1187	6.3	52.5	5	34	0.776	See Attached	-	-
08-B03055-S0007	BH3	UNKNOWN	-	3.8	<1	<1	-	<0.01	4427	1.1	11.2	<2	19	0.670	See Attached	-	-
08-B03055-S0008	BH4	UNKNOWN	-	<0.3	<1	7	-	<0.01	6132	110.9	394.4	32	491	3.299	See Attached	-	-
08-B03055-S0009	BH10D	UNKNOWN	-	7.5	<1	60	-	<0.01	25	0.7	28.5	<2	44	0.687	See Attached	-	-
08-B03055-S0010	BH16R	UNKNOWN	-	<0.3	<1	42	-	<0.01	815	7.7	494.3	9	52	1.689	See Attached	-	-
08-B03055-S0011	PW2	UNKNOWN	-	6.4	<1	20	-	<0.01	4	0.3	12.1	<2	22	0.756	See Attached	-	-
08-B03055-S0012	L1	UNKNOWN	68	<0.3	-	-	-	-	-	-	-	-	815	9.000	-	769.6	587
08-B03055-S0013	BH11D	UNKNOWN	-	7.6	10	15	-	<0.01	22	1.1	11.3	<2	19	0.701	See Attached	-	-
08-B03055-S0014	PW4	UNKNOWN	-	6.3	184	2800	-	<0.01	137	1.0	11.4	<2	17	0.668	See Attached	-	-
08-B03055-S0015	PW11	UNKNOWN	-	0.7	<1	<1	-	<0.01	8	0.7	7.8	<2	10	0.169	See Attached	-	-
08-B03055-S0016	PW15	UNKNOWN	-	<0.3	13	9800	-	<0.01	879	2.3	11.3	7	20	0.778	See Attached	-	-
08-B03055-S0017	SW1	UNKNOWN	3	-	-	-	<10	-	-	-	-	-	154	1.285	-	0.3	<15
08-B03055-S0018	SW2	UNKNOWN	2	-	-	-	<10	-	-	-	-	-	118	1.022	-	<0.2	<15
08-B03055-S0019	SW3	UNKNOWN	<2	-	-	-	1203	-	-	-	-	-	15	0.722	-	0.3	967
08-B03055-S0020	SW4	UNKNOWN	6	-	-	-	548	-	-	-	-	-	21	0.635	-	2.2	757

Notes : METHOD DETECTION LIMITS ARE NOT ALWAYS ACHIEVABLE DUE TO VARIOUS CIRCUMSTANCES BEYOND OUR CONTROL.

NDP = NO DETERMINATION POSSIBLE

Checked By : Dylan Halpin

Printed at 10:51 on 30/06/2008

* SUBCONTRACTED TO OTHER LABORATORY / ** SAMPLES ANALYSED AT THE CHESTER LABORATORY

☐ Interim
☑ Validated

ALcontrol Laboratories Ireland

Table Of Results

Ref Number: 08-B03055/02

Client: Fehily Timoney & Company (Dublin)

Date of Receipt: 16/05/2008
(of first sample)

Sample Type: WATER

Location: Silliot Hill

Client Contact: Nicola Hoare

Client Ref: 2006-114-01

	Detection Method	5 DAY ATU	Calculation	Filtration	Filtration	GRAVIMETRIC	HPLC	ICP MS	ICP OES	ICP OES	IR	KONE	METER	SPECTRO	SPECTRO	SPECTRO
	Method Detection Limit	<2mg/l	<0.3mg/l	<1cfu/100ml	<1cfu/100ml	<10mg/l	<0.01mg/l	<2ug/l	<0.2mg/l	<0.2mg/l	<2mg/l	<1mg/l	<0.014mS/cm	<0.2mg/l	<0.2mg/l	<15mg/l
UKAS Accredited [Testing Laboratory] No. 1291		✓	✓			✓	✓	✓			✓	✓	✓	✓	✓	✓
ALcontrol Reference	**Sample Identity**	**Other ID**	**BOD Unfiltered**	**Total Oxidised Nitrogen as N**	**Faecal Coliforms***	**Total Coliforms***	**Total Suspended Solids**	**Total Phenols**	**Dissolved Iron Low Level**	**Dissolved Potassium**	**Dissolved Sodium**	**Total Organic Carbon**	**Chloride**	**Electrical Conductivity @ 25C**	**Ammoniacal Nitrogen Low Level as N**	**Ammoniacal Nitrogen as N**	**COD Unfiltered**
			mg/l	mg/l	cfu/100ml	cfu/100ml	mg/l	mg/l	ug/l	mg/l	mg/l	mg/l	mg/l	mS/cm	mg/l	mg/l	mg/l
08-B03055-S0021	SW6	UNKNOWN	2	-	-	-	<10	-	-	-	-	-	14	0.340	-	<0.2	<15
08-B03055-S0022	SW7	UNKNOWN	<2	-	-	-	<10	-	-	-	-	-	17	0.322	-	1.1	<15
08-B03055-S0023	PW9	UNKNOWN	-	0.9	3	1500	35	<0.01	220	5.7	13.5	4	12	0.585	See Attached	-	22

Notes : METHOD DETECTION LIMITS ARE NOT ALWAYS ACHIEVABLE DUE TO VARIOUS CIRCUMSTANCES BEYOND OUR CONTROL.

NDP = NO DETERMINATION POSSIBLE

Checked By : Dylan Halpin

Printed at 10:51 on 30/06/2008

* SUBCONTRACTED TO OTHER LABORATORY / ** SAMPLES ANALYSED AT THE CHESTER LABORATORY

Validated ☑
Preliminary ☐

ALcontrol Laboratories Analytical Services
Table Of Results

ISO 17025 accredited
M MCERTS accredited
* Subcontracted test
» Shown on prev. report

Job Number: 08/09578/02/01 **Matrix:** LIQUID
Client: ALcontrol Geochem Ireland **Location:** SILLIOT HILL
Client Ref. No.: 08-B03055/01 **Client Contact:** Ireland Co-ordinators

Sample Identity	2357559-60	2357570-71	2357581-82	2357592-93	2357603-04	2357614-15	2357625-26	2357649	2357658-59	Method Code	LoD/Units
Depth (m)	-	-	-	-	-	-	-	-	-		
Sample Type	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID		
Sampled Date	28.05.08	28.05.08	28.05.08	28.05.08	28.05.08	28.05.08	28.05.08	28.05.08	28.05.08		
Sample Received Date	27.05.08	27.05.08	27.05.08	27.05.08	27.05.08	27.05.08	27.05.08	27.05.08	27.05.08		
Batch	1	1	1	1	1	1	1	1	1		
Sample Number(s)	1	2	3	4	5	6	7	8	9		
Ammoniacal Nitrogen as N	<0.2	3.3	0.4	170	<0.2	2.8	<0.2	<0.2	<0.2	TM099#	<0.2 mg/l

Date 02.06.2008

Validated ☑
Preliminary ☐

ALcontrol Laboratories Analytical Services
Table Of Results

ISO 17025 accredited
M MCERTS accredited
* Subcontracted test
» Shown on prev. report

Job Number: 08/09578/02/01 **Matrix:** LIQUID
Client: ALcontrol Geochem Ireland **Location:** SILLIOT HILL
Client Ref. No.: 08-B03055/01 **Client Contact:** Ireland Co-ordinators

Sample Identity	2357672-73	2357686-67	2357756							Method Code	LoD/Units
Depth (m)	-	-	-								
Sample Type	LIQUID	LIQUID	LIQUID								
Sampled Date	28.05.08	28.05.08	28.05.08								
Sample Received Date	27.05.08	27.05.08	27.05.08								
Batch	1	1	1								
Sample Number(s)	10	11	12								
Ammoniacal Nitrogen as N	<0.2	2.3	<0.2							TM099#	<0.2 mg/l

Date 02.06.2008

ALcontrol Laboratories (Dublin)

18a Rosemount Business Park,
Ballycoolin,
Dublin 11
Ireland
Tel: +353 (0) 1 8829893
Fax: +353 (0) 1 8829895

CERTIFICATE OF ANALYSIS

Client: Fehily Timoney & Company (Cork)

Core House
Pouladuff Road
Cork
Ireland

Attention: Nicola Hoare

Date: 18 August, 2008

Our Reference: 08-B04455/01

Your Reference: 2006-114-01

Location: Silliot Hill Waste Licence Implementation

A total of 13 samples was received for analysis on Wednesday, 23 July 2008. Accredited laboratory tests are defined in the log sheet, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation. We are pleased to enclose our final report, it was a pleasure to be of service to you, and we look forward to our continuing association.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Signed

Dylan Halpin

Dylan Halpin
Team Leader Project Co-ordination

Lorraine Mc Namara

Lorraine McNamara
General Manager

Mark Butler

Compiled By

Mark Butler

UKAS TESTING
1291

GROUP

ALcontrol Laboratories Ireland

Test Schedule Summary

Ref Number: **08-B04455/01** **Sample Type:** **WATER**
Client: Fehily Timoney & Company (Cork) Location: Silliot Hill Waste Licence Implementation
Date of Receipt: 23/07/2008 Client Contact: Nicola Hoare
Client Ref: 2006-114-01

* SUBCONTRACTED TO OTHER LABORATORY / ** SAMPLES ANALYSED AT THE CHESTER LABORATORY

SCHEDULE	METHOD	TEST NAME	TOTAL
X	5 DAY ATU	BOD Unfiltered	9
X	Calculation	Total Oxidised Nitrogen	13
X	CV AA	Dissolved Mercury Low Level	13
X	Filtration	Faecal Coliforms*	7
X	Filtration	Total Coliforms*	7
X	GCMS	Semi Volatile Organics	2
X	GCMS	Volatile Organic Compounds	2
X	GRAVIMETRIC	Total Suspended Solids	6
X	HPLC	Total Phenols by HPLC	2
X	ICP IRIS	Total Chromium	13
X	ICP IRIS	Total Phosphorus	13
X	ICP MS	Dissolved Boron Low Level	7
X	ICP MS	Dissolved Cadmium Low Level	13
X	ICP MS	Dissolved Calcium Low Level	13
X	ICP MS	Dissolved Copper Low Level	13
X	ICP MS	Dissolved Iron Low Level	13
X	ICP MS	Dissolved Lead Low Level	13
X	ICP MS	Dissolved Magnesium Low Level	13
X	ICP MS	Dissolved Manganese Low Level	13
X	ICP MS	Dissolved Zinc Low Level	13
X	ICP OES	Dissolved Potassium	13
X	ICP OES	Dissolved Sodium	13
X	IR	Total Organic Carbon	4
X	KONE	Chloride	13
X	KONE	Fluoride	7
X	KONE	ortho Phosphate	13
X	KONE	Sulphate	13
X	METER	Electrical Conductivity @ 25C	13
X	METER	Total Dissolved Solids Meter	4
X	SPECTRO	Ammoniacal Nitrogen	13
X	SPECTRO	COD Unfiltered	9
X	SPECTRO	Total Cyanide	7
X	TITRATION	Total Alkalinity	10
2	HPLC	Total Phenols by HPLC**	4

☐ Interim
☑ Validated

ALcontrol Laboratories Ireland

Table Of Results

Ref Number: 08-B04455/01
Client: Fehily Timoney & Company (Cork)
Date of Receipt: 23/07/2008
(of first sample)

Sample Type: WATER
Location: Silliot Hill Waste Licence Implementation
Client Contact: Nicola Hoare
Client Ref: 2006-114-01

	Detection Method		5 DAY ATU	Calculation	CV AA	Filtration	Filtration	GCMS	GCMS	GRAVIMETRIC	HPLC	HPLC	ICP IRIS	ICP IRIS	ICP MS	ICP MS	ICP MS
	Method Detection Limit		<2mg/l	<0.3mg/l	<0.05ug/l	<1cfu/100ml	<1cfu/100ml	n/a	n/a	<10mg/l	<0.01mg/l	<0.01mg/l	<0.05mg/l	<0.05mg/l	<3ug/l	<0.4ug/l	<120ug/l
UKAS Accredited [Testing Laboratory] No. 1291			✓	✓					✓	✓	✓	✓	✓	✓	✓	✓	✓
ALcontrol Reference	Sample Identity	Other ID	BOD Unfiltered	Total Oxidised Nitrogen as N	Dissolved Mercury Low Level	Faecal Coliforms*	Total Coliforms*	Semi Volatile Organics	Volatile Organic Compounds	Total Suspended Solids	Total Phenols	Total Phenols**	Total Chromium	Total Phosphorous	Dissolved Boron Low Level	Dissolved Cadmium Low Level	Dissolved Calcium Low Level
			mg/l	mg/l	ug/l	cfu/100ml	cfu/100ml			mg/l	mg/l	mg/l	mg/l	mg/l	ug/l	ug/l	ug/l
08-B04455-S0001	PW4	UNKNOWN	-	5.7	<0.05	61	160000	-	-	-		<0.01	<0.05	<0.05	<3	<0.4	120400
08-B04455-S0002	PW9	UNKNOWN	-	0.5	<0.05	<1	<1	Done	Done	-	-	<0.01	<0.05	<0.05	<3	<0.4	25420
08-B04455-S0003	PW11	UNKNOWN	-	1.0	<0.05	6	30000	Done	Done	-	-	<0.01	<0.05	0.33	24	<0.4	111700
08-B04455-S0004	PW15	UNKNOWN	-	<0.3	<0.05	140000	220000	-	-	-	-	0.08	<0.05	0.39	<3	<0.4	161800
08-B04455-S0005	SW1	UNKNOWN	<2	1.5	<0.05	-	-	-	-	11	-	-	<0.05	<0.05	-	<0.4	175600
08-B04455-S0006	SW2	UNKNOWN	<2	2.0	<0.05	-	-	-	-	13	-	-	<0.05	<0.05	-	<0.4	164300
08-B04455-S0007	SW3	UNKNOWN	<2	2.7	<0.05	-	-	-	-	81	-	-	<0.05	<0.05	-	<0.4	149000
08-B04455-S0008	SW4	UNKNOWN	14	<0.3	<0.05	-	-	-	-	3236	-	-	<0.05	3.20	-	<0.4	45180
08-B04455-S0009	SW6	UNKNOWN	<2	1.0	<0.05	-	-	-	-	<10	-	-	<0.05	<0.05	-	<0.4	44700
08-B04455-S0010	SW7	UNKNOWN	<2	0.9	<0.05	-	-	-	-	26	-	-	<0.05	0.08	-	<0.4	34720
08-B04455-S0011	L1	UNKNOWN	132	<0.3	<0.05	<1	130000	-	-	-	-	-	0.07	8.50	3139	<0.4	86620
08-B04455-S0012	L3	UNKNOWN	12	<0.3	<0.05	100000	2100000	-	-	-	-	-	<0.05	1.85	160	<0.4	108500
08-B04455-S0013	L4	UNKNOWN	26	<0.3	<0.05	<1	60000	-	-	-	-	-	<0.05	0.69	738	1.3	239300

Notes : METHOD DETECTION LIMITS ARE NOT ALWAYS ACHIEVABLE DUE TO VARIOUS CIRCUMSTANCES BEYOND OUR CONTROL. **NDP** = NO DETERMINATION POSSIBLE

Checked By : Mark Butler

* SUBCONTRACTED TO OTHER LABORATORY / ** SAMPLES ANALYSED AT THE CHESTER LABORATORY

☐ Interim

☑ Validated

ALcontrol Laboratories Ireland

Table Of Results

Ref Number: 08-B04455/01

Client: Fehily Timoney & Company (Cork)

Date of Receipt: 23/07/2008

(of first sample)

Sample Type: WATER

Location: Silliot Hill Waste Licence Implementation

Client Contact: Nicola Hoare

Client Ref: 2006-114-01

	Detection Method		ICP MS	ICP MS	ICP MS	ICP MS	ICP MS	ICP MS	ICP OES	ICP OES	IR	KONE	KONE	KONE	KONE	METER	METER
	Method Detection Limit		<1ug/l	<2ug/l	<1ug/l	<100ug/l	<1ug/l	<1ug/l	<0.2mg/l	<0.2mg/l	<2mg/l	<1mg/l	<0.1mg/l	<3mg/l	<0.03mg/l	<0.014mS/cm	<5mg/l
UKAS Accredited [Testing Laboratory] No. 1291			✓	✓	✓	✓	✓	✓			✓	✓		✓	✓	✓	
ALcontrol Reference	**Sample Identity**	**Other ID**	**Dissolved Copper Low Level**	**Dissolved Iron Low Level**	**Dissolved Lead Low Level**	**Dissolved Magnesium Low Level**	**Dissolved Manganese Low Level**	**Dissolved Zinc Low Level**	**Dissolved Potassium**	**Dissolved Sodium**	**Total Organic Carbon**	**Chloride**	**Fluoride**	**Sulphate**	**ortho Phosphate as PO4**	**Electrical Conductivity @ 25C**	**Total Dissolved Solids**
			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mS/cm	mg/l
08-B04455-S0001	PW4	UNKNOWN	43	70	2	16520	2	68	1.3	9.6	<2	16	0.3	24	0.05	0.092	307
08-B04455-S0002	PW9	UNKNOWN	50	71	2	1796	7	60	0.5	6.5	<2	62	0.7	27	<0.03	0.051	75
08-B04455-S0003	PW11	UNKNOWN	7	158	6	8432	4	42	5.7	9.7	2	9	0.3	21	<0.03	0.124	259
08-B04455-S0004	PW15	UNKNOWN	3	2343	1	14100	87	28	1.2	9.7	<2	18	0.3	10	<0.03	0.215	358
08-B04455-S0005	SW1	UNKNOWN	4	46	1	23380	7	17	2.5	113.0	-	171	-	19	0.12	0.252	-
08-B04455-S0006	SW2	UNKNOWN	5	61	<1	21490	17	26	2.2	60.2	-	102	-	22	<0.03	0.162	-
08-B04455-S0007	SW3	UNKNOWN	2	108	<1	17010	78	16	0.3	8.6	-	18	-	16	<0.03	0.725	-
08-B04455-S0008	SW4	UNKNOWN	2	675	1	3838	2076	30	6.0	8.7	-	24	-	58	2.05	0.126	-
08-B04455-S0009	SW6	UNKNOWN	2	85	<1	3833	23	18	0.8	7.0	-	12	-	8	<0.03	0.094	-
08-B04455-S0010	SW7	UNKNOWN	1	81	1	3189	20	20	0.4	7.8	-	12	-	7	<0.03	0.072	-
08-B04455-S0011	L1	UNKNOWN	4	3436	1	92740	634	26	438.4	1214.0	-	1483	3.6	608	11.23	14.500	-
08-B04455-S0012	L3	UNKNOWN	2	397	1	11450	186	27	25.4	47.6	-	54	0.6	24	4.42	0.637	-
08-B04455-S0013	L4	UNKNOWN	4	812	1	45390	1365	168	83.3	168.6	-	163	0.5	44	<0.03	0.620	-

Notes : METHOD DETECTION LIMITS ARE NOT ALWAYS ACHIEVABLE DUE TO VARIOUS CIRCUMSTANCES BEYOND OUR CONTROL.

NDP = NO DETERMINATION POSSIBLE

Checked By : Mark Butler

* SUBCONTRACTED TO OTHER LABORATORY / ** SAMPLES ANALYSED AT THE CHESTER LABORATORY

☐ Interim

☑ Validated

ALcontrol Laboratories Ireland

Table Of Results

Ref Number: 08-B04455/01

Client: Fehily Timoney & Company (Cork)

Date of Receipt: 23/07/2008

(of first sample)

Sample Type: WATER

Location: Silliot Hill Waste Licence Implementation

Client Contact: Nicola Hoare

Client Ref: 2006-114-01

	Detection Method		SPECTRO	SPECTRO	SPECTRO	TITRATION
	Method Detection Limit		<0.05mg/l	<0.2mg/l	<15mg/l	<1mg/l
UKAS Accredited [Testing Laboratory] No. 1291					✓	✓
ALcontrol Reference	Sample Identity	Other ID	Total Cyanide	Ammoniacal Nitrogen as N	COD Unfiltered	Total Alkalinity as CaCO3
			mg/l	mg/l	mg/l	mg/l
08-B04455-S0001	PW4	UNKNOWN	<0.05	<0.2	-	290
08-B04455-S0002	PW9	UNKNOWN	<0.05	<0.2	-	20
08-B04455-S0003	PW11	UNKNOWN	<0.05	<0.2	-	260
08-B04455-S0004	PW15	UNKNOWN	<0.05	2.3	-	340
08-B04455-S0005	SW1	UNKNOWN	-	<0.2	<15	340
08-B04455-S0006	SW2	UNKNOWN	-	<0.2	<15	280
08-B04455-S0007	SW3	UNKNOWN	-	<0.2	79	260
08-B04455-S0008	SW4	UNKNOWN	-	3.0	635	120
08-B04455-S0009	SW6	UNKNOWN	-	<0.2	<15	120
08-B04455-S0010	SW7	UNKNOWN	-	<0.2	43	70
08-B04455-S0011	L1	UNKNOWN	<0.05	1191.5	1856	-
08-B04455-S0012	L3	UNKNOWN	<0.05	49.2	40	-
08-B04455-S0013	L4	UNKNOWN	<0.05	151.6	95	-

Notes : METHOD DETECTION LIMITS ARE NOT ALWAYS ACHIEVABLE DUE TO VARIOUS CIRCUMSTANCES BEYOND OUR CONTROL.

NDP = NO DETERMINATION POSSIBLE

Checked By : Mark Butler

* SUBCONTRACTED TO OTHER LABORATORY / ** SAMPLES ANALYSED AT THE CHESTER LABORATORY

ALcontrol Laboratories (Dublin)

18a Rosemount Business Park,
Ballycoolin,
Dublin 11
Ireland
Tel: +353 (0) 1 8829893
Fax: +353 (0) 1 8829895

CERTIFICATE OF ANALYSIS

Client: Fehily Timoney & Company (Dublin)

Floor 2
Mill House
Ashtowngate
Navan Road
Dublin 15

Attention: Rose Lloyd

Date: 15 September, 2008

Our Reference: 08-B05035/01

Your Reference: 2006-114-01

Location:

A total of 1 samples was received for analysis on Thursday, 28 August 2008. Accredited laboratory tests are defined in the log sheet, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation. We are pleased to enclose our final report, it was a pleasure to be of service to you, and we look forward to our continuing association.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Signed

Dylan Halpin

Lorraine Mc Namara

Dylan Halpin
Team Leader Project Co-ordination

Lorraine McNamara
General Manager

Compiled By

Mark Butler

Mark Butler

UKAS TESTING
1291

GROUP

Printed at 12:00 on 16/09/2008

☐ Interim
☑ Validated

ALcontrol Laboratories Ireland

Table Of Results

Ref Number: 08-B05035/01
Client: Fehily Timoney & Company (Dublin)
Date of Receipt: 28/08/2008
(of first sample)

Sample Type: WATER
Location:
Client Contact: Rose Lloyd
Client Ref: 2006-114-01

	Detection Method		Filtration	Filtration														
	Method Detection Limit		<1cfu/100ml	<1cfu/100ml														
UKAS Accredited [Testing Laboratory] No. 1291																		
ALcontrol Reference	**Sample Identity**	**Other ID**	**Faecal Coliforms***	**Total Coliforms***														
			cfu/100ml	cfu/100ml														
08-B05035-S0005	BH10D	UNKNOWN	<1	15														

Notes : METHOD DETECTION LIMITS ARE NOT ALWAYS ACHIEVABLE DUE TO VARIOUS CIRCUMSTANCES BEYOND OUR CONTROL. **NDP** = NO DETERMINATION POSSIBLE

Checked By : Mark Butler

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ALcontrol Laboratories (Dublin)

18a Rosemount Business Park,
Ballycoolin,
Dublin 11
Ireland
Tel: +353 (0) 1 8829893
Fax: +353 (0) 1 8829895

CERTIFICATE OF ANALYSIS

Client: Fehily Timoney & Company (Cork)

Core House
Pouladuff Road
Cork
Ireland

Attention: Nicola Hoare

Date: 16 October, 2008

Our Reference: 08-B05810/01

Your Reference: 2006-114-01

Location: Silliott Hill Waste Licence Implementation

A total of 11 samples was received for analysis on Wednesday, 1 October 2008. Accredited laboratory tests are defined in the log sheet, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation. We are pleased to enclose our final report, it was a pleasure to be of service to you, and we look forward to our continuing association.

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Signed

Dylan Halpin

Dylan Halpin
Team Leader Project Co-ordination

Lorraine Mc Namara

Lorraine McNamara
General Manager

Compiled By

Caoimhe McLoughlin

Caoimhe McLoughlin

UKAS TESTING
1291
GROUP

Printed at 12:27 on 17/10/2008

☐ Interim
☑ Validated

ALcontrol Laboratories Ireland

Table Of Results

Ref Number: 08-B05810/01

Client: Fehily Timoney & Company (Cork)

Date of Receipt: 01/10/2008
(of first sample)

Sample Type: WATER

Location: Silliott Hill Waste Licence Implementation

Client Contact: Nicola Hoare

Client Ref: 2006-114-01

	Detection Method	Calculation	HPLC	ICP MS	ICP OES	ICP OES	IR	KONE	Membrane Filtration	Membrane Filtration	METER	METER	SPECTRO			
	Method Detection Limit	<0.3mg/l	<0.01mg/l	<2ug/l	<0.2mg/l	<0.2mg/l	<2mg/l	<1mg/l	<1cfu/250ml	<1cfu/250ml	<0.014mS/cm	napH Units	<0.2mg/l			
UKAS Accredited [Testing Laboratory] No. 1291		✓	✓	✓			✓	✓			✓	✓				
ALcontrol Reference	Sample Identity	Other ID	Total Oxidised Nitrogen as N	Total Phenols	Dissolved Iron Low Level	Dissolved Potassium	Dissolved Sodium	Total Organic Carbon	Chloride	Faecal Coliforms*	Total Coliforms*	Electrical Conductivity @ 25C	pH	Ammoniacal Nitrogen as N			
			mg/l	mg/l	ug/l	mg/l	mg/l	mg/l	mg/l	cfu/250ml	cfu/250ml	mS/cm	pH Units	mg/l			
08-B05810-S0024	BH1	UNKNOWN	4.3	0.02	56	2.7	55.0	<2	83	<1	100	0.958	7.47	1.9			
08-B05810-S0025	BH2	UNKNOWN	0.7	0.02	53	5.6	35.4	7	19	86	300	1.089	7.51	2.0			
08-B05810-S0026	BH3	UNKNOWN	4.6	<0.01	55	0.8	9.3	<2	22	<1	<1	0.864	7.46	0.8			
08-B05810-S0027	BH4	UNKNOWN	<0.3	0.01	72	111.2	394.7	37	435	<1	<1	3.750	7.56	299.5			
08-B05810-S0028	BH10D	UNKNOWN	6.3	<0.01	83	1.1	16.5	<2	32	100	1400	0.653	7.56	1.7			
08-B05810-S0029	BH11D	UNKNOWN	6.9	0.03	58	0.8	8.1	<2	15	<1	2200	0.734	7.69	1.4			
08-B05810-S0030	BH16R	UNKNOWN	<0.3	0.02	64	9.9	395.6	6	39	<1	100	1.396	8.86	2.8			
08-B05810-S0031	PW2	UNKNOWN	6.7	0.02	46	0.7	9.5	<2	20	<1	400	0.756	7.33	1.5			
08-B05810-S0032	PW4	UNKNOWN	6.6	0.01	59	1.1	9.0	<2	17	<1	6	0.675	7.88	1.5			
08-B05810-S0033	PW9	UNKNOWN	1.0	0.01	50	0.7	5.5	<2	10	<1	2	0.166	7.70	1.6			
08-B05810-S0034	PW11	UNKNOWN	1.0	0.01	42	5.2	10.3	<2	10	<1	14	0.408	7.92	1.4			

Notes : METHOD DETECTION LIMITS ARE NOT ALWAYS ACHIEVABLE DUE TO VARIOUS CIRCUMSTANCES BEYOND OUR CONTROL. **NDP** = NO DETERMINATION POSSIBLE

Checked By : Caoimhe McLoughlin

* SUBCONTRACTED TO OTHER LABORATORY / ** SAMPLES ANALYSED AT THE CHESTER LABORATORY

ALcontrol Laboratories (Dublin)

18a Rosemount Business Park,
Ballycoolin,
Dublin 11
Ireland
Tel: +353 (0) 1 8829893
Fax: +353 (0) 1 8829895

CERTIFICATE OF ANALYSIS

Client: Fehily Timoney & Company (Dublin)

Floor 2
Mill House
Ashtowngate
Navan Road
Dublin 15

Attention: Rose Lloyd

Date: 13 October, 2008

Our Reference: 08-B05808/01

Your Reference: 2006-114-01

Location: Silliot Hill IWMF

A total of 2 samples was received for analysis on Wednesday, 1 October 2008. Accredited laboratory tests are defined in the log sheet, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation. We are pleased to enclose our final report, it was a pleasure to be of service to you, and we look forward to our continuing association.

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Signed

Dylan Halpin

Lorraine Mc Namara

Dylan Halpin
Team Leader Project Co-ordination

Lorraine McNamara
General Manager

Compiled By

Mark Butler

UKAS TESTING
1291
GROUP

Printed at 12:10 on 15/10/2008

☐ Interim
☑ Validated

ALcontrol Laboratories Ireland

Table Of Results

Ref Number: 08-B05808/01
Client: Fehily Timoney & Company (Dublin)
Date of Receipt: 01/10/2008
(of first sample)

Sample Type: WATER
Location: Silliot Hill IWMF
Client Contact: Rose Lloyd
Client Ref: 2006-114-01

	Detection Method		5 DAY ATU	Calculation	KONE	KONE	METER	METER	SPECTRO	SPECTRO
	Method Detection Limit		<2mg/l	<0.3mg/l	<1mg/l	<0.3mg/l	<0.014mS/cm	napH Units	<15mg/l	<0.2mg/l
UKAS Accredited [Testing Laboratory] No. 1291			✓	✓	✓	✓	✓	✓	✓	
ALcontrol Reference	Sample Identity	Other ID	BOD Unfiltered	Total Oxidised Nitrogen as N	Chloride	Nitrate as NO3	Electrical Conductivity @ 25C	pH	COD Filtered	Ammoniacal Nitrogen as N
			mg/l	mg/l	mg/l	mg/l	mS/cm	pH Units	mg/l	mg/l
08-B05808-S0017	L3	UNKNOWN	8	1.0	63	3.0	1.315	7.58	44	193.7
08-B05808-S0018	L4	UNKNOWN	11	<0.3	135	<0.3	2.637	7.33	92	71.7

Notes : METHOD DETECTION LIMITS ARE NOT ALWAYS ACHIEVABLE DUE TO VARIOUS CIRCUMSTANCES BEYOND OUR CONTROL. **NDP** = NO DETERMINATION POSSIBLE

Checked By : Mark Butler

* SUBCONTRACTED TO OTHER LABORATORY / ** SAMPLES ANALYSED AT THE CHESTER LABORATORY

ALcontrol Laboratories (Dublin)

18a Rosemount Business Park,
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Fax: +353 (0) 1 8829895

CERTIFICATE OF ANALYSIS

Client: Fehily Timoney & Company (Dublin)

Floor 2
Mill House
Ashtowngate
Navan Road
Dublin 15

Attention: Rose Lloyd

Date: 21 October, 2008

Our Reference: 08-B05794/01

Your Reference: 2006-114-01

Location: Silliot Hill IWMF

A total of 2 samples was received for analysis on Thursday, 2 October 2008. Accredited laboratory tests are defined in the log sheet, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation. We are pleased to enclose our final report, it was a pleasure to be of service to you, and we look forward to our continuing association.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Signed

Dylan Halpin

Lorraine Mc Namara

Dylan Halpin
Team Leader Project Co-ordination

Lorraine McNamara
General Manager

Compiled By

Mark Butler

Mark Butler

UKAS TESTING
1291

GROUP

Printed at 17:14 on 22/10/2008

☐ Interim
☑ Validated

ALcontrol Laboratories Ireland

Table Of Results

Ref Number: 08-B05794/01
Client: Fehily Timoney & Company (Dublin)
Date of Receipt: 02/10/2008
(of first sample)

Sample Type: WATER
Location: Silliot Hill IWMF
Client Contact: Rose Lloyd
Client Ref: 2006-114-01

	Detection Method		5 DAY ATU	Calculation	HPLC	ICP MS	ICP OES	ICP OES	IR	KONE	KONE	Membrane Filtration	Membrane Filtration	METER	METER	SPECTRO	SPECTRO
	Method Detection Limit		<2mg/l	<0.3mg/l	<0.01mg/l	<2ug/l	<0.2mg/l	<0.2mg/l	<2mg/l	<1mg/l	<0.3mg/l	<1cfu/250ml	<1cfu/250ml	<0.014mS/cm	napH Units	<15mg/l	<0.2mg/l
UKAS Accredited [Testing Laboratory] No. 1291			✓	✓	✓	✓			✓	✓	✓			✓	✓	✓	
ALcontrol Reference	Sample Identity	Other ID	BOD Unfiltered	Total Oxidised Nitrogen as N	Total Phenols	Dissolved Iron Low Level	Dissolved Potassium	Dissolved Sodium	Total Organic Carbon	Chloride	Nitrate as NO3	Faecal Coliforms*	Total Coliforms*	Electrical Conductivity @ 25C	pH	COD Filtered	Ammoniacal Nitrogen as N
			mg/l	mg/l	mg/l	ug/l	mg/l	mg/l	mg/l	mg/l	mg/l	cfu/250ml	cfu/250ml	mS/cm	pH Units	mg/l	mg/l
08-B05794-S0003	L1	UNKNOWN	26	0.6	-	-	-	-	-	700	2.1	-	-	6.500	8.18	451	518.1
08-B05794-S0004	PW15	UNKNOWN	-	<0.3	0.20	1968	2.3	10.3	5	32	-	152	1000	0.813	7.81	-	5.1

Notes : METHOD DETECTION LIMITS ARE NOT ALWAYS ACHIEVABLE DUE TO VARIOUS CIRCUMSTANCES BEYOND OUR CONTROL. **NDP** = NO DETERMINATION POSSIBLE

Checked By : Mark Butler

* SUBCONTRACTED TO OTHER LABORATORY / ** SAMPLES ANALYSED AT THE CHESTER LABORATORY

Appendix III

Water Balances

Estimated volume of leachate generated in Phase 1 in 2008

Month	Rainfall (mm/month)	Area (m^2)	Effective rainfall (% of actual)	Effective Rainfall	Leachate generated (m^3/month)
January	111.10	79,000	57	63.33	500
February	18.70	79,000	57	10.66	84
March	98.90	79,000	57	56.37	445
April	33.00	79,000	57	18.81	149
May	37.10	79,000	57	21.15	167
June	70.20	79,000	57	40.01	316
July	102.00	79,000	57	58.14	459
August	172.20	79,000	57	98.15	775
September	123.50	79,000	57	70.40	556
October	112.30	79,000	57	64.01	506
November	53.80	79,000	57	30.67	242
December	53.20	79,000	57	30.32	240
Total					**4,440**

Notes

1. Infiltration is estimated at 10%
2. The effective rainfall percentage was determined from the mean values for the period from 1961 - 1990.

Estimated volume of leachate generated from the Civic Amenity Centre in 2008

Year	Month	Rainfall (mm/month)	Area of old Civic Amenity Centre (m^2)	Area of new Civic Amenity Building (m^2)	Leachate generated (m^3/month)
2006	January	111.10	870	160	114.4
	February	18.70	870	160	19.3
	March	98.90	870	160	101.9
	April	33.00	870	160	34.0
	May	37.10	870	160	38.2
	June	70.20	870	160	72.3
	July	102.00	870	160	105.1
	August	172.20	870	160	177.4
	September	123.50	870	160	127.2
	October	112.30	870	160	115.7
	November	53.80	870	160	55.4
	December	53.20	870	160	54.8
	Total				**960.8**

Estimated volume of leachate generated from the Transfer Station in 2008

Year	Month	Rainfall (mm/month)	Area of Transfer Station (m^2)	Leachate generated (m^3/month)
2006	January	111.10	2,450	272.20
	February	18.70	2,450	45.82
	March	98.90	2,450	242.31
	April	33.00	2,450	80.85
	May	37.10	2,450	90.90
	June	70.20	2,450	171.99
	July	102.00	2,450	249.90
	August	172.20	2,450	421.89
	September	123.50	2,450	302.58
	October	112.30	2,450	275.14
	November	53.80	2,450	131.81
	December	53.20	2,450	130.34
	Total			**2,416**

Volume of Rainfall Infiltration through to Groundwater from Phase 1 of Silliot Hill Landfill

			Area of Waste Acceptance (m^2)						Volume of Rainfall Infiltration (m^3)					
Year	**Total Rainfall (mm.)**	**Tonnages of waste (t)**	**Total**	**Active area**	**Intermediately capped**	**Permanently capped**			**Active area**	**Intermediately capped**	**Permanently capped**	**Total Volume**	**Volume Absorbed by Waste (m^3)**	**Infiltration through to Groundwate (m^3)**
				A (m2)	RCA	Phase 1A	Phase 1B	Phase 2	A	A	A		aW	IRCA
1988	824.4	76,000	79,000	10,000	69,000	-			8,244	17,065	-	25,309	7,600	17,70
1989	718	80,750	79,000	10,000	69,000	-			7,180	14,863	-	22,043	8,075	13,96
1990	871.1	85,500	79,000	10,000	69,000	-			8,711	18,032	-	26,743	8,550	18,19
1991	777.6	85,500	79,000	10,000	69,000	-			7,776	16,096	-	23,872	8,550	15,32
1992	699.3	85,500	79,000	10,000	69,000	-			6,993	14,476	-	21,469	8,550	12,91
1993	971.3	102,243	79,000	10,000	69,000	-			9,713	20,106	-	29,819	10,224	19,59
1994	872.6	94,570	79,000	10,000	69,000	-			8,726	18,063	-	26,789	9,457	17,33
1995	797.9	80,158	79,000	10,000	69,000	-			7,979	16,517	-	24,496	8,016	16,48
1996	847.2	86,738	79,000	10,000	69,000	-			8,472	17,537	-	26,009	8,674	17,33
1997	758.5	75,000	79,000	10,000	69,000			-	7,585	15,701	-	23,286	7,500	15,78
1998	1011.5	-	79,000	-	-		79,000		-	-	4,555	-	-	4,55
1999	887	-	79,000	-	-		79,000		-	-	3,994	-	-	3,99
2000	942	-	79,000	-	-		79,000		-	-	4,242	-	-	4,24
2001	541.9	-	79,000	-	-		79,000		-	-	2,440	-	-	2,44
2002	986.0	-	79,000	-	-		79,000		-	-	4,440	-	-	4,44
2003		-	79,000	-	-		79,000		-	-	-	-	-	-
2004		-	79,000	-	-		79,000		-	-	-	-	-	-
2005	624.2	-	79,000	-	-		79,000		-	-	2,811	-	-	2,81
2006	676.5	-	79,000	-	-		79,000		-	-	3,046	-	-	3,04
2007	811.0	-	79,000	-	-		79,000		-	-	3,652	-	-	3,65
2008	986.0	-	79,000	-	-		79,000	24000.00	-	-	6,806	-	-	6,80
														-
TOTAL	**12,506**	**851,959**										**Total Volume Produced**		**200,62**

Assumptions:

1 - Areas of active and intermediate capping have been assumed
2 100.00% Infiltration through active areas
3 30.00% Infiltration through intermediately capped areas
4 10.00% Infiltration through permanently soil capped areas
4 10.00% Infiltration through permanently synthetic capped areas
5 57.00% Evapotranspiration from permanently capped areas

Actual volume of leachate removed from facility during 2008

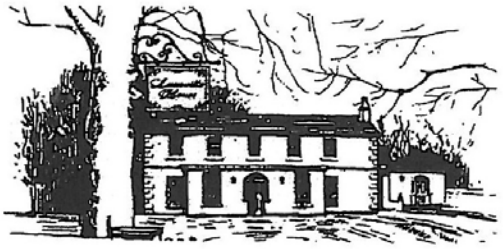
Year	Month	Rainfall (mm/month)	Volume of Leachate generated from Phase 1	Volume of Leachate generated from Phase 2	Volume of Leachate generated from Civic Amenity Centre	Volume of Leachate generated from Transfer Station	Total estimated volume of leachate generated on site	Leachate removed (m3/month)
2008	January	111.10	500	800	114	272	1,687	1,728
	February	18.70	84	135	19	46	284	1,828
	March	98.90	445	712	102	242	1,502	1,962
	April	33.00	149	238	34	81	501	811
	May	37.10	167	267	38	91	563	742
	June	70.20	316	505	72	172	1,066	1,085
	July	102.00	459	734	105	250	1,549	1,732
	August	172.20	775	1,240	177	422	2,615	716
	September	123.50	556	889	127	303	1,875	323
	October	112.30	506	809	116	275	1,705	293
	November	53.80	242	387	55	132	817	783
	December	53.20	240	383	55	130	808	938
	TOTAL	**986**	**4,440**	**7,099**	**1,016**	**2,416**	**14,970**	**12,938**

Appendix IV

Incidents & Complaints

Lumville House

CURRAGH, CO. KILDARE. TELEPHONE: (045) 441376
FAX: (045) 441020



21/12/07

Dear Mr Fitzpatrick

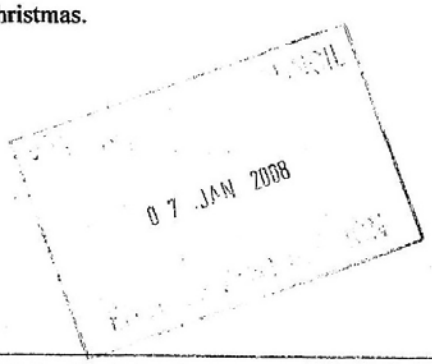
KILDARE CO COUNCIL can not be serious about recycling....let me explain.
We have a commercial premises, I sort tetra pack, plastic milk/cream containers, soft plastic, tins, mineral bottles into individual CLEAR plastic bags, so at a glance one can see exactly what each bag contains.
The powers that be in Silliot Hill insist that the recycler post through a hole, or a slot (not much bigger than a letter box) for tetra each individual item, sometimes for me 300 or more units. NO exceptions made, no matter how many or how carefully the items are sorted.
What STUPIDITY..... only Kildare Co. Council would think it up, to put one off recycling.

As a small service to commercial customers who want to recycle, and who pay rates, in our case 6,900 euro per year, plus pay to recycle, it would be so nice if an official would glance at the clear plastic bag, see its contents take it and tip it into the bins provided, or as an alternative let me tip it into the bin myself, but NO WAY that courtesy would be given, I just met the BRICK WALL.

Today 19th. Dec. 07 I did not have time to play the game of posting items through holes courtesy of Kildare Co. Council so I dumped tetra pack, plastic bottles, and soft plastic. The manager of the facility told me it was my privilege to do so. My question is, where is the sense in this....or where is the encouragement to recycle?
No provision by Kildare Co Council for small business recycling.

May I wish you and your family a happy Christmas.

Sincerely.
Nuala Lambe
Nuala Lambe



Proprietors: Michael Lambe, Nuala Lambe.

Michael Fitzpatrick T.D.
Kildare North

Copy to Ken Gerry Crehan M. Hol...

RECEIVED
KILDARE COUNTY COUNCIL
0 4 JAN 2008
ÁRAS CHILL DARA
DEVOY PARK, NAAS.

3 January 2008

County Secretary
Kildare County Council
Aras Chill Dara
Devoy Park
Naas

Attn: Environment Section

KILDARE COUNTY COUNCIL
0 7 JAN 2008
ENVIRONMENT SECTION

Re: Recycling KCC Facilities –
Nuala Lambe, Lumville House, The Curragh

Dear Secretary

Please see attached letter from Ms Nuala Lambe.

The issues raised are very important and I would appreciate your comments on her letter as soon as possible.

We all need to help provide better facilities for recycling in Kildare.

Thank you for your consideration of this request.

Yours sincerely.

Michael Fitzpatrick

Michael Fitzpatrick T.D.

iCerv
Ref No: 77284
04-2

Constituency Office: South Main Street, Naas, Co. Kildare. Tel: 045 888438 Fax: 045 888437
Dáil Éireann: Leinster House, Kildare Street, Dublin 2 Tel: 01 6183712 Fax: 01 6184196

Kildare Co. Council,
Integrated Waste Management Facility,
Silliothill,
Kilcullen.
Phone 045/482229.
Fax. 045/482230.
E-Mail gcrehan@kildarecoco.ie
10/01/2008.

Mr. M. Holligan
Senior Engineer.
Environment.

Re: Letter from Nula Lambe, Lumville House.

With reference to Ms. Lambe's letter dated 21/12/2007 to Michael Fitzpatrick T.D. which I received today, I wish to point out the following:-

The facility here is a Civic Amenity Site which was built for the use of members of the Public and not for the use by the Commercial Sector. However we do accept waste and recycling from both. With regard to recycling materials, we here at Silliot Hill had to put in place a system where the customer separates and segregates the recyclate. The reason for this was brought about due to health and safety reasons. When we accepted bags of recyclate previously from people we found on numerous occasions that the bags contained the following items:-

(a). Broken Glass.
(b). Broken Pottery.
©. Syringes.
(d) Dirty Nappies.
(e) Used Paper hankies.
(f) Other Sanitary Items.

On other occasions we found bags of rubbish which should have gone to landfill among the bags of recycling.

Had any of our operatives got cut with broken glass, stuck by a syringe or contacted some disease from dirty nappies etc. both Kildare Co. Council and me as Facility Manager would be held responsible by the Health and Safety Authority.

The Health and Safety of all employees on site is paramount and all necessary steps to keep it so will be put in place by me.

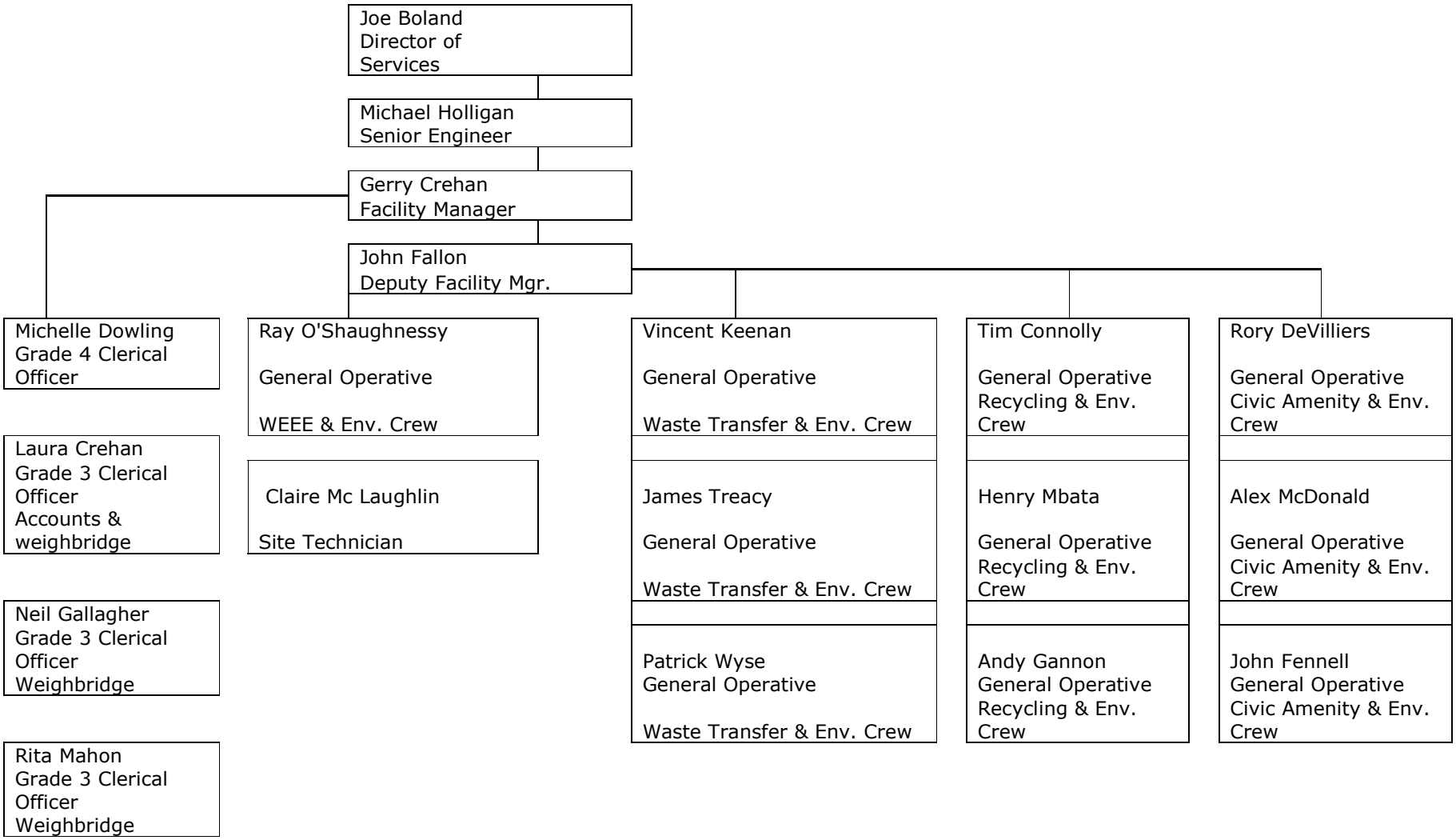
Since we opened the new facility and the recycling hub all customers must separate and segregate their recycling into the various portholes. The Staff have been informed on numerous occasions not to take bags of recycling from any member of the public.
If we were to make an exception to this rule for Ms. Lambe it would not be fair to other users who do not have any difficulty in using the system.
Ms. Lambe points out in her letter that she is bringing material from a commercial premises and has large quantities of recyclate and should be allowed to empty it into the cages on site. As she is coming from a commercial premises, I will allow her to use the facility in a different manner than the ordinary public. I will require that Ms. Lambe books in her waste in advance and she will be given a time that is suitable to our operations. This facility is afforded to the commercial sector who bring WEEE to our sites. Ms. Lambe will have to empty the recyclate herself and should there be any foreign matter contained within she will have to remove it. The charge for Commercial recycling of €92/Tonne will apply. The Staff at Silliot Hill will not be allowed to handle by hand any of this material.

I hope this meets with your satisfaction.

Gerard V. Crehan M.Sc. M.C.I.W.M.
Facility Manager.

Appendix V

Staff Structure


Joe Boland
Director of Services
Michael Holligan
Senior Engineer
Gerry Crehan
Facility Manager
John Fallon
Deputy Facility Mgr.
Michelle Dowling
Grade 4 Clerical Officer
Laura Crehan
Grade 3 Clerical Officer
Accounts & weighbridge
Neil Gallagher
Grade 3 Clerical Officer
Weighbridge
Rita Mahon
Grade 3 Clerical Officer
Weighbridge
Ray O'Shaughnessy
General Operative
WEEE & Env. Crew
Claire Mc Laughlin
Site Technician
Vincent Keenan
General Operative
Waste Transfer & Env. Crew
James Treacy
General Operative
Waste Transfer & Env. Crew
Patrick Wyse
General Operative
Waste Transfer & Env. Crew
Tim Connolly
General Operative
Recycling & Env. Crew
Henry Mbata
General Operative
Recycling & Env. Crew
Andy Gannon
General Operative
Recycling & Env. Crew
Rory DeVilliers
General Operative
Civic Amenity & Env. Crew
Alex McDonald
General Operative
Civic Amenity & Env. Crew
John Fennell
General Operative
Civic Amenity & Env. Crew

Appendix VI

Slope Stability Assessment

SLOPE STABILITY REPORT

SILLIOT HILL INTEGRATED WASTE MANAGEMENT FACILITY, KILCULLEN, COUNTY KILDARE

WASTE LICENCE W0014-01

Original

February 2009

CLIENT:
KILDARE COUNTY COUNCIL

ENVIRONMENTAL BALANCE IN DESIGN AND CONSTRUCTION

Ag Seo Ár gCúram

This We hold in Trust

FEHILY TIMONEY & COMPANY

SLOPE STABILITY REPORT

SILLIOT HILL INTEGRATED WASTE MANAGEMENT FACILITY, KILCULLEN, COUNTY KILDARE

WASTE LICENCE W0014-01

Copy

February 2009

CLIENT:
KILDARE COUNTY COUNCIL

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FEHILY TIMONEY & COMPANY

SLOPE STABILITY REPORT

SILLIOT HILL INTEGRATED WASTE MANAGEMENT FACILITY, KILCULLEN, COUNTY KILDARE

WASTE LICENCE W0014-01

User is Responsible for Checking the Revision Status of This Document

Rev. Nr.	Description of Changes	Prepared by:	Checked by:	Approved by:	Date:
0	Issue to client	AG/MG			03/02/09

Client: Kildare County Council.

Keywords: Silliot Hill, landfill, capping, slope stability.

Abstract: This slope stability report was carried out in order to comply with the waste licence. Analyses of deep rotational and shallow translational slip failures of the waste slopes are presented.

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Appendix 1: Drawing 2006-114-01-005 Rev A

1. INTRODUCTION

1.1. Purpose

This report presents the results of a slope stability assessment carried out for Silliot Hill Integrated Waste Management facility. This is in accordance with condition 8.10.2 of the EPA waste licence issued to the site (reference: W0014-01).

1.2. Site Description

Silliot Hill Waste Management Facility was developed in a former gravel pit and operates under Waste Licence Reg. No. W0014-01.

1.3. Slope Stability Analysis Method

SLOPE/W software of GEO-SLOPE International Ltd. was used to assess the stability of Silliot Hill Waste Management Facility's waste embankments. SLOPE/W is a general software tool for the slope stability analysis of earth structures. It uses the limit equilibrium method of analysis by using the idea of dissecting a potential sliding mass into vertical slices. It assesses the factor of safety for both, moment and force equilibrium based on various methods, including Bishops, Janbu and Morgenstern-Price.

Using this software, it is possible to deal with complex stratigraphy, highly irregular pore-water pressure conditions, a variety of linear and nonlinear shear strength models, virtually any kind of slip surface shape, concentrated loads and pressure lines. Limit equilibrium formulations based on the method of slices are also being applied more and more to the stability analysis of structures such as tieback walls, nail or fabric reinforced slopes, and even the sliding stability of structures subjected to high horizontal loading arising, for example, from ice flows.

Traditionally, the factor of safety is defined as that factor by which the shear strength of the soil must be reduced in order to bring the mass of soil into a state of limiting equilibrium along a selected slip surface. The results of the analysis show the overall stability of the embankment expressed as a factor of safety.

The definition of factor of safety used within SLOPE/W is:

$$F = \frac{\text{Available restoring moment (or forces)}}{\text{Total disturbing moment (or forces)}}$$

1.4. Limitations of Slope Stability Analyses

Updated shear strength parameters for the landfill waste has been estimated based on parameters used by Kolsch (1995).

Groundwater or leachate in landfills may occur in irregular perched bodies as opposed to interconnected liquid bodies. For the purposes of this analysis a natural groundwater/leachate table only has been assumed in analyses based on maximum 2007 leachate levels within the nearest available monitoring locations. At the time of writing, leachate levels for 2008 were not yet available.

1.5. Factors Controlling the Stability of Landfill Slopes

The factors controlling the stability of landfill slopes are:

- Slope geometry
- Geology
- Properties of the landfill wastes
- Properties of the supporting soil
- Groundwater/leachate levels within the waste
- Groundwater levels in the supporting soil
- Surcharge.

2. DESIGN CRITERIA

2.1. Slope Geometry

Using the latest topographical survey by Focus Surveys Ltd (Drawing No. 02-081_1,Rev K, typical cross-sections through the waste slopes of the site were taken at the locations shown on FTC Drawing 2006-114-01-005 Rev A. The side slopes analysed comprised both the steepest observed areas (Section A-A) and other typical slopes on the site (Slopes B-B and C-C).

Section A-A comprises two slope (northwest and southeast). The northwest slope is approximately 48 m long, 10 m high with a maximum slope of 1:1.5 (vertical : horizontal) while the southeast slope is approximately 43 m long, 7 m high, with a maximum slope of 1:2.3. Slope B-B is approximately 40 m long, 7 m high, with a maximum slope of 1:3.2. Slope C-C is approximately 60 m long, 6 m high, with a maximum slope of 1:5. The sections are presented in Figures 3.1 to 3.4. All of the slopes were capped and grassed at the time of writing.

2.2. Geology

The site is underlain by the Carrighill Formation, which comprises greywacke, siltstones and shales with a calcareous matrix of principally iron-rich dolomite.

Glacial and glaciofluvial deposits are generally very thick in this area. Deposits are commonly 30 m thick and can reach thicknesses in excess of 70 m in the Curragh and Blessington areas. In central and southern Kildare, these deposits are generally sands and gravels.

The waste facility is located in a former gravel pit and the site is underlain by coarse gravel deposits.

2.3. Physical Make-up

The slopes considered for analyses consist of the following layers, as outlined in Drawing 2006-114-01-005 Rev A.

- 0.5 to 1.5 m layer clay capping material
- Waste body
- Underlying Gravel

2.4. Waste Parameters

Table 2.1 below shows the parameters used for the landfill waste materials.

Table 2.1: Shear Strength Parameters for Waste Materials

Material	Waste (Old)	Waste (Fresh)
Cohesion (c')	10 kN/m^2	10 kN/m^2
Effective friction angle (ϕ')	22˚	15˚
Unit weight γ	11 kN/m^3	9.5 kN/m^3

The parameters shown in Table 2.1 above are the typical range of values from published papers on the properties of waste. For the purpose of this analysis, the parameters for fresh waste have been adopted as these will present the most conservative results.

2.5. Properties of the Supporting Soil and Capping Layer

Table 2.2 below shows the parameters used for the clay capping and the underlying coarse gravel.

Table 2.2: Shear Strength Parameters for Supporting Materials

Material	Clay Capping	Gravel
Cohesion, c', kN/m^2	4	0
Friction angle, ϕ', °	29	35
Bulk unit weight, γ, kN/m^3	18	21

2.6. Leachate Levels within the Waste Material

To assess the effects of leachate levels within the waste, the level of leachate at each slope location was obtained from monthly monitoring data for 2007 (2008 data was not available at the time of writing). This level was then set at the highest level recorded at each slope location in the various models. The leachate levels modelled were as follows:

Table 2.3: Shear Strength Parameters for Supporting Materials

Slope	Slope - Toe to Leachate Depth (m)	Elevation (mAOD)
A-A (NW)	2.2	133.6
A-A (SE)	4.3	134.5
B-B	2.0	136.0
C-C	6.5	136.0

2.7. Surcharge

A surcharge 20 kN/m^2 was applied to the top of the slopes during the analyses to simulate the movement of vehicles on the slopes.

3. RESULTS

3.1. Slope Stability Analyses

Eight models were run for the representative sections to assess the slope stability of the landfill waste embankments. The results of those analyses are summarised in Table 3.1 with factors of safety calculated for Bishop, Janbu and Morgenstern-Price methods. Table 3.1 also gives the location of each slope, the material parameters applied, the leachate level simulated, and the length of the relevant slip.

Four typical slope analyses are presented graphically for each slopes and given in Figures 3.1 through 3.4.

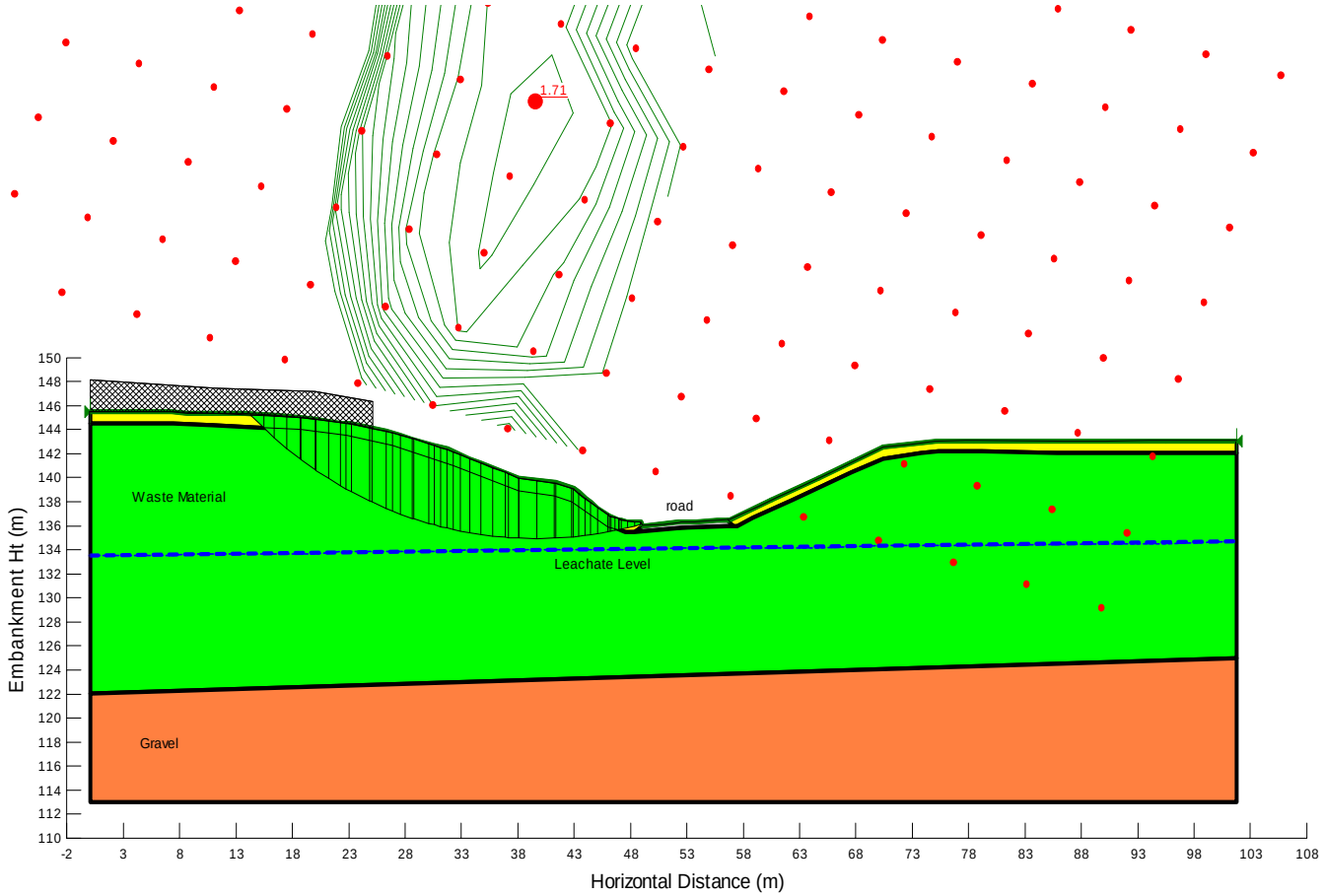
3.2. Factors of Safety

Factors of safety for potential slope failures (Table 3.1) ranged from 1.56 to 2.86. A factor of safety of 1.0 indicates the slope is in equilibrium and on the point of failure. Factors of safety greater than 1.0 indicate a margin of safety against failure. A factor of safety of 1.3 or greater is appropriate for landfill interim side slopes, with this value increasing to 1.5 for final side slopes after capping is complete.

Table 3.1: Slope Analyses Results

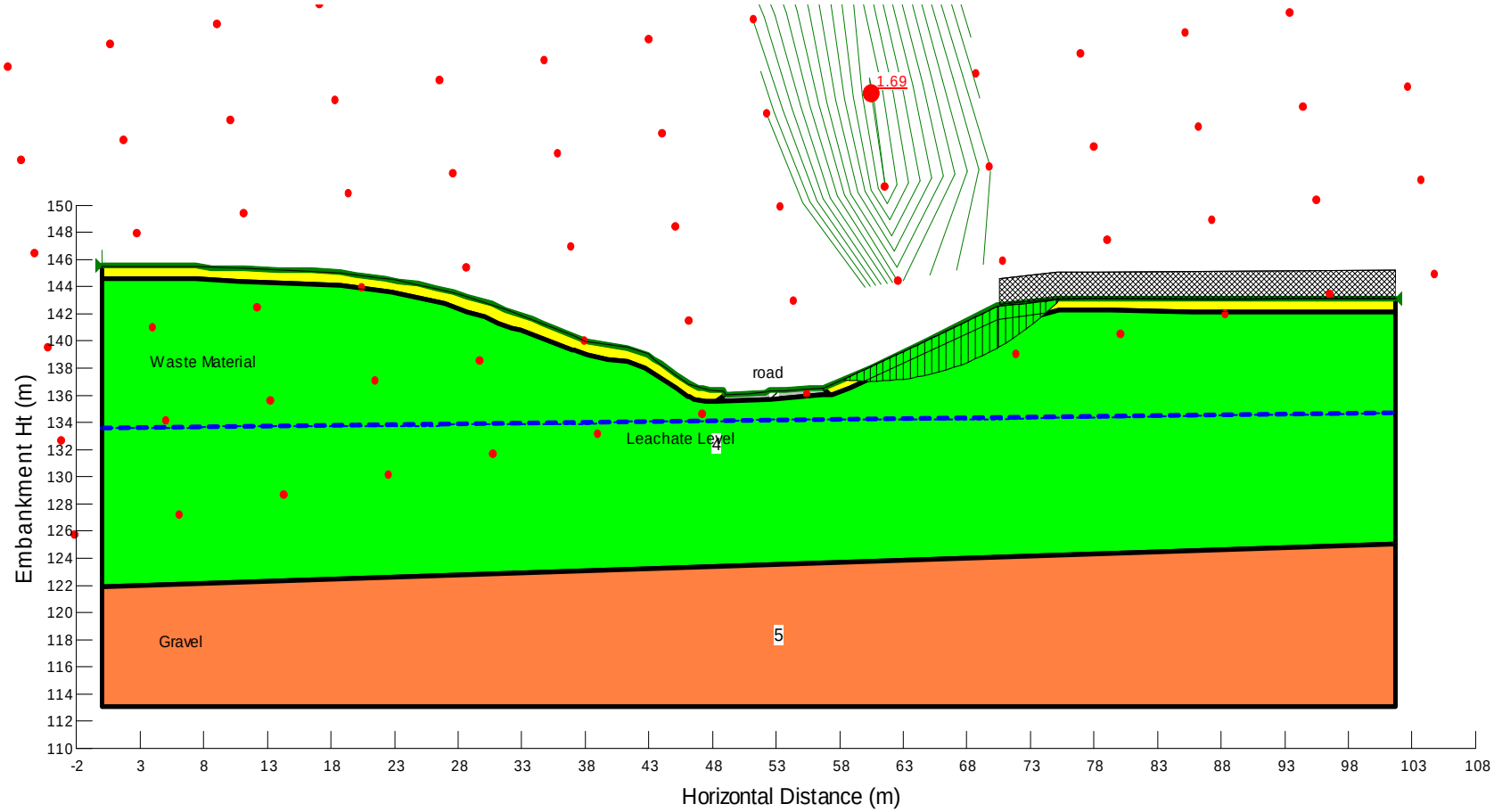
Slope name	Waste parameters (C, γ & φ)	Leachate Level (mAOD)	Bishop FoS	Janbu FoS	Morgenstern-Price FoS	Slip Length (m)	Slip location
A-A (NW)	10, 9.5, 15	133.6	1.91	1.85	1.91	30	Shallow rotational slip in clay capping and waste
	10, 9.5, 15	133.6	1.72	1.62	1.71	34	Deep slip through capping and waste materials
A-A (SE)	10, 9.5, 15	134.5	1.69	1.56	1.69	15	Shallow rotational slip in clay capping and waste
	10, 9.5, 15	134.5	1.84	1.65	1.84	21	Deep slip through capping and waste materials
B-B	10, 9.5, 15	136.0	2.28	2.16	2.28	17	Shallow rotational slip in clay capping and waste
	10, 9.5, 15	136.0	2.01	1.80	2.01	26	Deep slip through capping and waste materials
C-C	10, 9.5, 15	136.0	2.86	2.51	2.86	8	Shallow rotational slip in clay capping and waste
	10, 9.5, 15	136.0	2.83	2.57	2.83	30	Deep slip through capping and waste materials

Figure 3.1: Typical deep slope failure for Section A-A (NW) (Morgensten-Price method).



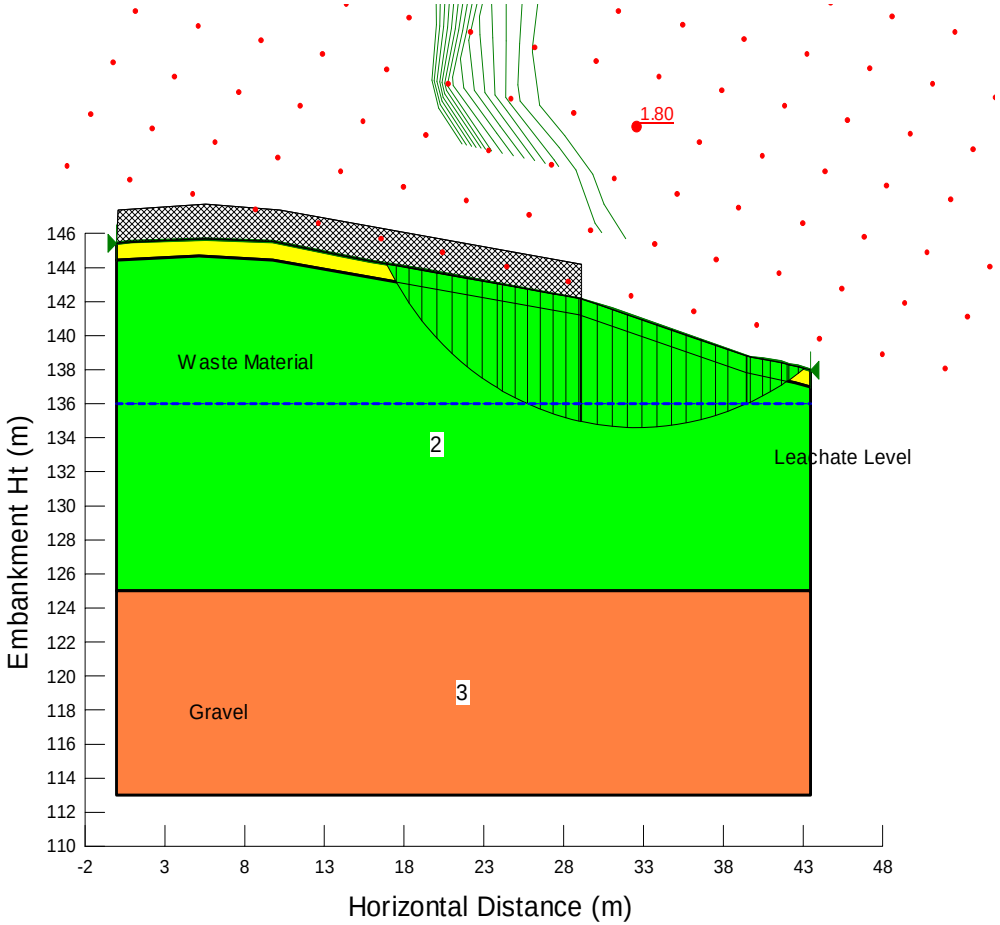
Material #: 1 Description: Clay Capping Wt: 18 Cohesion: 4 Phi: 29
Material #: 2 Description: Concrete
Material #: 3 Description: Waste Material Wt: 9.5 Cohesion: 10 Phi: 15
Material #: 4 Description: Gravel Wt: 21 Cohesion: 0 Phi: 35

Figure 3.2: Typical shallow slope failure for Section A-A (SE) (Bishop Method).



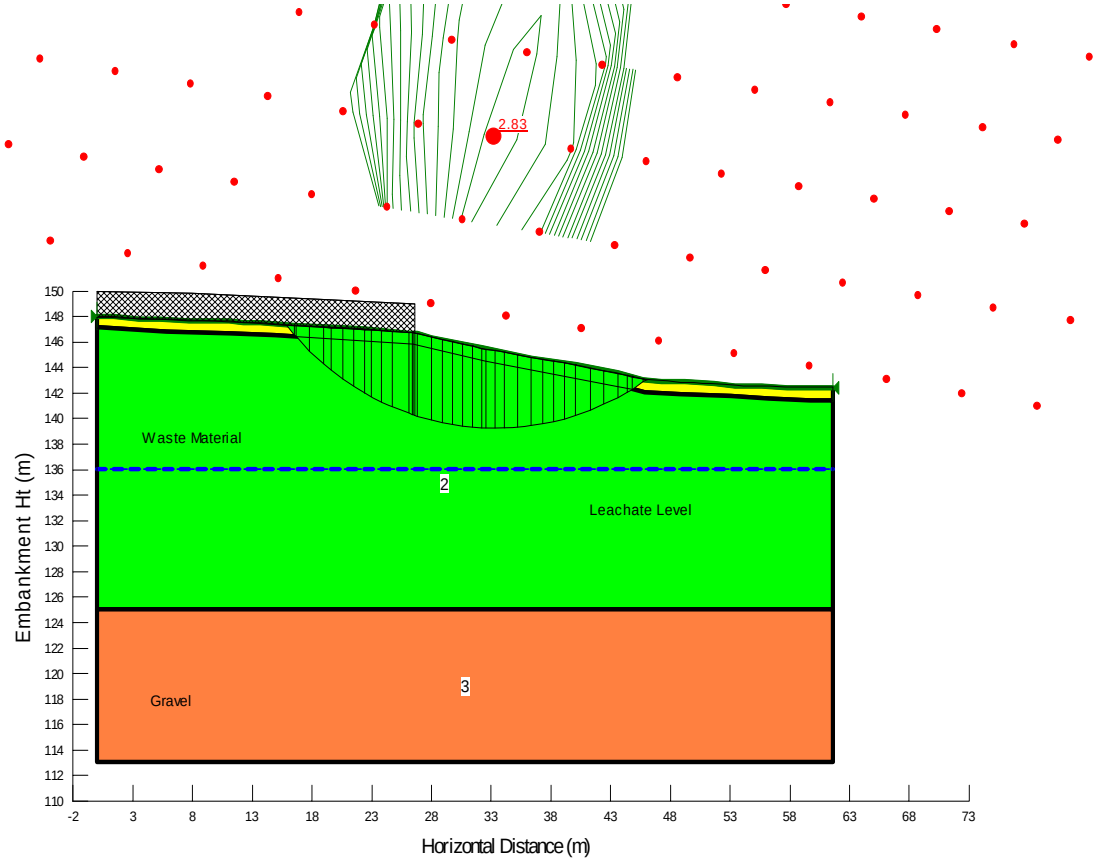
Material #: 1 Description: Clay Capping Wt: 18 Cohesion: 4 Phi: 29
Material #: 2 Description: Concrete
Material #: 3 Description: Waste Material Wt: 9.5 Cohesion: 10 Phi: 15
Material #: 4 Description: Gravel Wt: 21 Cohesion: 0 Phi: 35

Figure 3.3: Typical deep slope failure for Section B-B (Janbu method).



Material #: 1 Description: Clay Capping Wt: 18 Cohesion: 4 Phi: 29
Material #: 2 Description: Waste Material Wt: 9.5 Cohesion: 10 Phi: 15
Material #: 3 Description: Gravel Wt: 21 Cohesion: 0 Phi: 35

Figure 3.4: Typical deep slope failure for Section C-C (MP method).



Material #: 1 Description: Clay Capping Wt: 18 Cohesion: 4 Phi: 29
Material #: 2 Description: Waste Material Wt: 9.5 Cohesion: 10 Phi: 15
Material #: 3 Description: Gravel Wt: 21 Cohesion: 0 Phi: 35

4. DISCUSSIONS AND CONCLUSIONS

Factors of safety for potential slope failure ranged from 1.62 to 2.86. Out of the total eight case scenarios, all of the analyses have factors of safety of 1.5 or above.

Factors of safety values against deep-seated failure of the landfill embankment within the waste material ranged from 1.62 to 2.83. The lengths of the potential deep-seated failures are in the range of 15 to 34 m.

It is noted that the geotechnical parameters adopted are for fresh waste and are therefore considered conservative for this site. By adopting parameters for old waste, the minimum factor of safety for the slopes will increase further.

Based on the analyses presented the landfill side slopes are considered stable.

In order to maintain a factor of safety 1.5 or greater for final capped slopes, leachate and groundwater levels must be regularly monitored to prevent a build up of levels within the waste body and cause potential instability of the landfill slopes.

REFERENCES

1. Kolsch (1995) Material values for some mechanical properties of domestic waste, Proceedings 5th Sardinia International Landfill Symposium, Vol 2, pp 711-729.

2. E Kavazanjian, JR, N Matasovic & R C Bachus (1999), Large diameter static and cyclic laboratory testing of municipal solid waste, Vol 3, Sardinia Landfill Symposium pp 437-444.

3. S Thomas, A A Aboura, J P Gourc, P Gotteland, H Billard, T Delineau, T Gisbert, J F Ouvry and M Vuillemin, (1999), Vol 3, Sardinia Landfill Symposium, pp 445-452.

4. Slope Stability Report (FTC, 2008). Silliot Hill Integrated Waste Management Facility, Kilcullen, Co. Kildare.

5. Survey provided by Focus Surveys Ltd., Silliot Hill Landfill Site, dated July 2005, updated December 2007 (Focus drawing no. 02-081_1 Rev K)

Appendix 1

Existing Topographic Survey showing Section Lines
for Slope Stability Analysis

Drawing 2006-114-01-005 Rev A

NOTE
SURVEY BY FOCUS SURVEYS LTD.
05.12.2007
FOCUS DWG NO. 02-081_1 REV K

SLOPE STABILITY SECTIONS A — A

KEY PLAN

SITE PLAN
Scale 1:1000

Rev.	Drawn	Chkd	Appd	Date	Description
A	MJM	PC	PK	06.02.09	ISSUE FOR INFORMATION

Name of Client
KILDARE COUNTY COUNCIL

Name of Job
SILLIOT HILL INTERGRATED WASTE MANAGEMENT FACILITY

Title of Drawing
EXISTING TOPOGRAPHIC SURVEY SHOWING SECTION LINES FOR SLOPE STABILITY ANALYSES

Scales Used 1:1000 — This Drawing was printed to A3

Dwg. No. 2006-114-01-005 — **Rev.** A

O:\ACAD\2006\114\01\ACC\01_005

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