



## **Annual Environmental Report**

### **GLENALLA LANDFILL SITE (Waste Licence Ref. W0125-1)**

**By  
Donegal County Council  
For  
Environmental Protection Agency**

**Reporting Period: January to December 2008**

**March 2009**

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## 1. INTRODUCTION

- 1.1 This Annual Environmental Report (AER) has been prepared to meet the requirements of Schedule E and F of Waste Licence W0125-1 for Glenalla Landfill. This report provides an environmental review of the site from the 1<sup>st</sup> of January 2008 to the 31<sup>st</sup> of December 2008.
- 1.2 On the 4<sup>th</sup> of December 2001 the Environmental Protection Agency granted the Council a Waste Licence (registration number W0125-1) for the orderly closure, capping and restoration of the landfill facility, in accordance with the Third Schedule of the Waste Management Act, 1996. Donegal County Council ceased operational activity at Glenalla Landfill Site after the Christmas period in December 2001. Subsequently, Donegal County Council was only permitted to accept inert waste for disposal for the purposes of restoration and aftercare of the site. The quantity of inert waste to be accepted is limited to 46,000 tonnes. The Council has managed the facility to ensure that activities have not caused environmental pollution and carries out regular environmental monitoring. All monitoring data is submitted to the EPA. The site was formally restored in 2005/6.
- 1.3 Glenalla Landfill is an unlined facility, historically operated on the dilute and disperse principle, whereby leachate generated by rainfall infiltration and the decomposition of the landfilled waste is allowed to disperse into the surrounding environment. The landfill site is situated in a low-lying hollow that has been infilled by peat deposits constituting an area of blanket bog. These deposits can represent an effective hydraulic barrier to the downward percolation of leachate. The disposal of waste was undertaken by the landraise method, whereby tipping took place directly onto the stripped ground surface raising its level to form an elevated landform flanked by low graded banks. As mentioned above the site was formally restored in 2005/6.
- 1.4 The landfill is situated in a fully rural setting, some 4km east of Milford in an area of moderate relief that forms part of the upper catchment of the Glenalla River. This watercourse dissects the southwest boundary of the landfill site. The ground surface of the closed hollow in which the landfill is based generally falls in a south to south westerly direction under a shallow gradient towards the Glenalla River. The downstream extent of the landfill is therefore represented by a small area situated on the southern site boundary. The area to the north and northeast of the site represents the principal upstream area.

## 2. WASTE ACTIVITIES CARRIED OUT AT THE FACILITY

### 2.1 Type of Waste

The licensed disposal activities, in accordance with the Third Schedule of the Waste Management Act, 1996 are restricted to those listed as follows

- **Class 1 Deposit on, in or under land (including landfill):** This activity is limited to the deposition of inert waste.
- **Class 4 Surface impoundment, including placement of liquid or sludge discards into pits, ponds or lagoons:** This activity is limited too leachate collection and treatment
- **Class 13 Storage prior to submission to any activity referred to in a preceding paragraph of this Schedule, other than temporary storage, pending collection, on the premises where the waste concerned is produced:** This activity is limited to leachate collection and storage prior to treatment.

## 3. QUANTITIES AND COMPOSITION OF WASTE

### 3.1 Quantities of Waste for Restoration

In accordance with Condition 1 of the waste licence only inert waste may be deposited at the facility. A maximum of 46,000 tonnes shall be accepted for the purposes of restoration and aftercare. The quantity of waste received during the reporting period and each previous year at the facility are presented in Table 3.1.

3.2 Glenalla landfill site was closed in 2001 and no material was been imported or exported until restoration works commenced during 2005. The material imported during 2005 was inert and specifically for the purpose of restoring the site.

**Table 3.1 Waste quantities accepted (tonnes)**

Waste types	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Total	550	1,565	5,722	10,093	0	0	0	34,474	0	0	0

#### **4. SUMMARY REPORT OF EMISSIONS**

##### **4.1 Groundwater**

###### **4.1.1 Introduction**

Groundwater is monitored at the locations shown on drg. no. 5234.30/04. GW1 is located upstream of the landfill and GW3 and GW2 are downstream. GW2 was redrilled during 2006. Parameters to be monitored and frequencies as required by the Waste Licence are listed in Appendix A. All results in tabular and graphical format are contained in Appendix B. Results are compared against EC (Quality of Water Intended for Human Consumption ) Regulations 1988; EC (Drinking Water) Regulations 2000 and EPA Interim Guideline Values.

###### **4.1.2 Summary of Results**

The site was developed on the dilute and disperse principal, however the groundwater receives some protection against contamination from the peat underlying the landfill and the landfill is now fully restored. Results again indicate a slight impact on downstream groundwater from the landfill.

##### **4.2 Surface Water**

###### **4.2.1 Introduction**

Surface water monitoring is carried out at SW1, SW2, and SW3 as shown on Drawing No. 5234.30/102. SW1 is reflective of the quality of the surface water upstream of the landfill site. The parameters and frequencies of monitoring required by the Waste Licence are listed in Appendix A. The results of monitoring in tabular and graphical format are presented in Appendix B. Results are compared against EC (Quality of Surface Water Intended for the Abstraction of Drinking Water) Regulations 1989.

During the reporting period it was agreed with the EPA to locate a new surface water monitoring point further downstream of the landfill as both SW2 and SW3 are very close to the waste body. A location for SW4 was established in November 2008.

###### **4.2.2 Summary of Results**

On the basis of the hydrogeology of the site, surface water represents the principal receptor of leachate emissions from the site. Surface water results previously did indeed indicate that leachate was being released from the facility into the surrounding environment. Following restoration levels of emissions to surface water had been reducing. There was a slight rise in levels again at the start of this period, and two spikes in ammonia levels during the year. An investigation is underway into these levels.

#### **4.3 Leachate Composition**

- 4.3.1 Leachate is monitored at one location at the facility, L1, as shown on Drawing No. 5234.30/04. The results are contained in Appendix B and have been compared with typical leachate quality as reported in EPA Landfill Manual – Landfill Operational Practices (see Section 5.3). All parameters are consistent with typical leachate composition and comparable with levels recorded during the last reporting period.

#### **4.4 Landfill gas**

- 4.4.1 Landfill gas is monitored at three locations at the facility as shown on Drawing No. 5234.30/04. LG1, LG2, and LG3 are all located in waste. Both LG1 and LG3 were replaced during restoration works. Gas levels appear to be similar to those measured at the end of the last reporting period.

#### **4.5 Dust Monitoring**

- 4.5.1 Dust monitoring was not undertaken in this reporting period.

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**5. RESULTS & INTERPRETATIONS OF MONITORING INCLUDING PLANS & UPDATES OF MONITORING LOCATIONS.****5.1 Groundwater**

5.1.1 Locations, parameters and monitoring frequencies, as required by the Waste Licence are listed in Appendix A. Locations are shown in Drg no. 5234.30/04. Results of the monitoring programme are listed in Appendix B. These results have been compared to EC Quality of Water Intended for Human Consumption Regulations, 1988, the European communities (Drinking Water) Regulations, 2000 and the EPA Interim Report, Towards Setting Guidelines Values (IGV) for the Protection of Groundwater in Ireland. The majority of the parameters are below the recommended limits.

5.1.2 Upstream groundwater shows levels in excess of the MAC's for SS, Chloride, Boron & Phenols.

5.1.3 Downstream, levels of Ammonia, SS, Chloride, Iron and Manganese, Boron, Phenols and Phosphate levels are slightly elevated.

**5.2 Surface Water**

5.2.1 Locations, parameters and monitoring frequencies, as required by the Waste Licence are listed in Appendix A. Locations are shown in Drg no. 5234.30/04. The results are presented graphically and in tabular format in Appendix B. These results have been compared to EC Quality of Surface Water (Intended for the Abstraction of Drinking Water) Regulations, 1989.

5.2.2 Upstream of the site, results showed elevated levels of Chloride and Zinc.

5.2.3 Downstream, levels of Ammonia, Conductivity, COD Chloride and Phosphate are elevated.

**5.3 Leachate**

5.3.1 Leachate quality can vary during the lifetime of landfill site depending on the phase of decomposition of the waste. Leachate results for the reporting period are presented in Appendix B and some of the characteristic parameters of the leachate are listed in Table 5.1 below.

PARAMETER	Glenalla Landfill Site		From 30 samples from UK/Irish landfills accepting domestic waste Results in mg/l		
	Min.Conc	Max.Conc	Min.Conc	Max.Conc	Mean
Ammonia (mg/N)	73	149	<0.2	1700	491
BOD	1.4	61	4.5	>4800	>834
COD	69	1402	<10	33,700	3078
Chloride (mg/l)	96.98	354.96	27	3410	1256
Iron (mg/l)	-	196	0.4	664	54.4
Potassium (mg/l)	-	89.4	2.7	1480	491
TON (mg/l N)	0	0.79	/	/	/
Conductivity (mS/cm)	1874	2109	503	19,200	7789
pH	7.16	7.56	6.4	8	7.2

5.3.2 Leachate results have been compared to "Typical Leachate Composition of 30 Samples from UK/Irish Landfills accepting mainly Domestic Waste" (Landfill Operational Practices). All parameters are consistent with typical leachate composition.

#### 5.4 Landfill Gas

Levels this period are consistent with those recorded post restoration. Maximum and minimum levels are shown in Table 5.2 below and full results and graphs are contained in Appendix B. These wells are all located within waste.

**Table 5.2 Methane and Carbon Dioxide Max & Min for Gas Wells in Waste**

Parameter	2006		2007		2008	
	Max	Min	Max	Min	Max	Min
Methane	68.4%	2.9%	65.0%	0.0%	63.2%	12.7%
Carbon Dioxide	39.4%	0%	34.7%	0.0%	31.4%	1.4%

#### 5.5 Dust

Dust monitoring was not undertaken during this period.



## **6. VOLUME OF LEACHATE PRODUCED AND VOLUME OF LEACHATE DISCHARGED**

- 6.1 A water balance calculation has been undertaken and is contained in Appendix C. This indicates that the estimated volume of leachate produced at the site for 2008 was approximately 2547m<sup>3</sup>.
- 6.2 Leachate is typically tankered from the collection lagoon on the site one day per week, although frequency was varied during this period. The total volume of leachate tankered during the last reporting period was 1924m<sup>3</sup>.

## **7. TOPOGRAPHICAL SITE SURVEY**

- 7.1 A topographical survey of the site was carried out in May 2006 post restoration. Copies of the survey were forwarded to the Agency in March 2007.

## **8. REPORTED INCIDENTS AND COMPLAINTS SUMMARIES**

- 8.1 Donegal County Council reports on an on-going basis all occasions where either surface waters or groundwaters are found to contain in excess of 0.2mg/l ammonia, or where perimeter gas wells are found to contain greater than either 1% methane or 1.5% carbon dioxide. These are reported as incidents each six-monthly reporting period or when the results become available.
- 8.2 Apart from the on-going emissions exceedance reporting referred to above, no incidents have been reported to the Environmental Protection Agency during this reporting period.
- 8.3 No complaints were received during this reporting period.

## 9. REVIEW OF NUISANCE CONTROLS

### 9.1 General

As the facility is not operational, and all areas formerly used for placement of municipal waste have been fully restored, the following list of nuisances are no longer deemed likely to cause problems. Regular site inspections carried out by environmental scientists check for evidence of any of the following. Where any sign of these is detected appropriate control measures would be introduced.

- Flies and vermin;
- Dust;
- Litter;
- Birds;
- Noise;
- Odours.

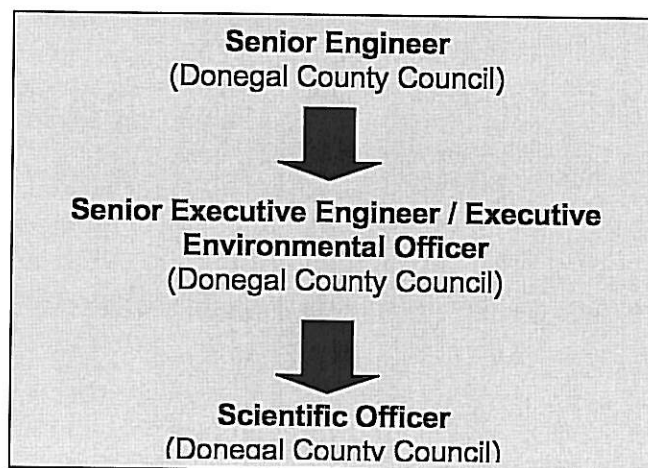
### 9.2.1 EMS

As part of the Environmental Management System a procedure has been developed to ensure that the site is inspected for each of the above-mentioned nuisances on a quarterly basis. This will ensure that should any nuisance arise, the situation is identified and dealt with appropriately.

## 10. MANAGEMENT STRUCTURE OF SITE

### 10.1 Organisation

The management of the landfill site is illustrated in the diagram that follows.



### 10.2 Management Responsibility

Senior Engineer: Overall responsibility for the management of the site and ensuring compliance with the Waste Licence. Delegation of authority and responsibility to ensure the effective management of the facility and licence compliance.

Senior Executive Engineer: Responsible for the day-to-day management of the facility as directed by the Senior Engineer.

Executive Environmental Officer: Responsible for compliance with EPA Licence.

Scientific Officer: Carry out environmental monitoring of emissions and reporting in accordance with licence requirements.

## **11. PROGRAMME FOR PUBLIC INFORMATION**

- 11.1 A public communication programme has been initiated in accordance with Condition 2 of the Waste Licence to ensure that information concerning the environmental performance is available at reasonable times. The public may view environmental records at the Donegal County Council Environmental Headquarters at Three Rivers Centre in Lifford. Details regarding this programme are contained in Section 2 of the Environmental Management System Manual.

## **12. CAPPING AND RESTORATION OF THE SITE.**

- 12.1 The site was fully restored in 2005/6 in accordance with the approved Restoration and Aftercare Plan dated May 2004.
- 12.2 It was agreed with the Agency in July 2006 that monitoring and reporting frequency would be reduced to bi-annually. It is hoped that when the benefits of restoration have been fully demonstrated that the Council can surrender the licence for this facility.

## **13. REPORT ON STAFF TRAINING**

- 13.1 As the site is no longer operational, management is as per Section 10. The Scientific Officers are scheduled for the following types of training courses:
- FAS Waste Management Training Programme;
  - FAS Waste Operatives Training;
  - Manual Handling.

**14. REPORT ON DEVELOPMENT WORK UNDERTAKEN DURING THE REPORTING PERIOD, AND A TIME SCALE FOR THOSE PROPOSED DURING THE COMING YEAR.**

14.1 No development work currently planned.

## **APPENDIX A**

### **MONITORING LOCATIONS, FREQUENCIES AND PARAMETERS**

**Table A1: Monitoring Locations**

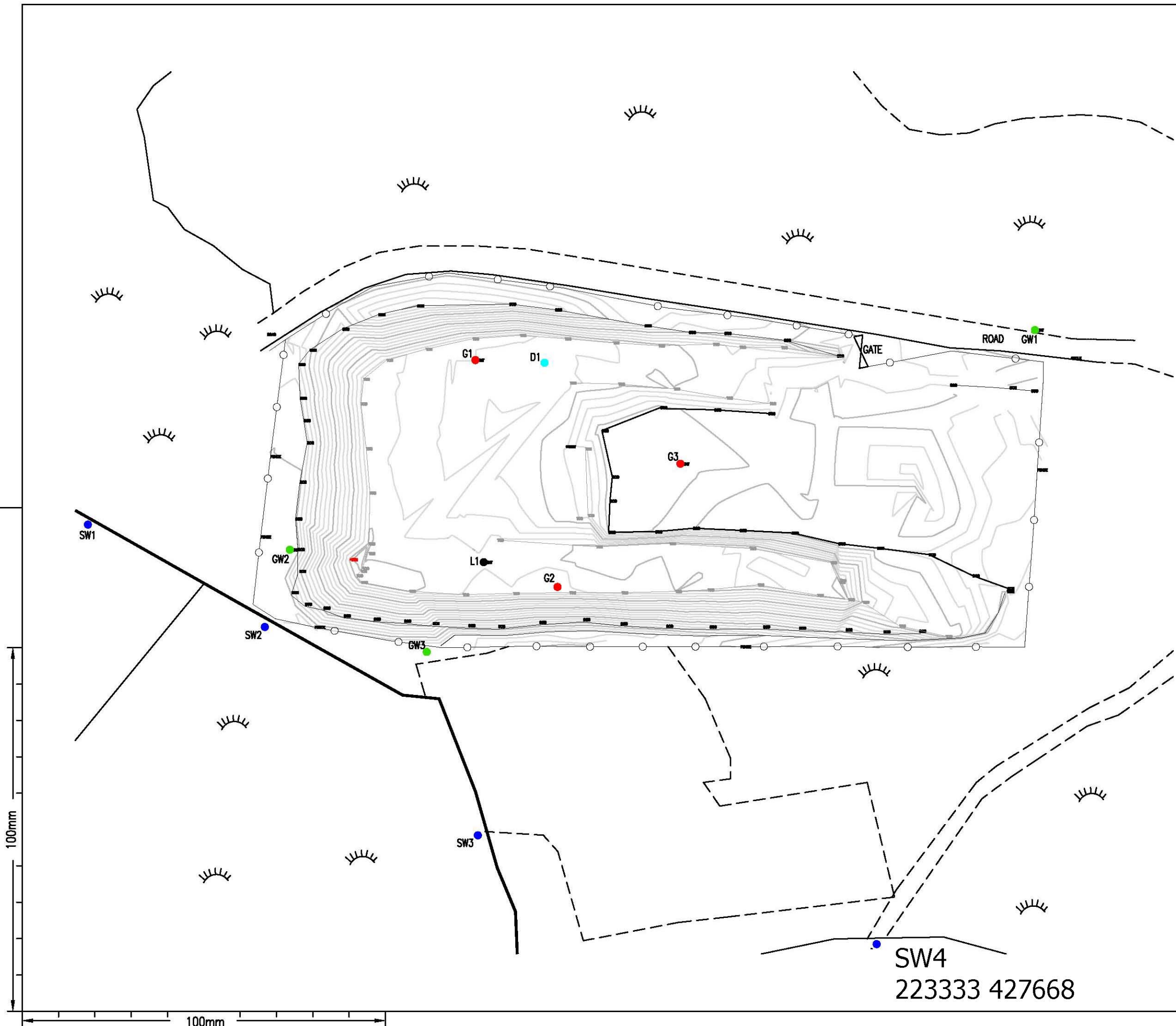
Type	Label	Location (Grid Ref.)
Landfill Gas	G1	223167 427958
	G2	223190 427895
	G3	223224 427989
Dust	D1	TBC
Groundwater	GW1	223391 427948
	GW2	223154 427882
	GW3	223116 427905
Leachate	L1	223169 427902
Surface Water	SW1	223060 427912
	SW2	223109 427884
	SW3	223168 427827
	SW4	223333 427668

**Table A2: Groundwater Parameters & Monitoring Frequencies**

Bi-annually	Annually	
Chloride	Boron	Magnesium
Dissolved Oxygen	Cadmium	Manganese
Sodium	Calcium	Mercury
TON	Chromium	Orthophosphate
TOC	Copper	Zinc
Phenols	Cyanide	Residual on evaporation
Ammoniacal Nitrogen	Fluoride	
Electrical Conductivity	Lead	
pH	List I/II substances	
Iron	Sulphate	
Potassium		
Temperature		
Groundwater Level		

**Table A3**                      **Surface Water Parameters & Monitoring Frequencies**

<b>Bi-Annually</b>	<b>Annually</b>	
Chloride	Iron	Magnesium
Dissolved Oxygen	Cadmium	Manganese
COD	Calcium	Mercury
Visual Inspection /Odour	Chromium	Orthophosphate
Ammoniacal Nitrogen	Copper	Zinc
BOD	Sodium	Potassium
Electrical Conductivity	Lead	TON
pH	List I/II substances	Sulphate
Suspended Solids		
Temperature		



**NOTES**

- KEY**
- L1 ● LEACHATE MONITORING POINT
  - G1 ● GAS MONITORING POINT
  - SW1 ● SURFACE WATER MONITORING POINT
  - GW1 ● GROUNDWATER MONITORING POINT
  - D1 ● DUST MONITORING POINT

MONITORING TYPE	REF NO	GRID REFERENCE
GROUNDWATER	GW1	223321 427966
	GW2	223116 427905
	GW3	223153 427877
LEACHATE	L1	223169 427902
GAS	G1	223167 427958
	G2	223190 427895
	G3	223224 427929
SURFACE WATER	SW1	223060 427912
	SW2	223109 427884
	SW3	223168 427827
DUST	D1	223186 427957

GRID COORDINATES DETERMINED FROM SITE SURVEY

B	UPDATED GRID COORDINATES	JD AUG 05	AMcG AUG 05
A	UPDATED GRID COORDINATES	JD JULY 05	AMcG JULY 05

REV	DESCRIPTION	BY DATE	CHECK DATE

DRAWN BY RS DATE JULY 03	CHECK BY KAD DATE JULY 03	APPROVED AB DATE JULY 03
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PLOT SCALE 1:1000	SCHEDULES	SHEET SIZE A3
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CLIENT  
DONEGAL COUNTY COUNCIL

PROJECT  
GLENALLA LANDFILL SITE

TITLE  
MONITORING LOCATIONS

**RPS Kirk McClure Morton**  
CONSULTING ENGINEERS

TEL: 074 916 1827 Email: info@kmm.eu.com FAX: 074 916 1828  
THE ENTERPRISE FUND BUSINESS CENTRE BALLYRAINE LETTERKENNY CO DONEGAL

ARCHITECT	DWG. STATUS
DRAWING No. 5234.30/04	PRELIM. <input type="checkbox"/>
REVISION A B	TENDER <input type="checkbox"/>
	CONST. <input checked="" type="checkbox"/>
	RECORD <input type="checkbox"/>

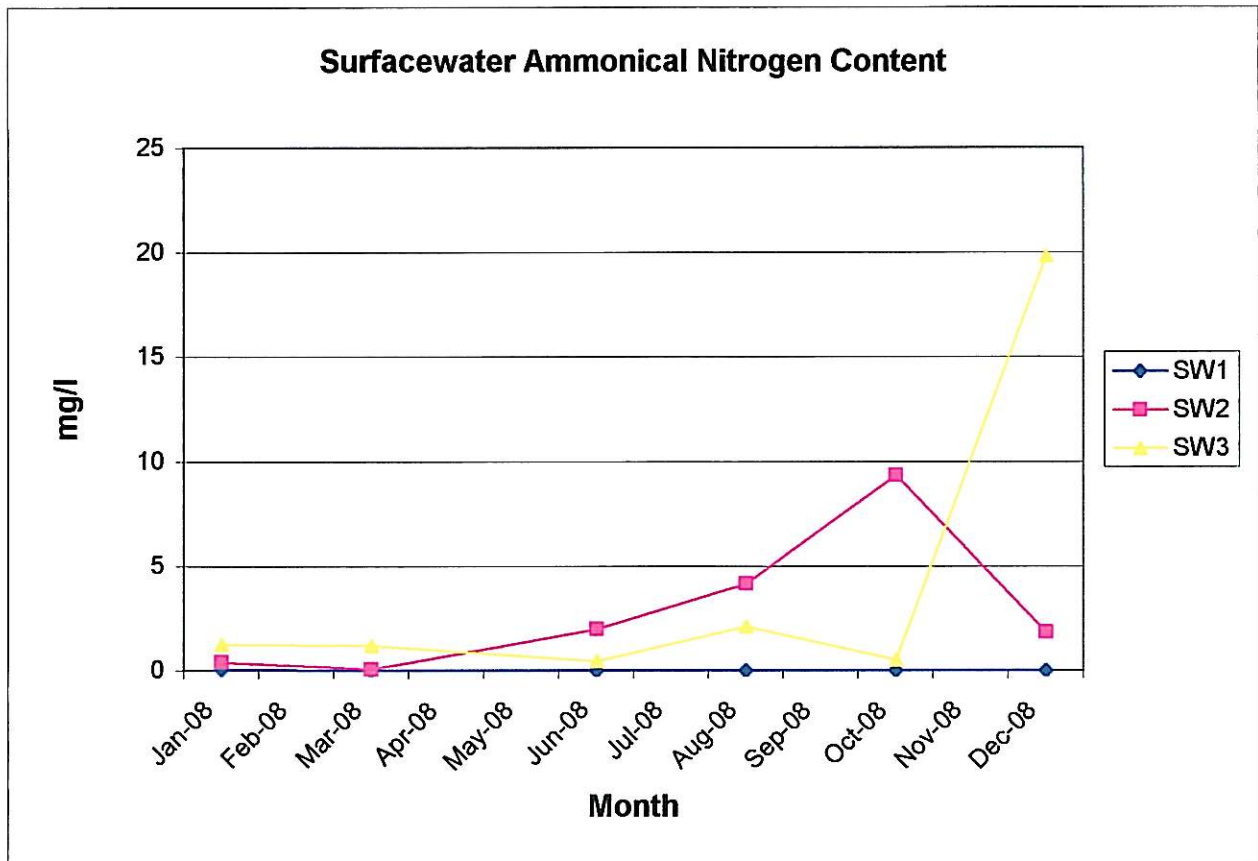
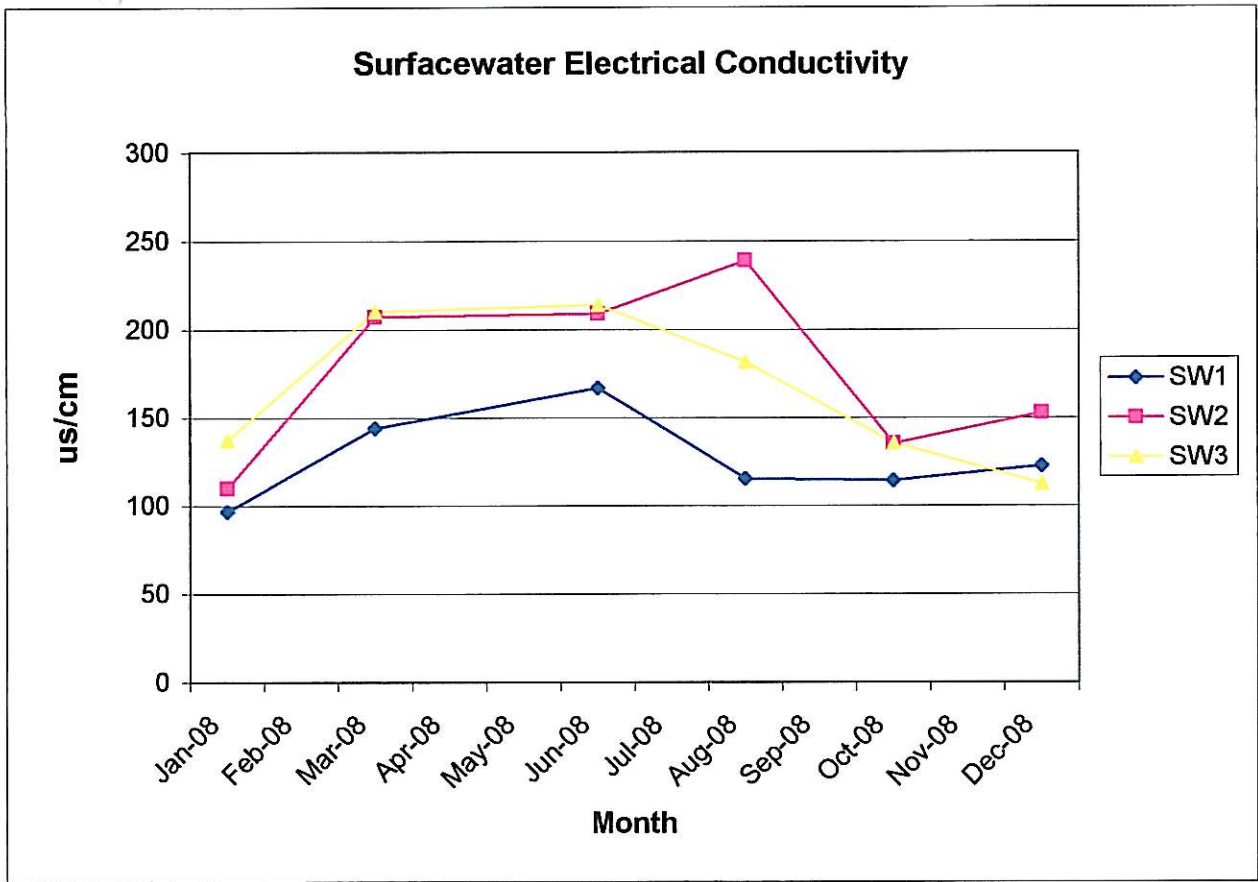


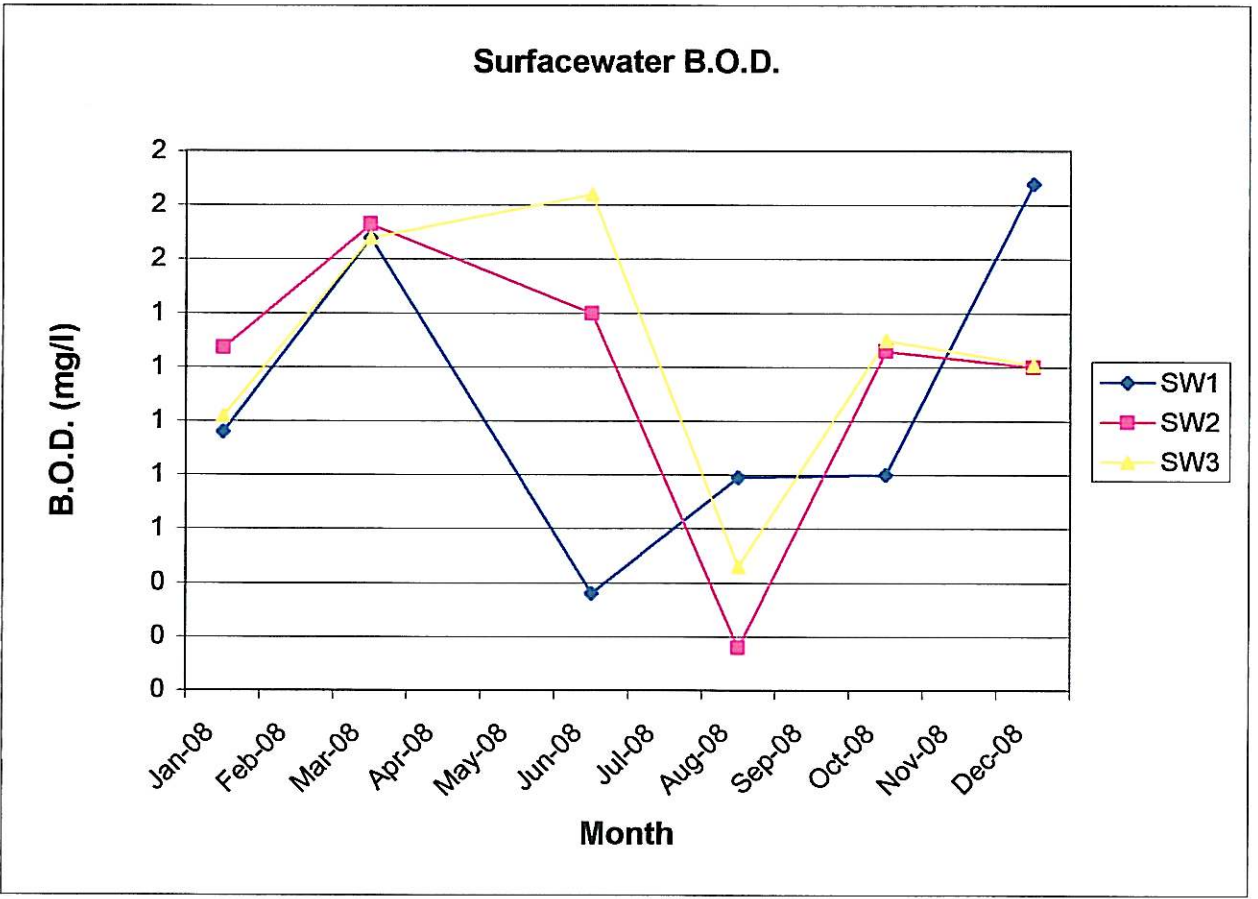
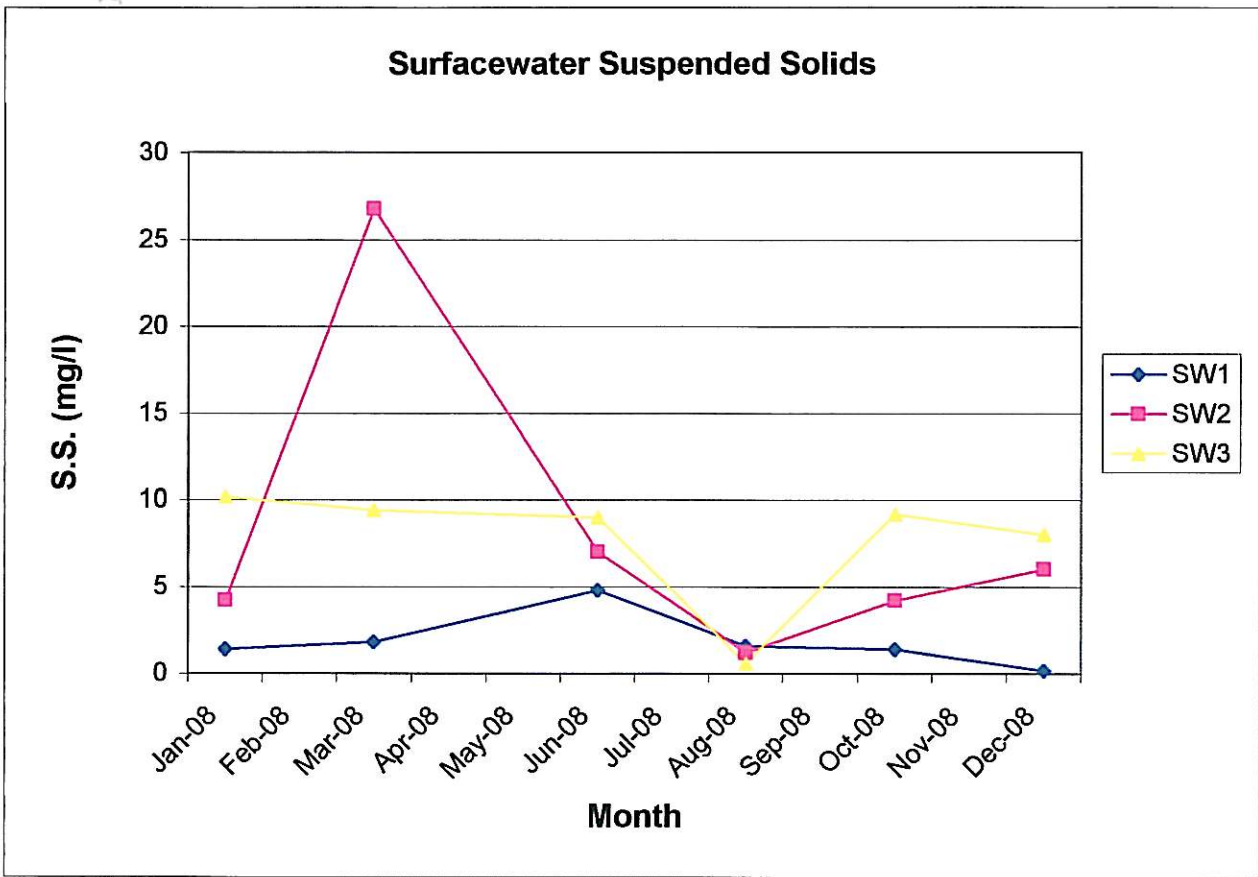
**APPENDIX B**  
**MONITORING RESULTS**

Location		Glenalla, Milford Co Donegal surface water											
Sample Type		SW1											
Site No		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Date of Sample		1312	---	2236	---	---	3830	---	5440	---	6707	---	7652
Lab No	---	7.47	---	7.20	---	---	6.74	---	6.73	---	6.97	---	7.15
pH	C	7.83	---	10.27	---	---	14.53	---	17.0	---	9.51	---	6.40
Electrical Conductivity uS/cm	mg/l	97	---	144	---	---	167.0	---	115.4	---	114.3	---	122.7
Ammonical Nitrogen	mg/l	0.06	---	0.00	---	---	0.00	---	0	---	0.069	---	0.015
COD	mg/l	12	---	17	---	---	19	---	15	---	5	---	10
BOD	mg/l	0.96	---	1.68	---	---	0.36	---	0.79	---	0.8	---	1.88
Disolved Oxygen	mg/l	12.11	---	11.51	---	---	9.74	---	8.64	---	12.54	---	11.28
SS	mg/l	1.4	---	1.8	---	---	4.8	---	1.6	---	1.4	---	0.2
Residue on Evaporator	ug/l	---	---	---	---	---	11820	---	---	---	---	---	---
Calcium	ug/l	---	---	---	---	---	<0.4	---	---	---	---	---	---
Cadmium	ug/l	---	---	---	---	---	<0.05	---	---	---	---	---	---
Chromium	ug/l	---	---	---	---	---	37.99	---	21.99	---	15.99	---	---
Chloride	mg/l	---	---	14.99	---	---	---	---	---	---	---	---	---
Chlorine	mg/l	---	---	---	---	---	5	---	---	---	---	---	---
Copper	ug/l	---	---	---	---	---	---	---	---	---	---	---	---
Cyanide	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
Dissolved Iron	ug/l	---	---	---	---	---	132	---	---	---	---	---	---
Lead	ug/l	---	---	---	---	---	1	---	---	---	---	---	---
Magnesium	ug/l	---	---	---	---	---	3517	---	---	---	---	---	---
Manganese	ug/l	---	---	---	---	---	8	---	---	---	---	---	---
Mercury	ug/l	---	---	---	---	---	<0.05	---	---	---	---	---	---
Nickel	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
Potassium	mg/l	---	---	---	---	---	0.8	---	---	---	---	---	---
Sodium	mg/l	---	---	---	---	---	21.0	---	---	---	---	---	---
Sulphate	mg/l	---	---	---	---	---	21	---	---	---	---	---	---
Zinc	ug/l	---	---	---	---	---	148	---	---	---	---	---	---
Total Alkalinity as CaCO3	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
Total Organic Carbon	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
Total Oxidised Nitrogen	mg/l	0.18	---	0.07	---	---	0.02	---	0.00	---	0.036	---	0.00
Arsenic	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
Barium	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
Boron	ug/l	---	---	---	---	---	---	---	---	---	---	---	---
Flouride	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
Total Phenols	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
Phosphorous	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
Selenium	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
Silver	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
Microtox	Toxic Units	---	---	---	---	---	---	---	---	---	---	---	---
Microtox	Toxic Units	---	---	---	---	---	---	---	---	---	---	---	---
Nitrite	mg/l	0.004	---	0.014	---	---	0.009	---	0.0	---	0.004	---	0.000
Nitrate	mg/l	0.1763	---	0.0537	---	---	0.0094	---	0.00	---	0.030	---	0.00
Phosphate - ORTHO	mg/l	0.000	---	0.000	---	---	0.000	---	0.000	---	0.000	---	0.00
Phosphate - TOTAL	mg/l	---	---	---	---	---	0.018	---	---	---	---	---	0.00
Total Coliforms	---	---	---	---	---	---	---	---	---	---	---	---	---
Facel Coliforms	---	---	---	---	---	---	---	---	---	---	---	---	---
Depth	m	---	---	---	---	---	---	---	---	---	---	---	---

Location		Glenalla, Milford Co Donegal											
Sample Type		surface water											
Site No		SW2											
Date of Sample		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Lab No		1313		2237			3831		5441		6708		7653
pH		7.33		7.16			7.05		7.01		696		7.00
Temp	C	7.56		10.01			14.26		16.6		8.98		5.48
Electrical Conductivity	uS/cm	110		207			209		239		135.3		152.6
Ammonical Nitrogen	mg/l	0.40		0.07			1.98		4.16		9.33		1.83
COD	mg/l	14		22			20		27		19		26
BOD	mg/l	1.27		1.73			1.4		0.16		1.26		1.2
Dissolved Oxygen	mg/l	12.02		11.25			9.91		7.6		12.13		11.25
SS	mg/l	4.20		26.80			7.0		1.2		4.2		6.0
Residue on Evaporator	mg/l												
Calcium	ug/l						15880						
Cadmium	ug/l						<0.4						
Chromium	ug/l						<0.05						
Chloride	mg/l			29.99			35.99		26.99		17.99		
Chlorine	mg/l												
Copper	ug/l						<1						
Cyanide	mg/l												
Dissolved Iron	ug/l						156						
Lead	ug/l						<1						
Magnesium	ug/l						4341						
Manganese	ug/l						12						
Mercury	ug/l						<0.05						
Nickel	mg/l												
Potassium	mg/l						2.9						
Sodium	mg/l						23.7						
Sulphate	mg/l						20						
Zinc	ug/l						21						
Total Alkalinity as CaCO3	mg/l												
Total Organic Carbon	mg/l												
Total Oxidised Nitrogen	mg/l	0.08		0.10			0.28		0.00		0.090		0.10
Arsenic	mg/l												
Barium	mg/l												
Boron	ug/l												
Flouride	mg/l												
Total Phenols	mg/l												
Phosphorous	mg/l												
Selenium	mg/l												
Silver	mg/l												
Microtox	Toxic Units												
Microtox	Toxic Units												
Nitrite	mg/l	0.005		0.006			0.000		0.000		0.000		0.0
Nitrate	mg/l	0.0748		0.0915			0.2809		0.0000		0.090		0.10
Phosphate - ORTHO	mg/l	0.000		0.006			0.036		0.000		0.040		0.07
Phosphate - TOTAL	mg/l						0.026						
Total Coliforms													
Facel Coliforms													
Depth	m												

Location		Glenalla, Milford Co Donegal											
Sample Type		surface water											
Site No		SW3											
Date of Sample		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Lab No		1314		2238			3832		5442		6709		7654
pH		7.22		7.17			7.6		7.02		6.93		7.04
Temp	C	7.43		9.91			14.23		16.7		9.85		6.74
Electrical Conductivity	uS/cm	137		210			214		181.8		135.6		112.6
Ammonical Nitrogen	mg/l	1.25		1.20			0.460		2.12		0.52		19.84
COD	mg/l	19		12			15		36		36		22
BOD	mg/l	1.0		1.7			1.84		0.46		1.3		1.21
Dissolved Oxygen	mg/l	11.9		11.3			10.13		8.43		12.17		11.26
SS	mg/l	10.2		9.4			9.0		0.6		9.2		8.0
Residue on Evaporator	mg/l												
Calcium	ug/l						15300						
Cadmium	ug/l						<0.4						
Chromium	ug/l						<0.05						
Chloride	mg/l			24.99			35.99		35.99		21.99		
Chlorine	mg/l												
Copper	ug/l						<1						
Cyanide	mg/l												
Dissolved Iron	ug/l						170						
Lead	ug/l						<1						
Magnesium	ug/l						4414						
Manganese	ug/l						8						
Mercury	ug/l						<0.05						
Nickel	mg/l												
Potassium	mg/l						2.8						
Sodium	mg/l						22.6						
Sulphate	mg/l						22						
Zinc	ug/l						18						
Total Alkalinity as CaCO3	mg/l												
Total Organic Carbon	mg/l												
Total Oxidised Nitrogen	mg/l	0.89		0.10			0.450		0.00		0.000		0.06
Arsenic	mg/l												
Barium	mg/l												
Boron	ug/l												
Flouride	mg/l												
Total Phenols	mg/l												
Phosphorous	mg/l												
Selenium	mg/l												
Silver	mg/l												
Microtox	Toxic Units												
Microtox	Toxic Units												
Nitrite	mg/l	0.005		0.008			0.000		0.000		0.000		0.0
Nitrate	mg/l	0.8861		0.0938			0.450		0.0000		0.000		0.06
Phosphate - ORTHO	mg/l	0.001		0.004			0.015		0.000		0.040		0.06
Phosphate - TOTAL	mg/l						0.037						
Total Coliforms													
Facal Coliforms													
Depth	m												





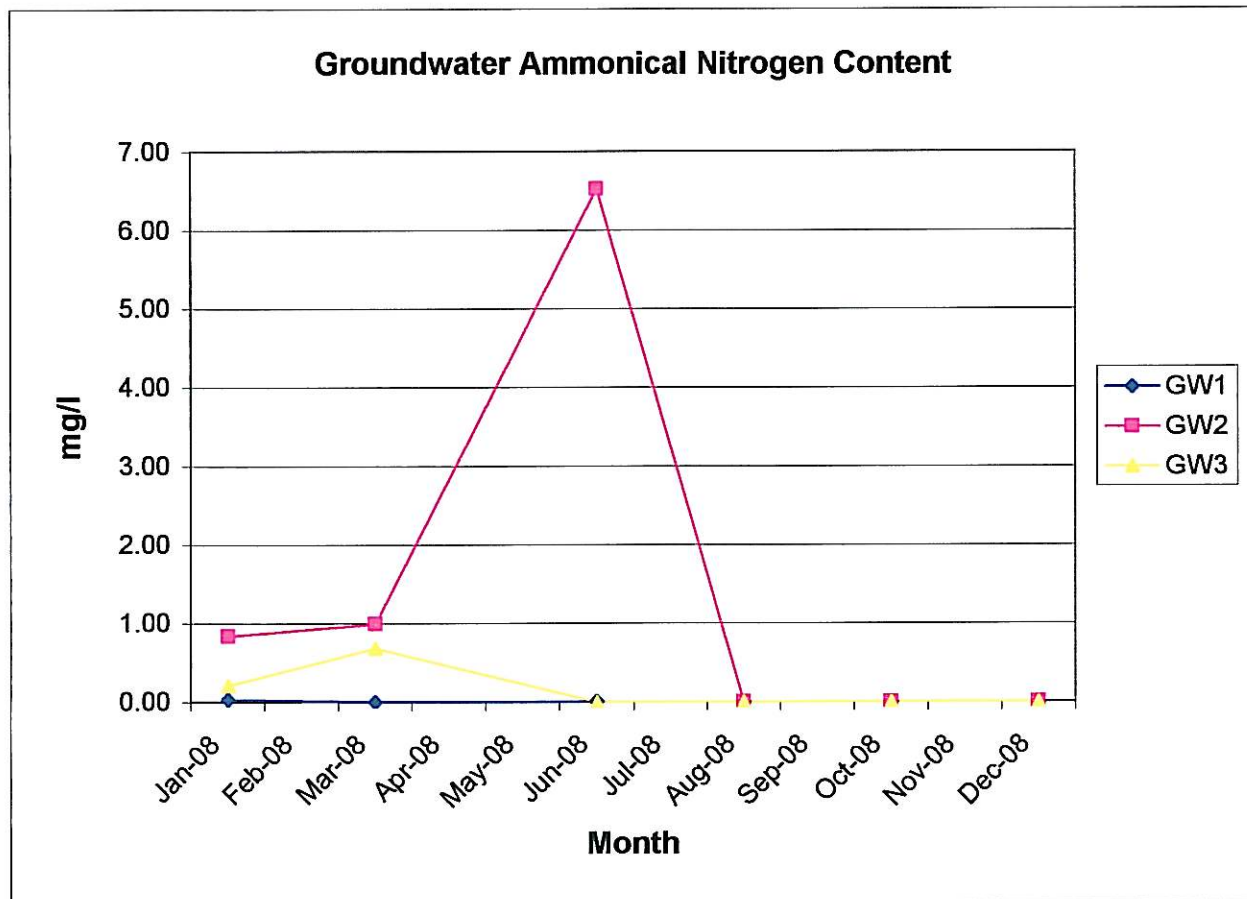
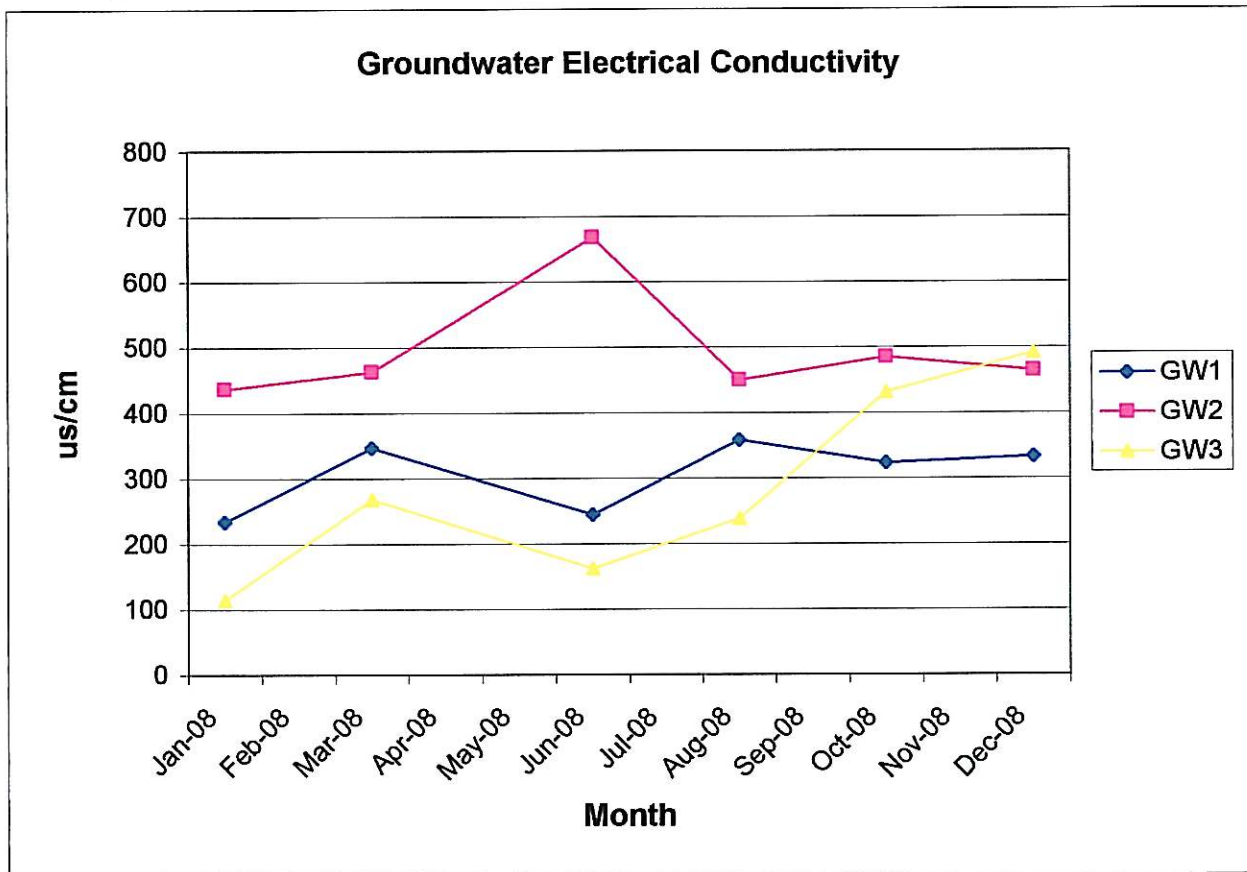
Location		Glenalla, Milford Co Donegal											
Sample Type		groundwater											
Site No		GW1											
Date of Sample		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Lab No		1315		2239			3833		5443		6710		7655
pH		6.96		6.86			6.80		6.99		6.75		6.73
Temp	C	9.69		10.18			14.95		16.4		10.08		8.00
Electrical Conductivity	uS/cm	234		347			245		358		323.3		333
Ammonical Nitrogen	mg/l	0.04		0.00			0.00		0.020		0.037		0.005
COD	mg/l			13			17						
BOD	mg/l												
Dissolved Oxygen	mg/l	5.31		4.95			3.26		4.57		4.66		4.44
SS	mg/l	347		412			649.2		669.4		229.5		516
Residue on Evaporator	mg/l						212						
Calcium	ug/l						57190						
Cadmium	ug/l						<0.4						
Chromium	ug/l						<0.05						
Chloride	mg/l			15.99			37.99		22.99		16.99		
Chlorine	mg/l												
Copper	ug/l						<1						
Cyanide	mg/l						<0.05						
Dissolved Iron	ug/l						71				<2		
Lead	ug/l						<1						
Magnesium	ug/l						7017						
Manganese	ug/l						22						
Mercury	ug/l						<0.05						
Nickel	mg/l												
Potassium	mg/l						3.5				3.5		
Sodium	mg/l						21.9				21.2		
Sulphate	mg/l						22						
Zinc	ug/l						18						
Total Alkalinity as CaCO3	mg/l												
Total Organic Carbon	mg/l						***				2		
Total Oxidised Nitrogen	mg/l	1.12		0.23			0.00		0.06		0.093		0.148
Arsenic	mg/l												
Barium	mg/l												
Boron	ug/l						15						
Flouride	ug/l						<0.1						
Total Phenols	mg/l						0.02				<0.01		
Phosphorous	mg/l												
Selenium	mg/l												
Silver	mg/l												
Microtox	Microtox												
Toxic Units	Toxic Units												
Nitrite	mg/l	0.007					0.004		0.035		0.007		0.024
Nitrate	mg/l	1.1086		0.2340			0.0000		0.0300		0.090		0.12
Phosphate - ORTHO	mg/l	0.000		0.159			0.000		0.004		0.000		0.0
Phosphate - TOTAL	mg/l												
Total Coliforms							0.487						
Face Coliforms													
Depth	m	0.50		0.70			0.8		0.85		0.5		0.3

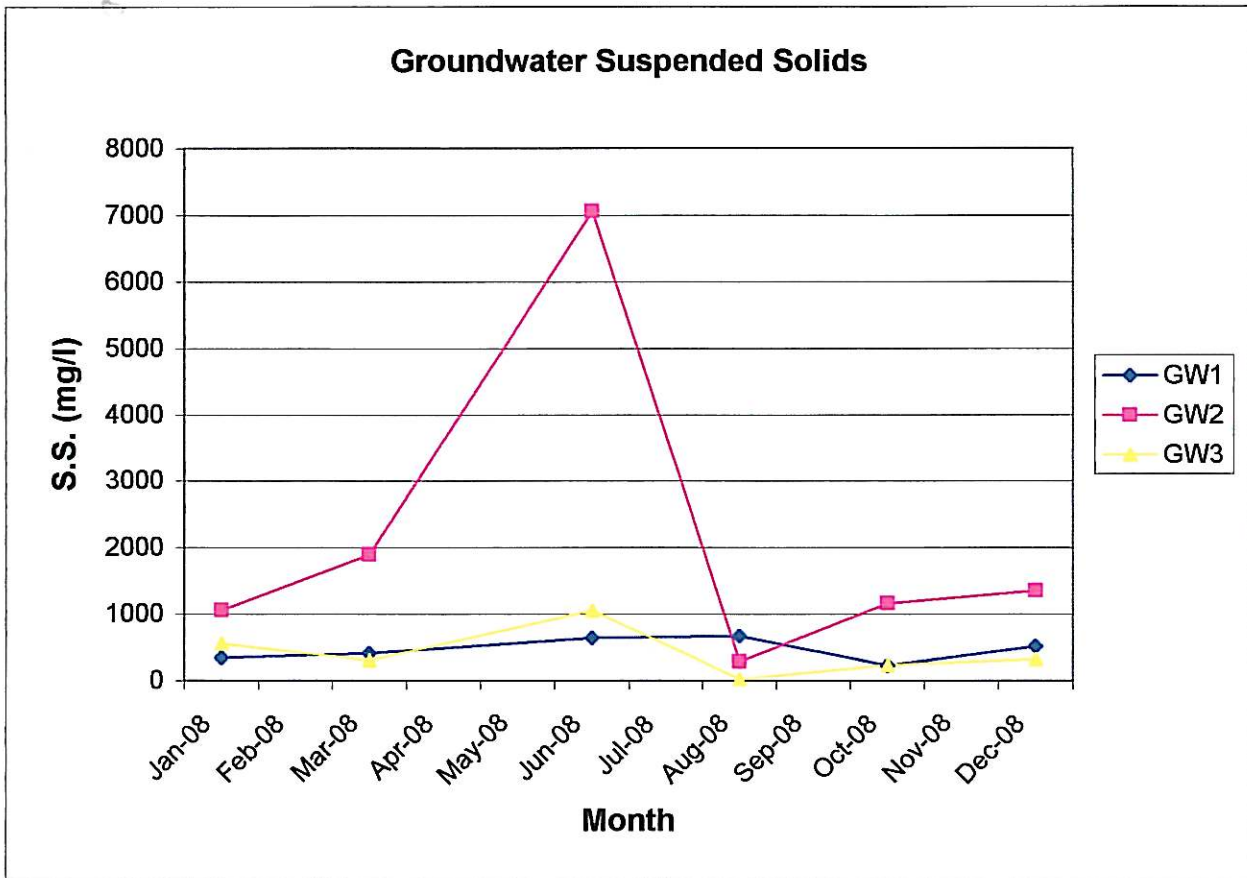
Location		Glenalla, Milford Co Donegal											
Sample Type		groundwater											
Site No		GW2											
Date of Sample		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Lab No		1316		2240			3834		5444		6711		7656
pH		7.02		7.31			7.16		7.40		6.82		7.16
Temp	C	9.02		11.13			14.41		16.6		1.22		8.62
Electrical Conductivity	uS/cm	437		463			669		450		486		465
Ammonical Nitrogen	mg/l	0.84		1.00			6.53		0.78		1.10		1.0
COD	mg/l												
BOD	mg/l												
Dissolved Oxygen	mg/l	1.77		4.66			1.82		3.28		2.84		4.36
SS	mg/l	1058		1900			7064		292		1163		1362
Residue on Evaporator	mg/l						1201						
Calcium	ug/l						86970						
Cadmium	ug/l						<0.4						
Chromium	ug/l						<0.05						
Chloride	mg/l			26.99			44.99		43.99		36.99		
Chlorine	mg/l												
Copper	ug/l						<1						
Cyanide	mg/l						<0.05						
Dissolved Iron	ug/l						279				<2		
Lead	ug/l						<1						
Magnesium	ug/l						12770						
Manganese	ug/l						914						
Mercury	ug/l						<0.05						
Nickel	mg/l												
Potassium	mg/l						6.3				3.3		
Sodium	mg/l						62.7				27.1		
Sulphate	mg/l						7						
Zinc	ug/l						18						
Total Alkalinity as CaCO3	mg/l												
Total Organic Carbon	mg/l						***				2		
Total Oxidised Nitrogen	mg/l	0.00		0.03			0.00		0.00		0.000		0.0
Arsenic	mg/l												
Barium	mg/l												
Boron	ug/l						51						
Flouride	mg/l						0.6						
Total Phenols	mg/l						0.02				<0.01		
Phosphorous	mg/l												
Selenium	mg/l												
Silver	mg/l												
Microtox	Microtox												
Toxic Units	Toxic Units												
Nitrite	mg/l												
Nitrate	mg/l	0.000		0.000			0.000		0.000		0.000		0.0
Nitrate - ORTHO	mg/l	0.0000		0.0260			0.0000		0.0000		0.000		0.0
Phosphate - TOTAL	mg/l	0.050		0.148			0.036		0.000		0.040		0.16
Total Coliforms	mg/l						0.36						
Facel Coliforms	mg/l												
Depth	m	0.35		0.60			0.6		1.2		0.6		0.2

---- not applicable



Location		Glenalla, Milford Co Donegal groundwater GW3											
Sample Type	Site No	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Date of Sample													
Lab No		1317		2241			3835		5445		6712		7657
pH		6.77		6.33			6.03		6.09		6.75		6.68
Temp	C	8.98		11.75			14.20		16.2		11.30		7.73
Electrical Conductivity	uS/cm	115		268			162.9		239		432		493
Ammonical Nitrogen	mg/l	0.21		0.69			0.00		1.33		2.15		2.64
COD	mg/l												
BOD	mg/l												
Dissolved Oxygen	mg/l	7.02		7.23			2.94		4.72		3.22		4.34
SS	mg/l	558		310			1060.8		31		240		326
Residue on Evaporator	mg/l						113						
Calcium	ug/l						21450						
Cadmium	ug/l						<0.4						
Chromium	ug/l						<0.05						
Chloride	mg/l			32.99			26.99		45.99		42.99		
Chlorine	mg/l												
Copper	ug/l						7						
Cyanide	mg/l						<0.05						
Dissolved Iron	ug/l						331				2170		
Lead	ug/l						8						
Magnesium	ug/l						1750						
Manganese	ug/l						24						
Mercury	ug/l						<0.05						
Nickel	mg/l												
Potassium	mg/l						0.6				2.9		
Sodium	mg/l						14.5				18.2		
Sulphate	mg/l						18						
Zinc	ug/l						21						
Total Alkalinity as CaCO3	mg/l												
Total Organic Carbon	mg/l						***				14		
Total Oxidised Nitrogen	mg/l	0.00		0.08			0.00		0.00		0.160		0.0
Arsenic	mg/l												
Barium	mg/l												
Boron	ug/l						19						
Flouride	mg/l						<0.1						
Total Phenols	mg/l						0.02				<0.01		
Phosphorous	mg/l												
Selenium	mg/l												
Silver	mg/l												
Toxic Units													
Microtox	Microtox												
Nitrite	mg/l	0.000		0.000			0.000		0.000		0.000		0.0
Nitrate	mg/l	0.0000		0.0840			0.0000		0.0000		0.160		0.0
Phosphate - ORTHO	mg/l	0.040		0.167			0.036		0.000		0.050		0.06
Phosphate - TOTAL	mg/l												
Total Coliforms							0.26						
Facel Coliforms													
Depth	m	0.25		0.35			0.55		1.3		0.7		0.1



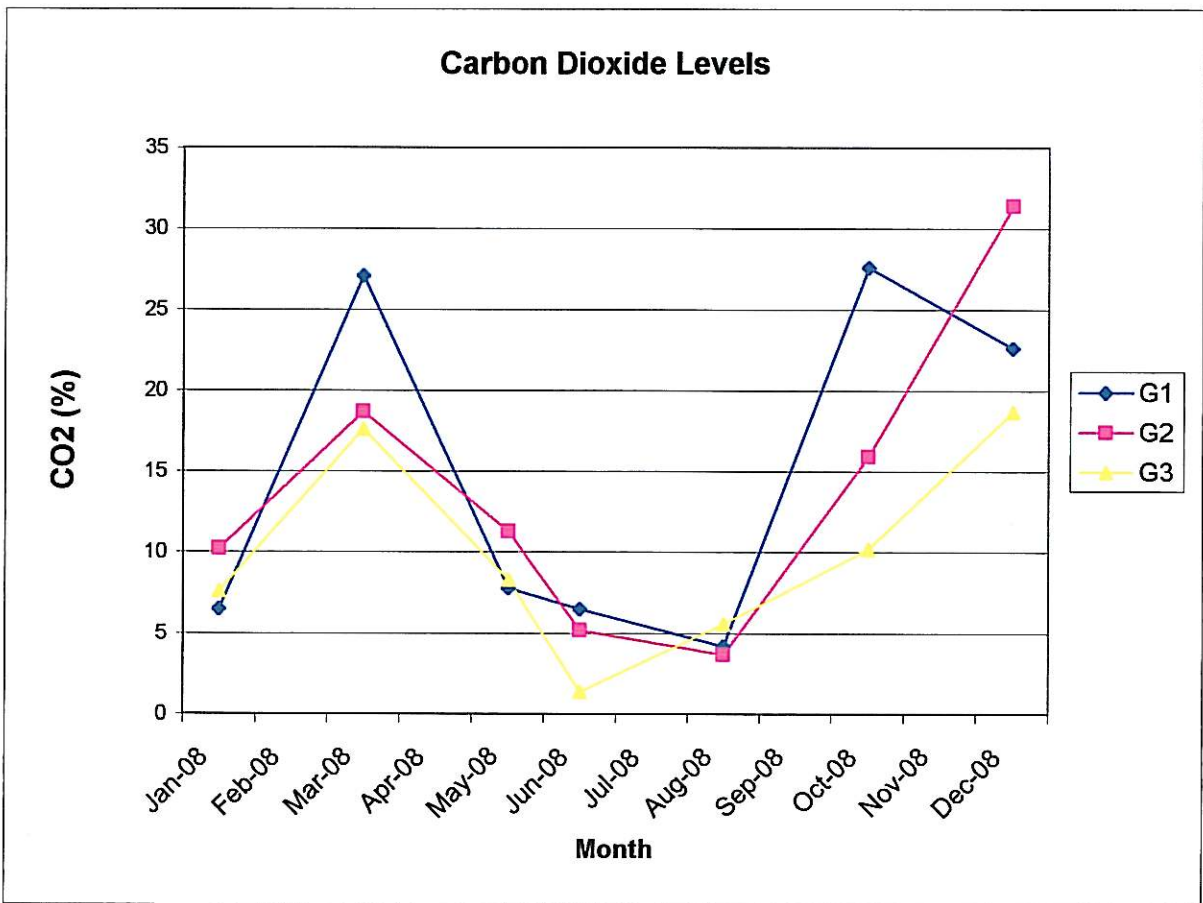
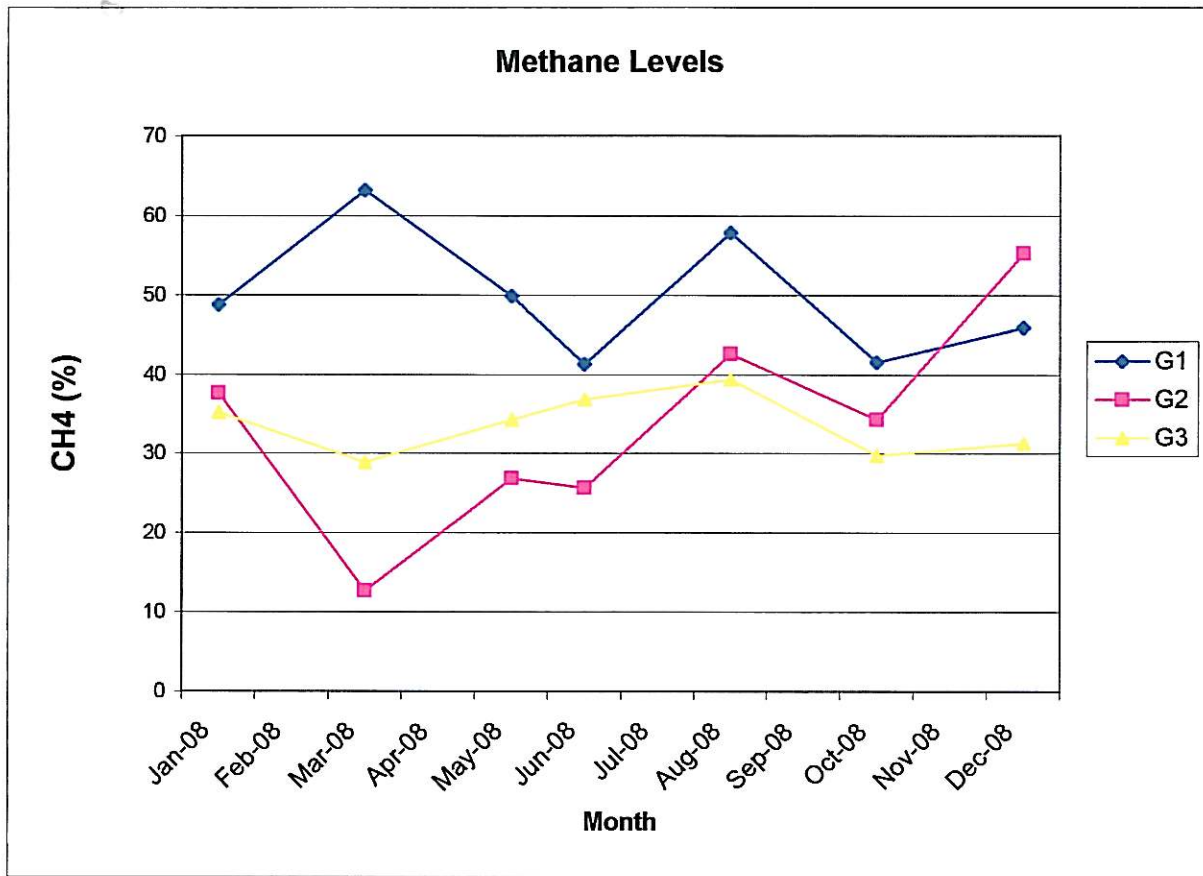


Location		Glenalla, Milford Co Donegal											
Sample Type		leachate											
Site No		L1											
Date of Sample		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Lab No		1318		2242			3836		5446		6713		7658
pH		7.43		7.37			7.37		7.54		7.22		7.16
Temp	C	12.13		14.28			15.01		16.4		12.09		9.52
Electrical Conductivity	uS/cm	1962		2250			1997		2010		2010		2109
Ammonical Nitrogen	mg/l	149.00		73.02			133.00		92.4		96.4		107
COD	mg/l	97		69			86		1402		882		1198
BOD	mg/l	31.0000		19.8000			61		17.7		8.1		1.4
Dissolved Oxygen	mg/l	2.26		3.51			0.68		2.02		2.79		1.57
SS	mg/l	970		1584			1894		729.6		1224		754
Residue on Evaporator	mg/l												
Calcium	ug/l						92000						
Cadmium	ug/l						<0.4						
Chromium	ug/l						<0.05						
Chloride	mg/l			96.98			164.95		354.96		289.86		
Chlorine	mg/l												
Copper	ug/l						<1						
Cyanide	mg/l						<0.05						
Dissolved Iron	ug/l						1960						
Lead	ug/l						1						
Magnesium	ug/l						65150						
Manganese	ug/l						221						
Mercury	ug/l						<0.05						
Nickel	mg/l												
Potassium	mg/l						89.4						
Sodium	mg/l						134.8						
Sulphate	mg/l						33						
Zinc	ug/l						25						
Total Alkalinity as CaCO3	mg/l												
Total Organic Carbon	mg/l												
Total Oxidised Nitrogen	mg/l	0.79		0.13			0.00		0.00		0.000		0.0
Arsenic	mg/l												
Barium	mg/l												
Boron	ug/l						1148						
Flouride	mg/l						0.3						
Total Phenols	mg/l												
Phosphorous	mg/l												
Selenium	mg/l												
Silver	mg/l												
Microtox	Toxic Units												
Microtox	Toxic Units												
Nitrite	mg/l	0.200		0.000			0.000		0.000		0.000		0.0
Nitrate	mg/l	0.5900		0.1250			0.0000		0.0000		0.000		0.0
Phosphate - ORTHO	mg/l	0.050		0.038			0.710		0.000		0.023		0.32
Phosphate - TOTAL	mg/l						1.64						
Total Coliforms													
Facel Coliforms													
Depth	m	5.10		5.35			5.0		5.6		5.2		4.6

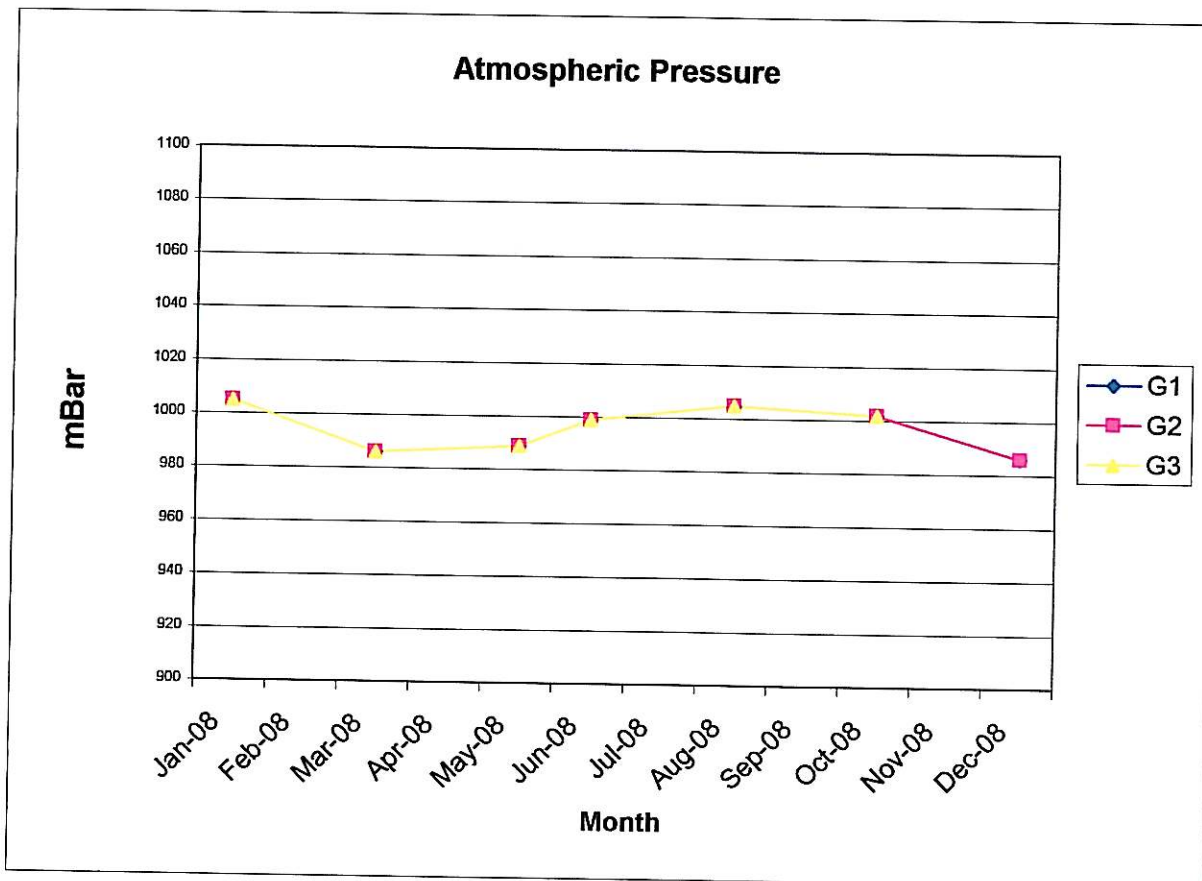
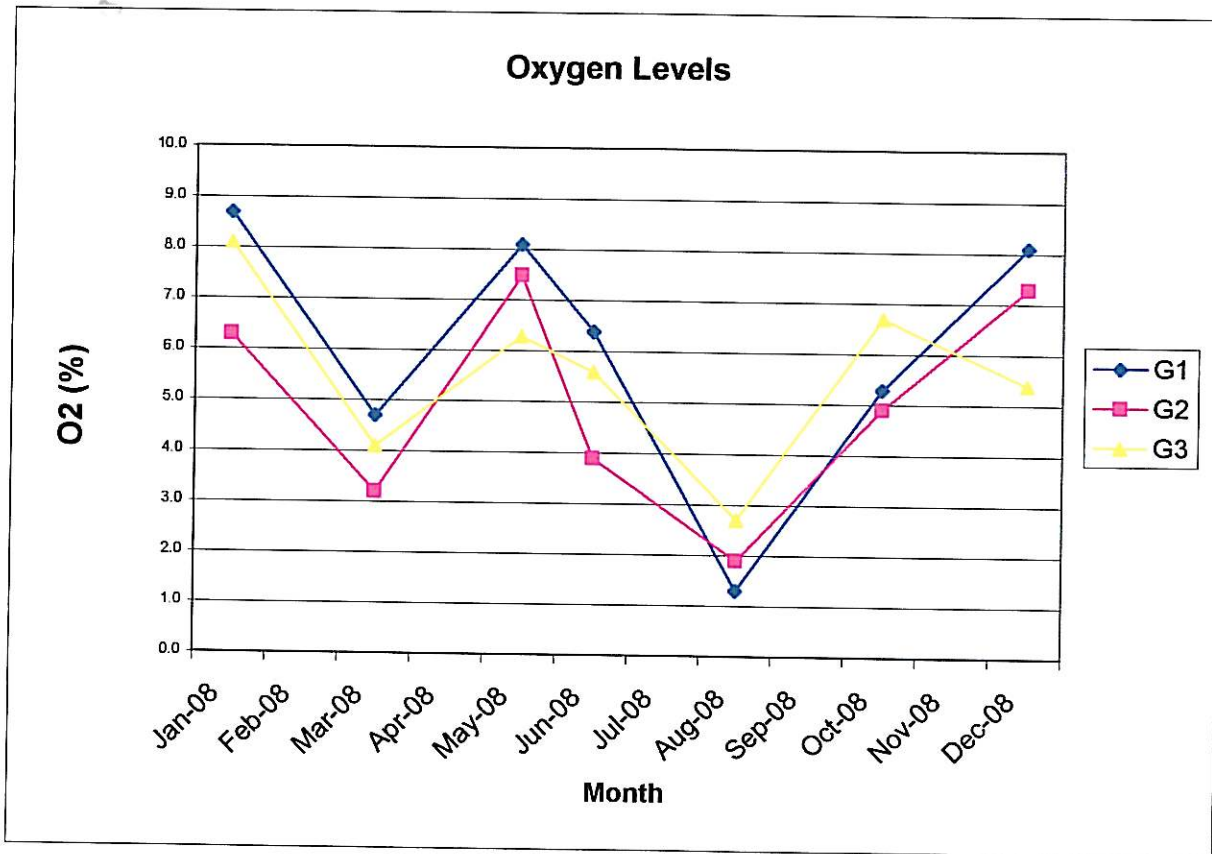
Glenalla, Milford Co Donegal												
Landfill Gas levels												
G1												
Date of Sample												
Parameters	Units	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	
		30-Jan-08	---	27-Mar-08	---	27-May-08	24-Jun-08	26-Aug-08	---	30-Oct-08	---	10-Dec-08
Methane	%	48.8	---	63.2	---	49.9	41.3	57.9	---	41.6	---	45.9
Carbon Dioxide	%	6.5	---	27.1	---	7.8	6.5	4.2	---	27.6	---	22.6
Oxygen	%	8.7	---	4.7	---	8.1	6.4	1.3	---	5.3	---	8.1
Atmos. Pressure	mBar	1005	---	986	---	989	999	1005	---	1002	---	986

Location		Glenalla, Milford Co Donegal											
Sample Type		Landfill Gas levels											
Site No		G2											
Date of Sample	Units	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date
		30-Jan-08	27-Mar-08	27-May-08	24-Jun-08	26-Aug-08	30-Oct-08	10-Dec-08					
Methane	%	37.6	12.7	26.9	25.7	42.6	34.3	55.3					
Carbon Dioxide	%	10.2	18.7	11.3	5.2	3.7	15.9	31.4					
Oxygen	%	6.3	3.2	7.5	3.9	1.9	4.9	7.3					
Atmos. Pressure	mBar	1005	986	989	999	1005	1002	986					

Location		Glenalla, Milford Co Donegal/											
Sample Type		Landfill Gas levels											
Site No		G3											
Date of Sample													
Parameters	Units	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date
		30-Jan-08	---	27-Mar-08	---	27-May-08	24-Jun-08	26-Aug-08	30-Oct-08	---	---	---	10-Dec-08
Methane	%	35.2	28.9	28.9	34.3	34.3	36.9	39.4	29.8	---	---	---	31.3
Carbon Dioxide	%	7.6	17.6	17.6	8.3	8.3	1.4	5.6	10.2	---	---	---	18.7
Oxygen	%	8.1	4.1	4.1	6.3	6.3	5.6	2.7	6.7	---	---	---	5.4
Atmos. Pressure	mBar	1005	986	989	989	989	999	1005	1002	---	---	---	986







**APPENDIX C**  
**WATER BALANCE CALCULATION**

GLENNALLA WATER BALANCE CALCULATION

YEAR	Status	Active Area A(m <sup>2</sup> )	Waste Input Unmonth	Rainfall	Active Area Infiltration RA(m <sup>2</sup> )	Liquid Waste LM(m <sup>3</sup> )	Temp Restored Area	Temp Restored Infiltration RTCA(m <sup>3</sup> )	Restored area Area	Restored Infiltration RTCA(m <sup>3</sup> )	Total Water	Leachate produced Lo(m <sup>3</sup> )
2009	Closed	0	0	1242.6			0		20500	2547	2547	2547
Total				1243								2547

Assumptions

IRCA=	Fully Capped/Restored area Infiltration of minifill estimated (2-10% of ER )LEPA Manual	10%	%
Restored area	Area capped is 20,500.	20,500	m <sup>2</sup>
Rainfall Data	Data taken from Met Eireann Station Malin Head, Total Rainfall used.	1242.6	mm

**APPENDIX D**  
**E-PRTR Regulations**  
**(AER Electronic Reporting System)**

**At the time of reporting passwords for the EPA's web-based database have not been issued for the 2008 period. Hard copy of this return will be forwarded to the Agency under separate cover when the return can be made.**