ANNUAL ENVIRONMENTAL REPORT

For

Muckish Landfill Site

(Waste Licence Reference W0126-1)

By
Donegal County Council
For
Environmental Protection Agency

Reporting Period: January 2008 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 Condition 2.3 of Waste Licence W0126-1 for Muckish Landfill and includes the information listed in Schedule A of the Waste Licence.

1.2 Muckish Landfill Site is located in a rural setting on the lower slopes of Muckish Mountain, approximately 5km south east of the village of Falcarragh. The site is within the upper catchment of the Ray River and is situated on an extensive area of blanket bog.

1.3 Donegal County Council submitted an application to the Environmental Protection Agency for the continued operation of the landfill site, as required by the Waste Management (Licensing) Regulations 1997. On the 29th of May 2001 the Environmental Protection Agency granted the Council a Waste Licence (registration number W0126-1) for the facility, in accordance with the Third Schedule of the Waste Management Act, 1996.

1.4 The Licence granted was for the orderly closure, capping and restoration of the landfill and allows only for the acceptance of inert waste to be used for the purpose of site restoration. The facility ceased to accept waste on the 6th of November 2001 and the site was closed.

1.5 The facility had been developed and operated on the 'dilute and disperse' principle, whereby rainfall infiltrated the landfill and generated leachate, the leachate was in turn allowed to disperse into the surrounding environment.

1.6 The site was fully restored during 2005/6 in accordance with the approved Restoration and Aftercare Plan.

2. REPORTING PERIOD

2.1 This report refers to the period from 1st January, 2008 to 31st December 2008.

3. WASTE ACTIVITIES CARRIED OUT AT THE FACILITY

3.1 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 disposal of inert waste only and leachate treatment at the facility.
- **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.

4. QUANTITIES OF WASTE

4.1 In accordance with Condition 1 of the waste licence only inert waste shall be accepted for the purposes of remediation, rehabilitation, enhancement and restoration of the facility. The maximum total of inert waste to be disposed of at the site is 40,000 tonnes. The quantities of waste received during each year at the facility are presented in Table 1. 2,500 tonnes of inert waste (for use in restoration works) was accepted onto the site during 2004. The balance of restoration materials were imported during this reporting period and the quantity is shown under 2005 in the table.

Table 1: Waste Quantities Accepted (tonnes)

Waste Type	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Domestic Refuse*	4418	5639	7008	5729	0	0	0	0	0	0	0
Inert Waste	0	0	0	0	0	0	2,500	34,667	0	0	0

*Figures based on estimates

5. SUMMARY REPORT ON EMISSIONS

5.1 Groundwater

5.1.1 Groundwater flow is typically in a north-easterly direction ultimately providing base flow to the Ray River. Groundwater monitoring is carried out at three locations (GW1, GW2 and GW3) as shown on Drawing No 5234.20/102 Monitoring Locations. These groundwater monitoring boreholes were installed at the landfill early in 2000 as per licence requirements. Results of this year's monitoring are presented in Appendix A in tabular and graphical format. Monitoring location GW1 is representative of water quality upstream and monitoring locations GW2 and GW3 are immediately downstream of the waste body.

5.1.2 Groundwater results show that levels of parameters indicative of groundwater contamination with leachate, such as ammonia and electrical conductivity, are slightly lower than those in the last reporting period. Again this period, the only well showing any significant presence of parameters indicative of leachate is GW3, which is situated immediately downstream of the waste body.

5.2 Surface Water

5.2.1 Muckish landfill site is situated in the upper catchment of the Ray (Duvowen) River. The landfill site is based on an area of extensive blanket bog. This river forms the northeast boundary of the landfill and Council ownership boundary. Surface water monitoring is carried out at four monitoring locations as shown on Drawing No 5234.20/04 Monitoring Locations. Monitoring points S1 and S2 are upstream of the waste body. Results continue to show that previous low levels of leachate contamination of the Ray River have been virtually eliminated since the capping of the site.

5.3 Leachate Composition

5.3.1 Leachate monitoring is carried out at one monitoring location point on the site as shown on Drawing No 5234.20/04 Monitoring Locations. All parameters are consistent with typical leachate composition ranges (as presented in EPA Manual 'Landfill Operational Practices'), but leachate is stronger in composition yet again when compared results from the previous reporting period. Again this is consistent with the continuing effects of the capping.

5.4 Landfill gas

5.4.1 Landfill gas monitoring is undertaken at three locations as shown on Drawing No 5234.20/102 Monitoring Locations, which are located within the site boundary in waste. Gas monitoring on the mature waste body is indicative of methanogenic gas processes that would be occurring under anaerobic conditions.

6. SUMMARY OF RESULTS AND INTERPRETATIONS OF ENVIRONMENTAL MONITORING.

6.1 Summary of Results

All monitoring data for the period is contained in Appendix A. This data is summarised in Graphs also contained in this Appendix.

6.2 Update of Monitoring Locations

Monitoring locations for the site are as given in Table 6.1. These locations are shown on Drawing No 5234.20/04 Monitoring Locations and grid coordinates for the points are included on this drawing. A post restoration topographical survey was undertaken in July 2006. This was submitted to the Agency under separate cover. There have not been any new monitoring locations installed during this reporting period.

Table 6.1: Monitoring Points

	Monitoring Locations
Landfill Gas	P1, P2, P3
Groundwater	GW1, GW2, GW3
Leachate	L1
Surface Water	SW1, SW2, SW3, SW4

6.3 Interpretation of Environmental Monitoring

6.3.1 Groundwater

Condition 9 and Schedule D of the Licence requires the Licensee to monitor groundwater water quality at various locations on and outside the site on a monthly, quarterly and annual basis for those parameters as listed in Table D3 of the Waste Licence. 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 for the Protection of Groundwater in Ireland.

The majority of the parameters measured are below the recommended limits. Those exceeding the limits are discussed below. Parameters indicative of possible leachate contamination include Ammoniacal-N, Conductivity, Iron, Chloride and heavy metals.

Upstream

Levels of suspended solids, iron, boron phenols & nutirents are slightly raised at GW1 relative to MAC.

Downstream

Monitoring at GW2 and GW3 detected elevated levels of Ammoniacal Nitrogen (max 17.23mg/l – GW3), SS (max 7162mg/l), iron (max 73mg/l), iron (max 5602ug/l), manganese

(max 962ug/l), potassium (max 16mg/l), boron (max 150ug/l), phenols (max 0.1mg/l) and nutrients during the reporting period.

These results generally indicate that leachate was being released from the waste body into the immediate groundwater environment. The downstream wells however are very close to the waste body.

6.3.2 Surface Water

Condition 9 and Schedule D of the licence requires the licensee to monitor surface water at four locations in the vicinity of the site on a quarterly and annual basis for those parameters as listed in Table D3 of the waste licence.

These results have been compared to EC (Quality of Surface Water Intended For The Abstraction of Drinking Water) Regulations, 1989. The majority of the parameters have been below the recommended limits for A1 category surface water. Those exceeding the limits are discussed below.

Upstream

Upstream only nutrient levels are slightly raised.

Downstream

Chemical analysis of samples indicates ammonia levels below MAC in SW3 and SW4 throughout the period. Leachate contamination of surface water appears to have been eliminated. Iron (max 226ug/l) and manganese (51ug/l) slightly over MAC and nutrient levels are slightly raised.

6.3.3 Leachate

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 A and some of the characteristic parameters of the leachate are listed in Table 6.2 below.

Table 6.2: Leachate Concentrations

	Muckish Landfill Site 2008		From 30 samples from UK/Irish landfills accepting domestic waste Results in mg/l		
PARAMETER	**Min.Conc**	**Max.Conc**	**Min.Conc**	**Max.Conc**	**Mean**
Ammonia (mg/N)	319.6	448	<0.2	1700	491
BOD	5.7	34.7	4.5	>4800	>834
COD	476	1402	<10	33,700	3078
Chloride (mg/l)	289.9	443.86	27	3410	1256
Iron (ug/l)	-	3983	0.4	664	54.4
Potassium(ug/l)	-	223.3	2.7	1480	491
TON (mg/l N)		0	/	/	/
Conductivity (mS/cm)	5040	5551	503	19,200	7789
pH	7.14	7.42	6.4	8	7.2

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 ranges. The data for this period shows leachate concentrations continuing to increase, this being consistent with the on-going effects of the site now being capped.

6.3.4 Landfill Gas

Gas monitoring on the mature waste body is indicative of methanogenic gas processes that would be occurring under anaerobic conditions. Methane concentrations range from 18% to 63.7%. Carbon Dioxide levels range from 6.8% to 33.1%. There are no monitoring locations outside of the waste body.

7. VOLUME OF LEACHATE PRODUCED AND VOLUME OF LEACHATE DISCHARGED

7.1 Leachate is been tankered on a weekly basis from the collection sump on site. Records show that during this period 338m^3 of leachate was removed from the site and tankered to Donegal County Council's Wastewater Treatment Plant in Letterkenny.

7.2 A water balance calculation has been produced for this period and is shown in Appendix B. This indicates that the estimated volume of leachate being produced at the site for the reporting period is 2547m^3. The water balance calculation is attached in Appendix B.

8. CAPPING AND RESTORATION OF COMPLETED CELLS / PHASES

8.1 The site is fully restored.

9. REPORTED INCIDENTS AND COMPLAINTS SUMMARIES

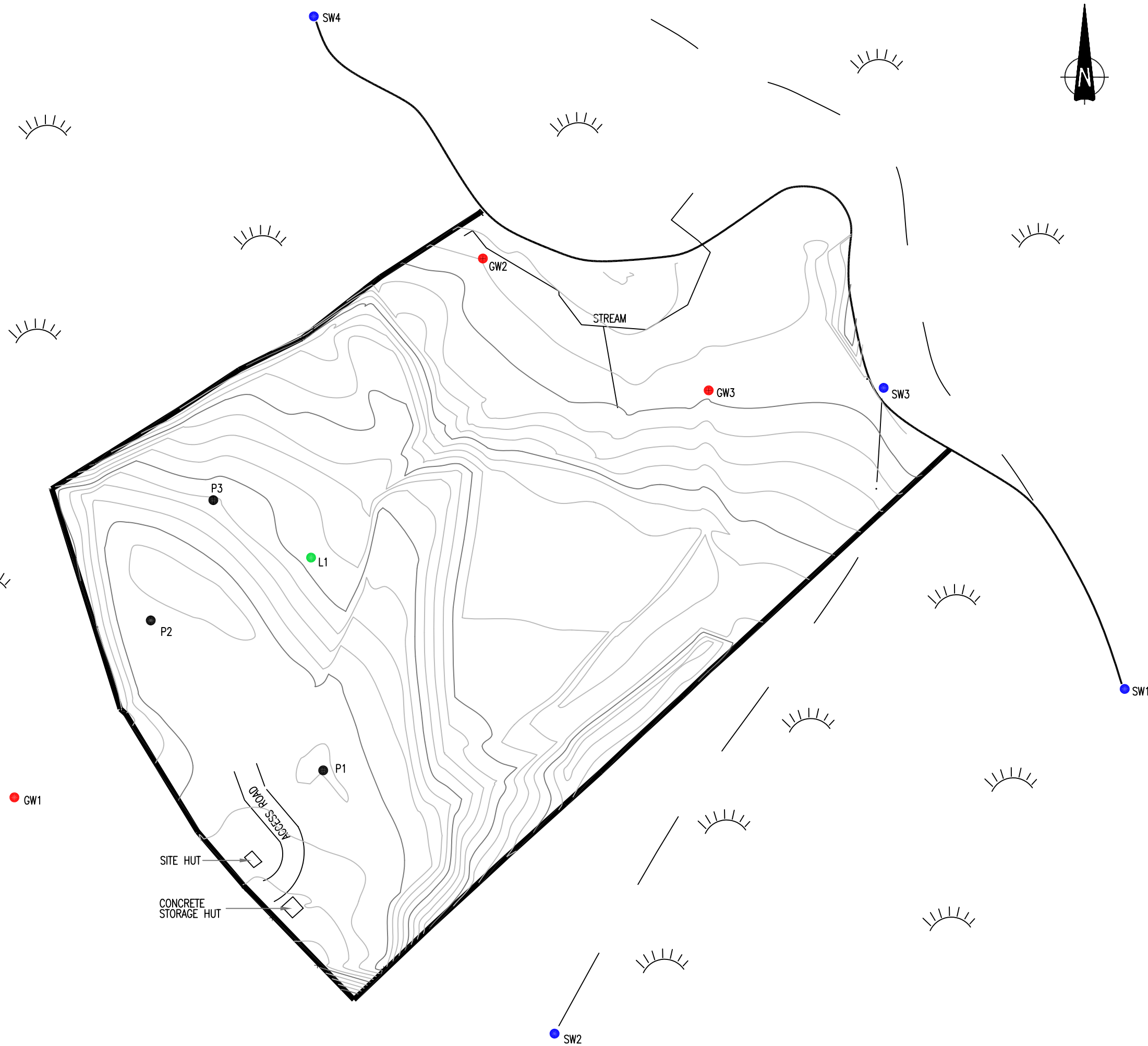
9.1 Donegal County Council reports to the EPA emissions exceedances on an on-going basis. In the case of Muckish, there are no perimeter gas wells, but levels of ammonia in excess of 0.2mg/l in either surface water or groundwater monitoring locations are reported as incidents with each bi-annual report.

9.2 Other than the on-going exceedance incident reporting described above, no further incidents occurred during this reporting period, and therefore none were reported to the EPA.

9.3 No complaints were received during the reporting period.

10. REVIEW OF NUISANCE CONTROLS

10.1 The site is inspected regularly for all types of nuisances (flies, pests, dust, litter and illegal dumping, birds and odours) and where any action is deemed necessary the appropriate steps are taken in accordance with the EMS.



NOTES

KEY

1. GRID REFERENCE B 9780E, 2729N

- SITE BOUNDARY
- GW GROUNDWATER MONITORING BOREHOLES
- L LEACHATE MONITORING LOCATION
- SW SURFACE WATER MONITORING LOCATIONS
- P GAS MONITORING LOCATIONS

MONITORING TYPE	REF NO	GRID REFERENCE
GROUNDWATER	GW1	197674 427305
	GW2	197802 427389
	GW3	197860 427356
SURFACE WATER	SW1	197962 427330
	SW2	197817 427242
	SW3	197903 427411
	SW4	197754 427505
LEACHATE	L1	197759 427313
GAS	P1	197762 427260
	P2	197719 427332
	P3	197734 427328

GRID COORDINATES DETERMINIED FROM SITE SURVEY

REV	DESCRIPTION	BY DATE	CHECK DATE
A	UPDATED GRID COORDINATES	JD JULY 05	AMcG JULY 05

DRAWN BY JD DATE JULY 04	CHECK BY DD DATE JULY 04	APPROVED DD DATE JULY 04
PLOT SCALE 1:1000	SCHEDULES	SHEET SIZE A3

CLIENT
DONEGAL COUNTY COUNCIL

PROJECT
MUCKISH LANDFILL SITE

TITLE
MONITORING LOCATIONS

RPS Kirk McClure Morton
CONSULTING ENGINEERS
TEL: 074 916 1927 Email@Info.kmm.eu.com FAX:074 916 1928
THE ENTERPRISE FUND BUSINESS CENTRE BALLYRAINE LETTERKENNY CO DONEGAL

ARCHITECT	
DRAWING No.	5234.20/04
REVISION	A

DWG. STATUS	
PRELIM.	
TENDER	
CONST.	●
RECORD	

100mm

100mm

APPENDIX A
MONITORING DATA

Location		Muckish, Falcarragh, Co Donegal											
Sample Type		surface water											
Site No		SW1											
Date of Sample		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Lab No		1300	---	2223	---	3172	3837	---	4998	---	6695	---	7629
pH		6.73	---	6.49	---	7.34	6.52	---	7.05	---	7.96	---	6.46
Temp	C	7.81	---	13.30	---	12.49	13.19	---	13.61	---	8.88	---	9.77
Electrical Conductivity	uS/cm	78	---	138	---	92	90	---	84	---	75	---	84
Ammonical Nitrogen	mg/l	0.00	---	0.00	---	0.01	0.00	---	0.02	---	0.00	---	0.00
COD	mg/l	0	---	0	---	2	0	---	7	---	22	---	0
BOD	mg/l	1.02	---	1.55	---	0.82	1.96	---	0.35	---	1.20	---	0.61
Dissolved Oxygen	mg/l	11.76	---	9.08	---	10.84	10.61	---	10.40	---	11.44	---	8.87
SS	mg/l	0.8	---	0.7	---	4	0.4	---	4.0	---	0.8	---	2.4
Residue on Evaporator	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
Calcium	ug/l	---	---	---	---	---	2983	---	---	---	---	---	---
Cadmium	ug/l	---	---	---	---	---	<0.4	---	---	---	---	---	---
Chromium	ug/l	---	---	---	---	---	<0.05	---	---	---	---	---	---
Chloride	mg/l	---	---	---	---	---	23	---	17	---	22	---	---
Chlorine	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
Copper	ug/l	---	---	---	---	---	<1	---	---	---	---	---	---
Cyanide	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
Dissolved Iron	ug/l	---	---	---	---	---	198	---	---	---	---	---	---
Lead	ug/l	---	---	---	---	---	1	---	---	---	---	---	---
Magnesium	ug/l	---	---	---	---	---	2968	---	---	---	---	---	---
Manganese	ug/l	---	---	---	---	---	<1	---	---	---	---	---	---
Mercury	ug/l	---	---	---	---	---	<0.05	---	---	---	---	---	---
Nickel	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
Potassium	mg/l	---	---	---	---	---	1	---	---	---	---	---	---
Sodium	mg/l	---	---	---	---	---	13	---	---	---	---	---	---
Sulphate	mg/l	---	---	---	---	---	6	---	---	---	---	---	---
Zinc	ug/l	---	---	---	---	---	19	---	---	---	---	---	---
Total Alkalinity as CaCO3	mg/l	---	---	---	---	---	16	---	---	---	---	---	---
Total Organic Carbon	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
Total Oxidised Nitrogen	mg/l	0.15	---	0.17	---	0.28	0.23	---	0.12	---	0.29	---	0.16
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	---	---	---	---	---	---	---	---	---	---	---	---
Mircrotox	Toxic Units	---	---	---	---	---	---	---	---	---	---	---	---
Microtox	Toxic Units	---	---	---	---	---	---	---	---	---	---	---	---
Nitrite	mg/l	0.005	---	0.009	---	0.008	0.007	---	0.014	---	0	---	0.00
Nitrate	mg/l	0.1421	---	0.1636	---	0.2772	0.2275	---	0.100	---	0.280	---	0.16
Phosphate - ORTHO	mg/l	0.013	---	0.164	---	0.017	0.00	---	0.000	---	0.001	---	0.00
Phosphate - TOTAL	mg/l	---	---	0.0000	---	---	0.00	---	---	---	---	---	---
Total Coliforms		---	---	---	---	---	---	---	---	---	---	---	---
Facel Coliforms		---	---	---	---	---	---	---	---	---	---	---	---
Depth	m	---	---	---	---	---	---	---	---	---	---	---	---

--- not applicable

Location		Muckish, Falcarragh, 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		1301	---	2224	---	3173	3838	---	4999	---	6696	---	7630
pH		6.43	---	6.42	---	6.83	6.41	---	6.06	---	5.67	---	5.53
Temp	C	7.92	---	10.20	---	12.16	13.59	---	13.98	---	8.45	---	9.61
Electrical Conductivity	uS/cm	80	---	121	---	92	95	---	79	---	70	---	82
Ammonical Nitrogen	mg/l	0.00	---	0.00	---	0.01	0.04	---	0.02	---	0.00	---	0.01
COD	mg/l	20	---	10	---	26	5	---	30	---	21	---	2
BOD	mg/l	0.53	---	1.04	---	0.28	1.09	---	0.39	---	1.08	---	0.70
Dissolved Oxygen	mg/l	10.72	---	10.35	---	10.16	9.63	---	9.02	---	9.98	---	8.42
SS	mg/l	0.4	---	0.3	---	0.8	0.2	---	6.0	---	0.2	---	0.4
Residue on Evaporator	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
Calcium	ug/l	---	---	---	---	---	3186	---	---	---	---	---	---
Cadmium	ug/l	---	---	---	---	---	<0.4	---	---	---	---	---	---
Chromium	ug/l	---	---	---	---	---	<0.05	---	---	---	---	---	---
Chloride	mg/l	---	---	---	---	---	23	---	19	---	24	---	---
Chlorine	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
Copper	ug/l	---	---	---	---	---	<1	---	---	---	---	---	---
Cyanide	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
Dissolved Iron	ug/l	---	---	---	---	---	87.0	---	---	---	---	---	---
Lead	ug/l	---	---	---	---	---	1.0	---	---	---	---	---	---
Magnesium	ug/l	---	---	---	---	---	3425.0	---	---	---	---	---	---
Manganese	ug/l	---	---	---	---	---	1.0	---	---	---	---	---	---
Mercury	ug/l	---	---	---	---	---	<0.05	---	---	---	---	---	---
Nickel	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
Potassium	mg/l	---	---	---	---	---	0.8	---	---	---	---	---	---
Sodium	mg/l	---	---	---	---	---	13.3	---	---	---	---	---	---
Sulphate	mg/l	---	---	---	---	---	9.0	---	---	---	---	---	---
Zinc	ug/l	---	---	---	---	---	16.0	---	---	---	---	---	---
Total Alkalinity as CaCO3	mg/l	---	---	---	---	---	10.0	---	---	---	---	---	---
Total Organic Carbon	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
Total Oxidised Nitrogen	mg/l	0.05	---	0.09	---	0.16	0.12	---	0.03	---	0.06	---	0.09
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	---	---	---	---	---	---	---	---	---	---	---	---
Mircrotox	Toxic Units	---	---	---	---	---	---	---	---	---	---	---	---
Microtox	Toxic Units	---	---	---	---	---	---	---	---	---	---	---	---
Nitrite	mg/l	0.003	---	0.023	---	0.007	0.006	---	0.018	---	0.005	---	0.008
Nitrate	mg/l	0.0451	---	0.0634	---	0.1525	0.1152	---	0.0200	---	0.0500	---	0.0839
Phosphate - ORTHO	mg/l	0.000	---	0.063	---	0.000	0.000	---	0	---	0.004	---	0.000
Phosphate - TOTAL	mg/l	---	---	0.0000	---	---	0.0000	---	---	---	---	---	---
Total Coliforms		---	---	---	---	---	---	---	---	---	---	---	---
Facel Coliforms		---	---	---	---	---	---	---	---	---	---	---	---
Depth	m	---	---	---	---	---	---	---	---	---	---	---	---

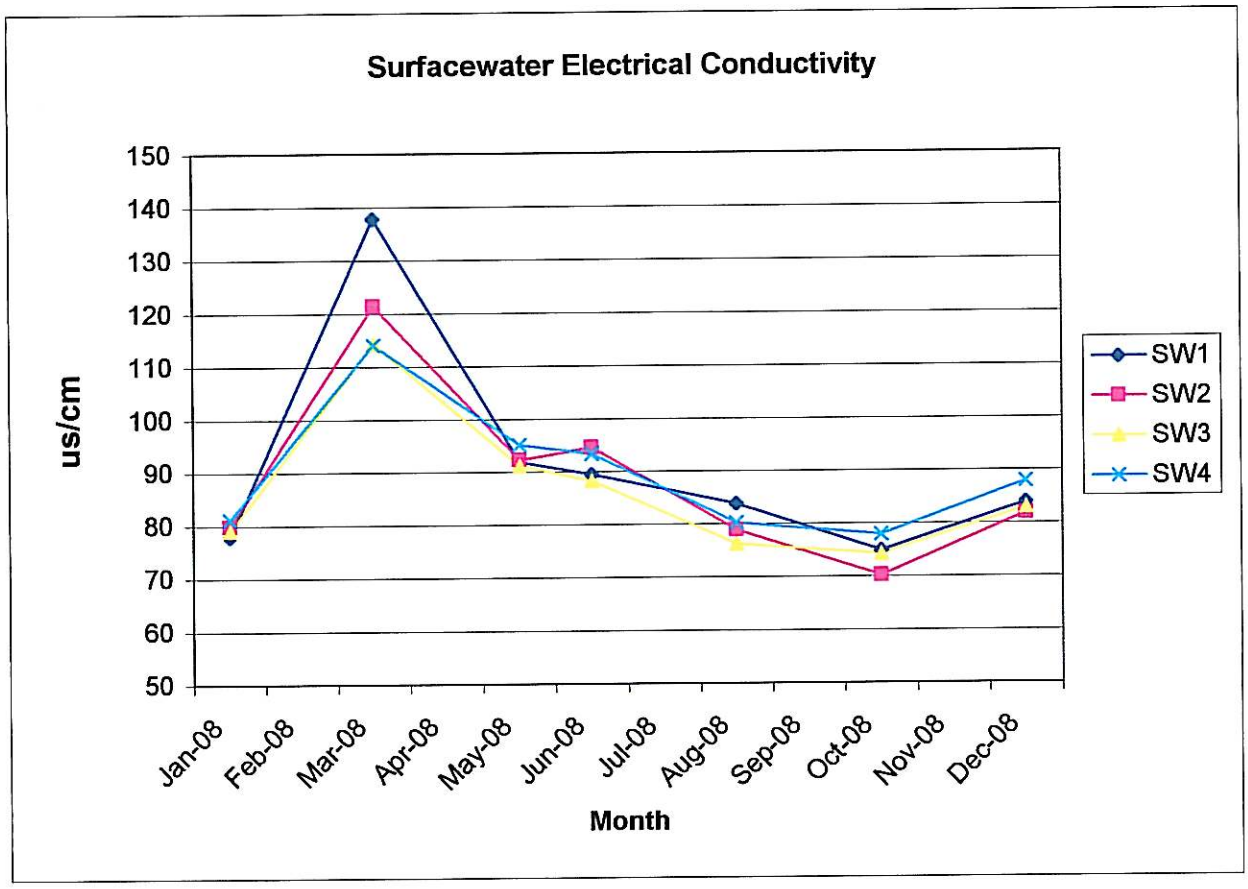
--- not applicable

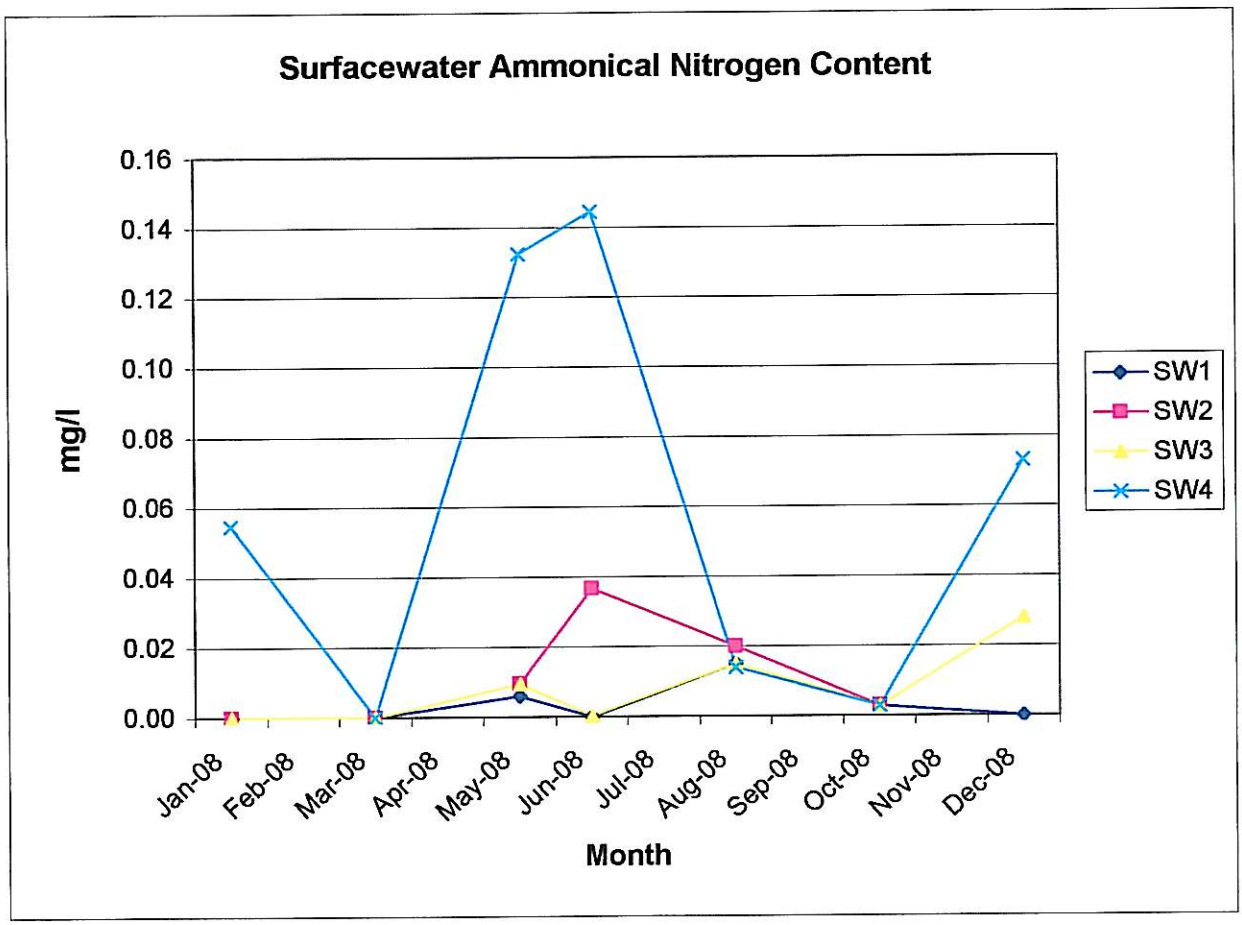
Location		Muckish, Falcarragh, Co Donegal											
Sample Type		surface water											
Site No		SW3											
Date of Sample		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Lab No		1302	---	2225	---	3174	3839	---	5000	---	6697	---	7631
pH		6.35	---	6.39	---	6.85	7.02	---	6.49	---	5.87	---	6.23
Temp	C	7.82	---	9.45	---	11.53	13.15	---	13.42	---	9.16	---	9.38
Electrical Conductivity	uS/cm	79	---	114	---	91	88	---	76	---	74	---	83
Ammonical Nitrogen	mg/l	0.00	---	0.0	---	0.01	0.00	---	0.02	---	0.00	---	0.03
COD	mg/l	15	---	6	---	6	7	---	12	---	19	---	1
BOD	mg/l	0.80	---	1.40	---	0.31	1.32	---	0.43	---	0.65	---	0.67
Dissolved Oxygen	mg/l	11.65	---	11.47	---	10.70	10.58	---	10.37	---	10.66	---	9.24
SS	mg/l	0.0	---	0.2	---	0.4	0.0	---	6.0	---	0.4	---	0.6
Residue on Evaporator	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
Calcium	ug/l	---	---	---	---	---	2969	---	---	---	---	---	---
Cadmium	ug/l	---	---	---	---	---	<0.4	---	---	---	---	---	---
Chromium	ug/l	---	---	---	---	---	<0.05	---	---	---	---	---	---
Chloride	mg/l	---	---	---	---	---	23	---	21	---	21	---	---
Chlorine	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
Copper	ug/l	---	---	---	---	---	<1	---	---	---	---	---	---
Cyanide	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
Dissolved Iron	ug/l	---	---	---	---	---	172.0	---	---	---	---	---	---
Lead	ug/l	---	---	---	---	---	1.0	---	---	---	---	---	---
Magnesium	ug/l	---	---	---	---	---	2937.0	---	---	---	---	---	---
Manganese	ug/l	---	---	---	---	---	2.0	---	---	---	---	---	---
Mercury	ug/l	---	---	---	---	---	<0.05	---	---	---	---	---	---
Nickel	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
Potassium	mg/l	---	---	---	---	---	1.1	---	---	---	---	---	---
Sodium	mg/l	---	---	---	---	---	12.6	---	---	---	---	---	---
Sulphate	mg/l	---	---	---	---	---	6.0	---	---	---	---	---	---
Zinc	ug/l	---	---	---	---	---	22.0	---	---	---	---	---	---
Total Alkalinity as CaCO3	mg/l	---	---	---	---	---	12.0	---	---	---	---	---	---
Total Organic Carbon	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
Total Oxidised Nitrogen	mg/l	0.13	---	0.15	---	0.25	0.26	---	0.12	---	0.12	---	0.18
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	---	---	---	---	---	---	---	---	---	---	---	---
Mircrotox	Toxic Units	---	---	---	---	---	---	---	---	---	---	---	---
Microtox	Toxic Units	---	---	---	---	---	---	---	---	---	---	---	---
Nitrite	mg/l	0.003	---	0.007	---	0.004	0.008	---	0.018	---	0.004	---	0.00
Nitrate	mg/l	0.1262	---	0.1385	---	0.2488	0.2492	---	0.100	---	0.120	---	0.17
Phosphate - ORTHO	mg/l	0.000	---	0.139	---	0.000	0.000	---	0	---	0.000	---	0.00
Phosphate - TOTAL	mg/l	---	---	0.0000	---	---	0.0883	---	---	---	---	---	---
Total Coliforms		---	---	---	---	---	---	---	---	---	---	---	---
Facel Coliforms		---	---	---	---	---	---	---	---	---	---	---	---
Depth	m	---	---	---	---	---	---	---	---	---	---	---	---

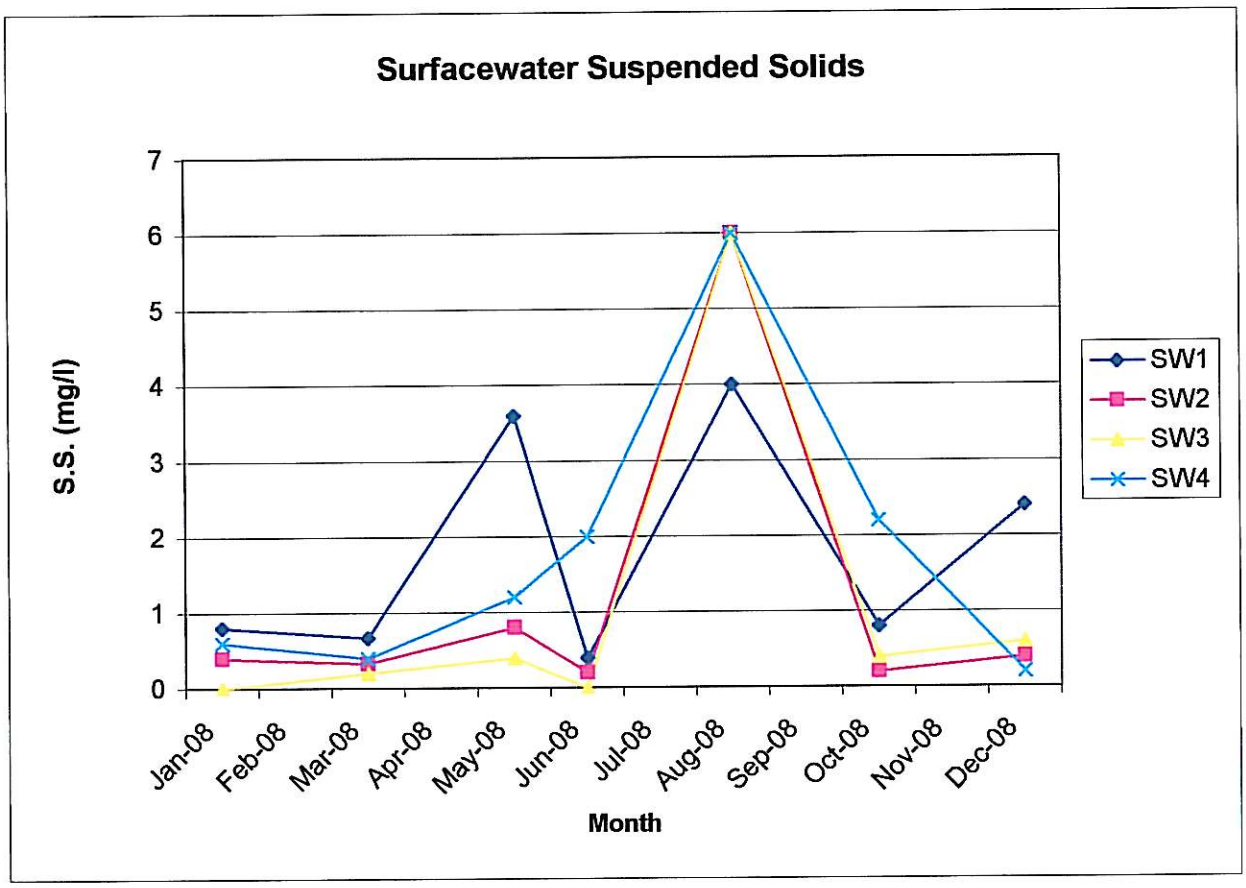
--- not applicable

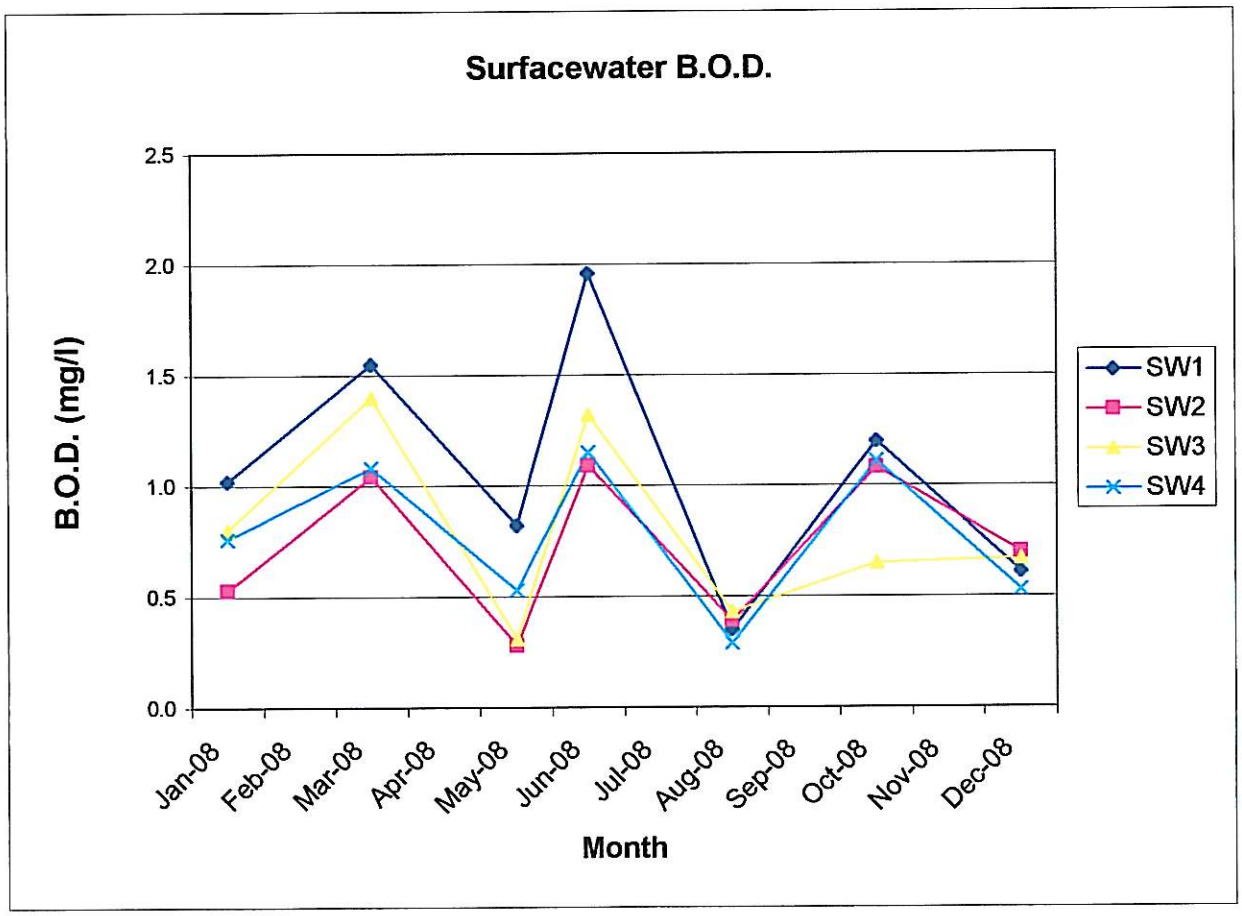
Location		Muckish, Falcarragh, Co Donegal											
Sample Type		surface water											
Site No		SW4											
Date of Sample		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Lab No		1303	---	2226	---	3175	3840	—	5001	—	6698	---	7632
pH		6.39	—	6.39	---	6.81	6.62	---	6.56	—	6.07	—	6.45
Temp	C	8.03	---	9.46	—	11.38	12.49	—	13.42	---	7.60	---	9.69
Electrical Conductivity	uS/cm	81	---	114	---	95	93	—	80	—	78	—	88
Ammonical Nitrogen	mg/l	0.05	—	0.00	—	0.13	0.14	---	0.01	---	0.00	---	0.07
COD	mg/l	6	---	0	—	2	11	—	13	—	26	---	1
BOD	mg/l	0.76	---	1.08	---	0.53	1.15	---	0.29	—	1.11	—	0.53
Dissolved Oxygen	mg/l	11.00	---	11.56	—	10.75	10.85	—	10.59	---	11.69	---	9.34
SS	mg/l	0.6	---	0	---	1	2	—	6.0	—	2.2	---	0.2
Residue on Evaporator	mg/l	—	—	---	---	---	---	---	—	—	—	—	—
Calcium	ug/l	—	—	—	---	---	2763	---	---	---	---	---	---
Cadmium	ug/l	---	---	—	—	—	<0.4	---	---	---	---	---	---
Chromium	ug/l	—	---	---	---	---	<0.05	---	—	—	—	---	---
Chloride	mg/l	—	—	—	---	---	23	---	23	---	26	—	—
Chlorine	mg/l	---	---	—	—	---	---	---	---	---	---	---	---
Copper	ug/l	---	---	---	---	---	<1	—	—	—	---	---	---
Cyanide	mg/l	---	---	—	—	—	---	---	---	---	---	---	---
Dissolved Iron	ug/l	---	---	---	---	---	226.0	—	—	—	---	---	---
Lead	ug/l	—	---	---	---	---	<1	---	---	—	—	—	—
Magnesium	ug/l	—	—	—	—	—	3030.0	---	---	---	---	---	---
Manganese	ug/l	---	---	---	---	—	51.0	—	—	—	—	---	---
Mercury	ug/l	—	—	—	---	---	<0.05	---	---	---	---	—	—
Nickel	mg/l	---	---	—	—	—	—	---	---	---	---	---	---
Potassium	mg/l	—	—	---	---	---	1.1	---	---	—	—	—	—
Sodium	mg/l	---	---	---	---	—	12.9	—	—	—	—	---	---
Sulphate	mg/l	—	—	---	---	---	7.0	---	---	—	—	—	—
Zinc	ug/l	---	—	—	---	—	18.0	---	---	---	---	---	---
Total Alkalinity as CaCO3	mg/l	---	---	---	---	---	12.0	—	—	—	—	---	---
Total Organic Carbon	mg/l	—	—	—	---	---	---	---	---	---	—	—	—
Total Oxidised Nitrogen	mg/l	0.21	—	0.19	—	0.25	0.21	—	0.11	---	0.15	—	0.23
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	—	---	---	---	---	---	—	—	—	—	---	---
Mircrotox	Toxic Units	---	---	—	—	—	---	---	---	---	—	—	—
Microtox	Toxic Units	---	---	---	—	—	—	—	---	---	---	---	---
Nitrite	mg/l	0.010	---	0.004	---	0.006	0.005	—	0.006	—	0.005	---	0.0
Nitrate	mg/l	0.1987	—	0.1876	---	0.245	0.204	---	0.100	—	0.150	---	0.2
Phosphate - ORTHO	mg/l	0.016	---	0.188	---	0	0	—	0	—	0.000	---	0.0
Phosphate - TOTAL	mg/l	—	—	0.00	---	---	0.00	—	—	—	---	---	---
Total Coliforms		---	---	---	—	—	---	---	---	---	---	—	—
Facel Coliforms		---	---	---	---	—	---	---	---	---	---	—	—
Depth	m	—	—	—	---	---	---	---	—	—	—	—	—

— not applicable


Surfacewater Electrical Conductivity
us/cm
150
140
130
120
110
100
90
80
70
60
50
Jan-08
Feb-08
Mar-08
Apr-08
May-08
Jun-08
Jul-08
Aug-08
Sep-08
Oct-08
Nov-08
Dec-08
Month
SW1
SW2
SW3
SW4


Surfacewater Ammonical Nitrogen Content
mg/l
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
Jan-08
Feb-08
Mar-08
Apr-08
May-08
Jun-08
Jul-08
Aug-08
Sep-08
Oct-08
Nov-08
Dec-08
Month
SW1
SW2
SW3
SW4


Surfacewater Suspended Solids
S.S. (mg/l)
0
1
2
3
4
5
6
7
Jan-08
Feb-08
Mar-08
Apr-08
May-08
Jun-08
Jul-08
Aug-08
Sep-08
Oct-08
Nov-08
Dec-08
Month
SW1
SW2
SW3
SW4


Surfacewater B.O.D.
B.O.D. (mg/l)
0.0
0.5
1.0
1.5
2.0
2.5
Jan-08
Feb-08
Mar-08
Apr-08
May-08
Jun-08
Jul-08
Aug-08
Sep-08
Oct-08
Nov-08
Dec-08
Month
SW1
SW2
SW3
SW4

Location		Muckish, Falcarragh, 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		1304	---	2227	---	3176	3841	---	5002	---	6699	---	7633
pH		6.04	---	5.67	---	6.53	6.33	---	6.60	---	6.19	---	6.62
Temp	C	9.64	---	10.18	---	12.85	11.94	---	13.56	---	8.93	---	11.45
Electrical Conductivity	uS/cm	142	---	156	---	140	194	---	218	---	157	---	168
Ammonical Nitrogen	mg/l	0.07	---	0.00	---	0.01	0.02	---	0	---	0.01	---	0.00
COD	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
BOD	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
Dissolved Oxygen	mg/l	10.29	---	9.21	---	6.38	3.62	---	8.33	---	8.23	---	8.51
SS	mg/l	75	---	60	---	1828	28016	---	678	---	99	---	386
Residue on Evaporator	mg/l	---	---	---	---	---	7892	---	---	---	---	---	---
Calcium	ug/l	---	---	---	---	---	11780	---	---	---	---	---	---
Cadmium	ug/l	---	---	---	---	---	<0.4	---	---	---	---	---	---
Chromium	ug/l	---	---	---	---	---	0.130	---	---	---	---	---	---
Chloride	mg/l	---	---	---	---	---	24	---	20	---	28	---	---
Chlorine	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
Copper	ug/l	---	---	---	---	---	3.00	---	---	---	---	---	---
Cyanide	mg/l	---	---	---	---	---	<0.05	---	---	---	---	---	---
Dissolved Iron	ug/l	---	---	---	---	---	326.0	---	---	---	70	---	---
Lead	ug/l	---	---	---	---	---	2.0	---	---	---	---	---	---
Magnesium	ug/l	---	---	---	---	---	2166.0	---	---	---	---	---	---
Manganese	ug/l	---	---	---	---	---	15.0	---	---	---	---	---	---
Mercury	ug/l	---	---	---	---	---	<0.05	---	---	---	---	---	---
Nickel	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
Potassium	mg/l	---	---	---	---	---	3.6	---	---	---	1.80	---	---
Sodium	mg/l	---	---	---	---	---	43.7	---	---	---	9.40	---	---
Sulphate	mg/l	---	---	---	---	---	27.0	---	---	---	---	---	---
Zinc	ug/l	---	---	---	---	---	15.0	---	---	---	---	---	---
Total Alkalinity as CaCO3	mg/l	---	---	---	---	---	68.0	---	---	---	---	---	---
Total Organic Carbon	mg/l	---	---	---	---	---	15	---	---	---	18.0	---	---
Total Oxidised Nitrogen	mg/l	0.17	---	0.18	---	0.80	0.69	---	0.43	---	0.07	---	0.16
Arsenic	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
Barium	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
Boron	ug/l	---	---	---	---	---	29.0	---	---	---	---	---	---
Flouride	mg/l	---	---	---	---	---	<0.1	---	---	---	---	---	---
Total Phenols	mg/l	---	---	---	---	---	0.02	---	---	---	<0.01	---	---
Phosphorous	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
Selenium	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
Silver	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
Mircrotox	Toxic Units	---	---	---	---	---	---	---	---	---	---	---	---
Microtox	Toxic Units	---	---	---	---	---	---	---	---	---	---	---	---
Nitrite	mg/l	0.005	---	0.010	---	0.007	0.007	---	0.016	---	0	---	0.0
Nitrate	mg/l	0.1626	---	0.1672	---	0.795	0.678	---	0.410	---	0.060	---	0.2
Phosphate - ORTHO	mg/l	0.009	---	0.167	---	0.000	0.000	---	0	---	0.026	---	0.0
Phosphate - TOTAL	mg/l	---	---	0	---	---	0.927	---	---	---	---	---	---
Total Coliforms		---	---	0.0	---	---	0	---	0	---	0	---	---
Facel Coliforms		---	---	0.0	---	---	0	---	0	---	0	---	---
Depth	m	1.2	---	1.0	---	1.1	0.9	---	2.5	---	3.2	---	2.9

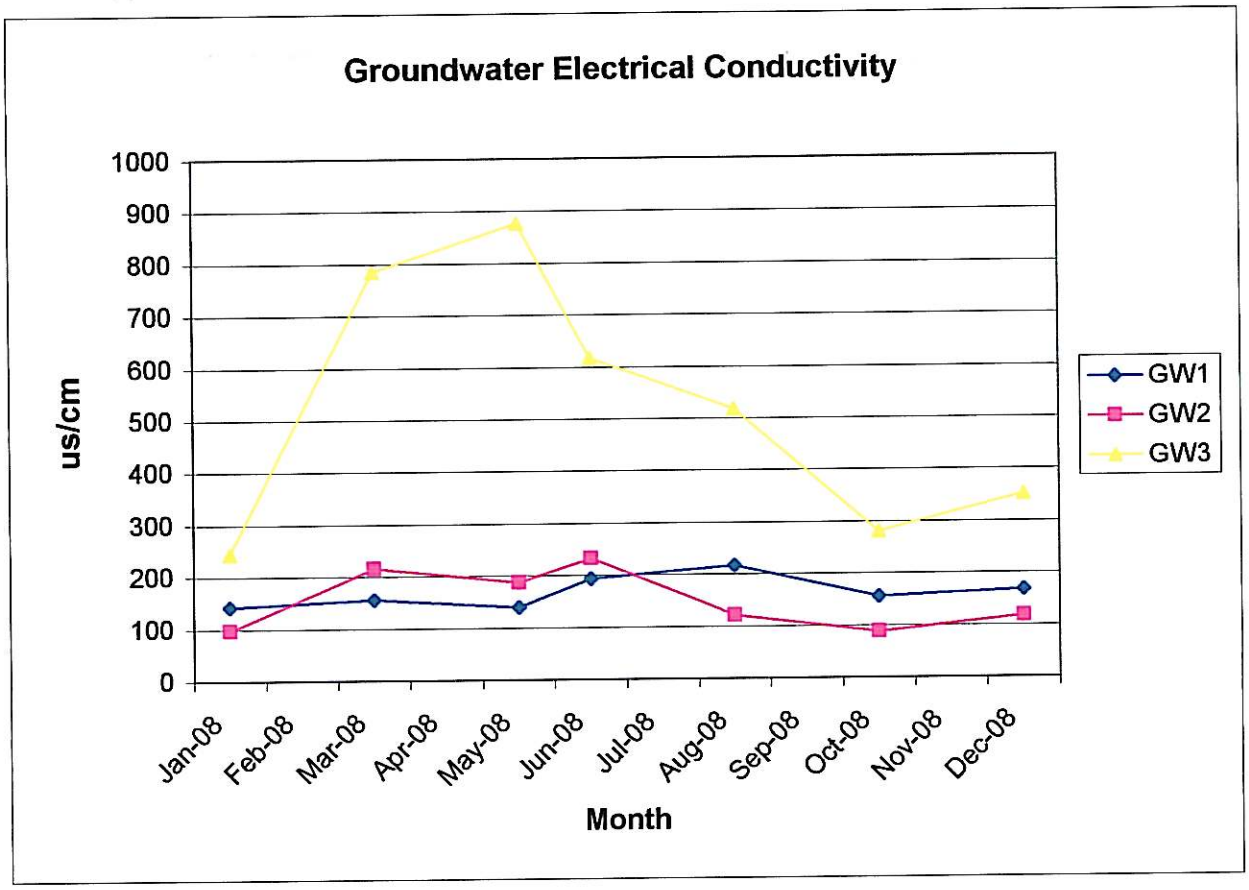
--- not applicable

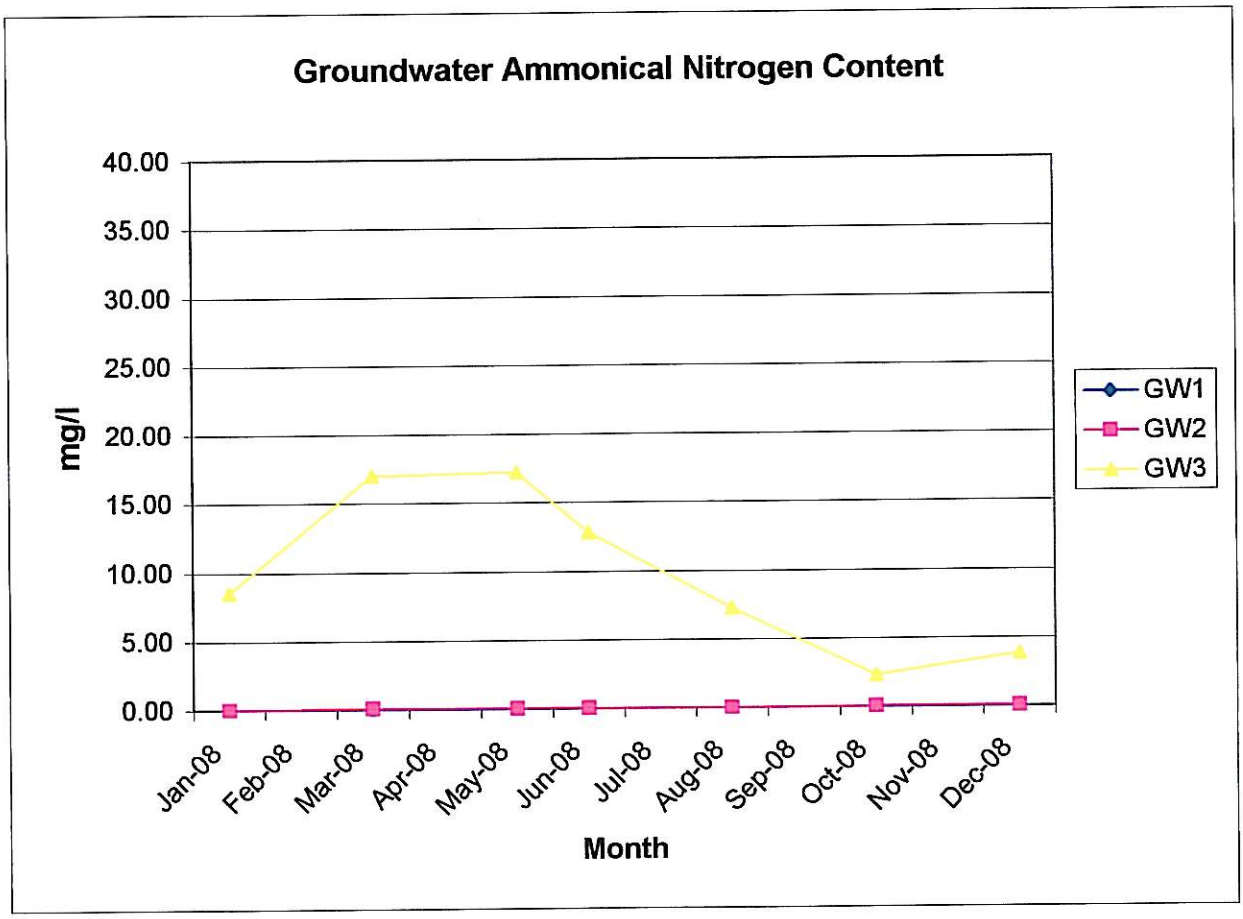
Location		Muckish, Falcarragh, Co Donegal											
Sample Type		groundwater											
Site No		GW2											
Date of Sample		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Lab No		1305	---	2228	---	3177	3842	---	5003	---	6700	---	7634
pH		5.85	---	6.58	---	5.84	6.33	---	5.46	---	6.18	---	5.51
Temp	C	10.30	---	10.68	---	11.50	12.40	---	14.68	---	8.16	---	9.06
Electrical Conductivity	uS/cm	97	---	216	---	188	233	---	121	---	88	---	118
Ammonical Nitrogen	mg/l	0.00	---	0.08	---	0.03	0.03	---	0.00	---	0.05	---	0.06
COD	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
BOD	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
Dissolved Oxygen	mg/l	6.32	---	6.48	---	4.12	2.14	---	3.55	---	2.87	---	4.88
SS	mg/l	334	---	730	---	1300	6494	---	566	---	438	---	1066
Residue on Evaporator	mg/l	---	---	---	---	---	3567	---	---	---	---	---	---
Calcium	ug/l	---	---	---	---	---	10390	---	---	---	---	---	---
Cadmium	ug/l	---	---	---	---	---	<0.4	---	---	---	---	---	---
Chromium	ug/l	---	---	---	---	---	<0.05	---	---	---	---	---	---
Chloride	mg/l	---	---	---	---	---	36	---	37	---	36	---	---
Chlorine	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
Copper	ug/l	---	---	---	---	---	5.0	---	---	---	---	---	---
Cyanide	mg/l	---	---	---	---	---	<0.05	---	---	---	---	---	---
Dissolved Iron	ug/l	---	---	---	---	---	5602.0	---	---	---	459	---	---
Lead	ug/l	---	---	---	---	---	3.0	---	---	---	---	---	---
Magnesium	ug/l	---	---	---	---	---	7389.0	---	---	---	---	---	---
Manganese	ug/l	---	---	---	---	---	116.0	---	---	---	---	---	---
Mercury	ug/l	---	---	---	---	---	<0.05	---	---	---	---	---	---
Nickel	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
Potassium	mg/l	---	---	---	---	---	5.0	---	---	---	1.60	---	---
Sodium	mg/l	---	---	---	---	---	23.8	---	---	---	11.00	---	---
Sulphate	mg/l	---	---	---	---	---	65.0	---	---	---	---	---	---
Zinc	ug/l	---	---	---	---	---	40.0	---	---	---	---	---	---
Total Alkalinity as CaCO3	mg/l	---	---	---	---	---	20.0	---	---	---	---	---	---
Total Organic Carbon	mg/l	---	---	---	---	---	27.0	---	---	---	16.0	---	---
Total Oxidised Nitrogen	mg/l	0.00	---	0.07	---	0.00	0.4	---	0.00	---	0.00	---	0.00
Arsenic	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
Barium	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
Boron	ug/l	---	---	---	---	---	146.0	---	---	---	---	---	---
Flouride	mg/l	---	---	---	---	---	<0.1	---	---	---	---	---	---
Total Phenols	mg/l	---	---	---	---	---	0.1	---	---	---	<0.01	---	---
Phosphorous	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
Selenium	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
Silver	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
Mircrotox	Toxic Units	---	---	---	---	---	---	---	---	---	---	---	---
Microtox	Toxic Units	---	---	---	---	---	---	---	---	---	---	---	---
Nitrite	mg/l	0.000	---	0.000	---	0.000	0.000	---	0	---	0	---	0.00
Nitrate	mg/l	0.0000	---	0.0660	---	0.000	0.413	---	0	---	0.000	---	0.00
Phosphate - ORTHO	mg/l	0.040	---	0.066	---	0.029	0.062	---	0	---	0.050	---	0.06
Phosphate - TOTAL	mg/l	---	---	0	---	---	0.3638	---	---	---	---	---	---
Total Coliforms		---	---	0	---	---	0.0	---	1	---	0	---	---
Facel Coliforms		---	---	0	---	---	0.0	---	1	---	0	---	---
Depth	m	0.70	---	0.4	---	0.55	0.60	---	0.70	---	0.50	---	0.20

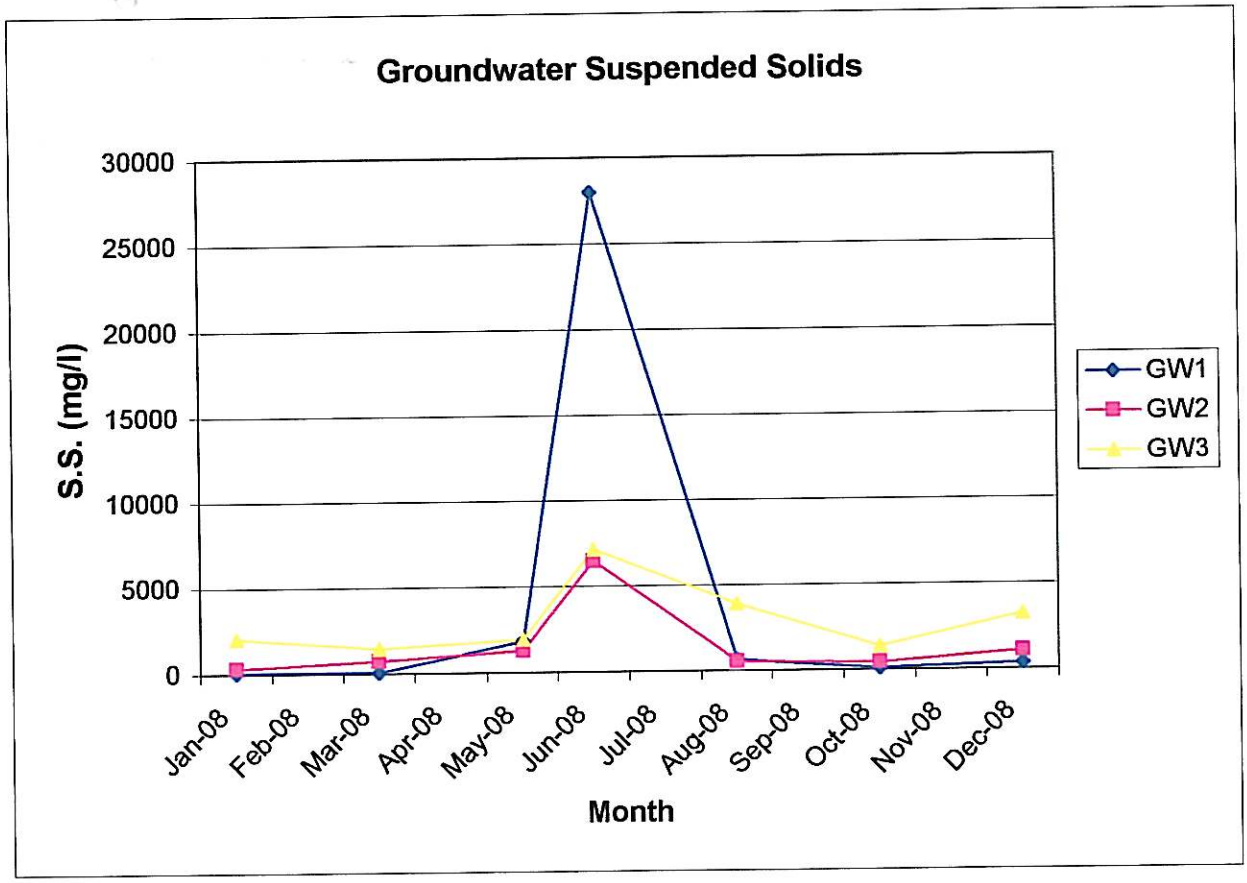
--- not applicable

Location		Muckish, Falcarragh, Co Donegal											
Sample Type		groundwater											
Site No		GW3											
Date of Sample		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Lab No		1306	---	2229	---	3178	3843	---	5004	---	6701	---	7635
pH		6.83	---	7.05	---	6.54	6.15	---	6.81	---	6.22	---	6.70
Temp	C	8.34	---	10.32	---	11.99	11.86	---	14.44	---	8.14	---	9.10
Electrical Conductivity	uS/cm	244	---	785	---	877	618	---	518	---	281	---	353
Ammonical Nitrogen	mg/l	8.51	---	17.03	---	17.23	12.84	---	7.26	---	2.35	---	3.89
COD	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
BOD	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
Dissolved Oxygen	mg/l	4.60	---	4.65	---	2.83	1.11	---	2.53	---	3.54	---	3.28
SS	mg/l	2042	---	1450	---	1930	7162	---	3924	---	1400	---	3252
Residue on Evaporator	mg/l	---	---	---	---	---	2899	---	---	---	---	---	---
Calcium	ug/l	---	---	---	---	---	48460	---	---	---	---	---	---
Cadmium	ug/l	---	---	---	---	---	<0.4	---	---	---	---	---	---
Chromium	ug/l	---	---	---	---	---	<0.05	---	---	---	---	---	---
Chloride	mg/l	---	---	---	---	---	73	---	43	---	43	---	---
Chlorine	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
Copper	ug/l	---	---	---	---	---	3.0	---	---	---	---	---	---
Cyanide	mg/l	---	---	---	---	---	<0.05	---	---	---	---	---	---
Dissolved Iron	ug/l	---	---	---	---	---	5533.0	---	---	---	526.00	---	---
Lead	ug/l	---	---	---	---	---	2.0	---	---	---	---	---	---
Magnesium	ug/l	---	---	---	---	---	19660.0	---	---	---	---	---	---
Manganese	ug/l	---	---	---	---	---	962.0	---	---	---	---	---	---
Mercury	ug/l	---	---	---	---	---	<0.05	---	---	---	---	---	---
Nickel	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
Potassium	mg/l	---	---	---	---	---	16.0	---	---	---	9.20	---	---
Sodium	mg/l	---	---	---	---	---	48.0	---	---	---	21.90	---	---
Sulphate	mg/l	---	---	---	---	---	63.0	---	---	---	---	---	---
Zinc	ug/l	---	---	---	---	---	18.0	---	---	---	---	---	---
Total Alkalinity as CaCO3	mg/l	---	---	---	---	---	184.0	---	---	---	---	---	---
Total Organic Carbon	mg/l	---	---	---	---	---	19.0	---	---	---	9.0	---	---
Total Oxidised Nitrogen	mg/l	0.34	---	0.75	---	4.28	0.14	---	0.00	---	0.01	---	0
Arsenic	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
Barium	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
Boron	ug/l	---	---	---	---	---	150	---	---	---	---	---	---
Flouride	mg/l	---	---	---	---	---	0.1	---	---	---	---	---	---
Total Phenols	mg/l	---	---	---	---	---	0.04	---	---	---	<0.01	---	---
Phosphorous	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
Selenium	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
Silver	mg/l	---	---	---	---	---	---	---	---	---	---	---	---
Mircrotox	Toxic Units	---	---	---	---	---	---	---	---	---	---	---	---
Microtox	Toxic Units	---	---	---	---	---	---	---	---	---	---	---	---
Nitrite	mg/l	0.00	---	0.00	---	0.003	0.000	---	0.00	---	0	---	0.00
Nitrate	mg/l	0.3400	---	0.7500	---	4.275	0.135	---	0.00	---	0.010	---	0.13
Phosphate - ORTHO	mg/l	0.040	---	0.750	---	0.070	0.062	---	0.040	---	5.000	---	0.06
Phosphate - TOTAL	mg/l	---	---	0	---	---	0.2698	---	---	---	---	---	---
Total Coliforms		---	---	0	---	---	0	---	1	---	0	---	---
Facel Coliforms		---	---	0	---	---	0	---	1	---	0	---	---
Depth	m	0.50	---	0.20	---	0.45	0.35	---	0.50	---	0.20	---	0.20

--- not applicable


Groundwater Electrical Conductivity
us/cm
1000
900
800
700
600
500
400
300
200
100
0
Jan-08
Feb-08
Mar-08
Apr-08
May-08
Jun-08
Jul-08
Aug-08
Sep-08
Oct-08
Nov-08
Dec-08
Month
GW1
GW2
GW3


Groundwater Ammonical Nitrogen Content
mg/l
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
Jan-08
Feb-08
Mar-08
Apr-08
May-08
Jun-08
Jul-08
Aug-08
Sep-08
Oct-08
Nov-08
Dec-08
Month
GW1
GW2
GW3


Groundwater Suspended Solids
30000
25000
20000
15000
10000
5000
0
S.S. (mg/l)
Jan-08
Feb-08
Mar-08
Apr-08
May-08
Jun-08
Jul-08
Aug-08
Sep-08
Oct-08
Nov-08
Dec-08
Month
GW1
GW2
GW3

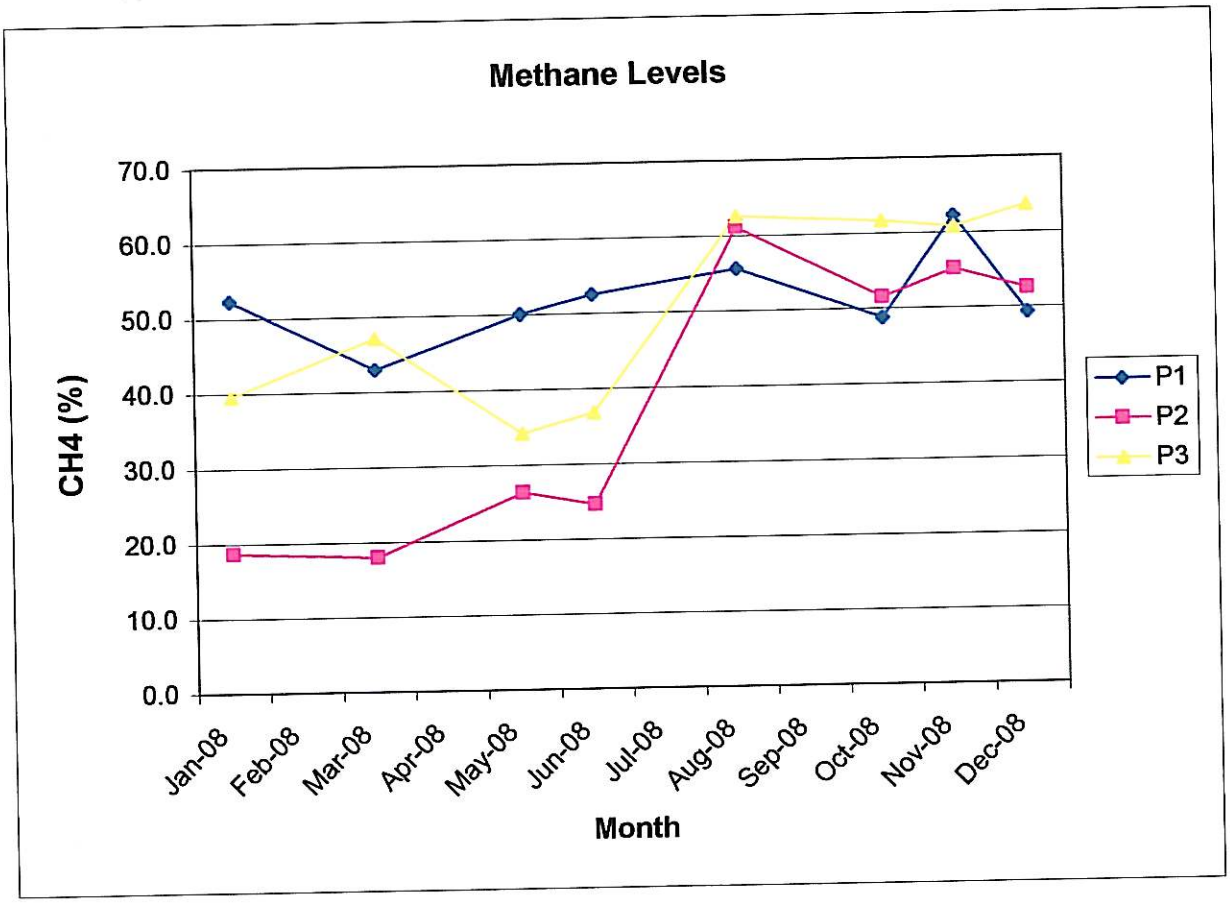
Location		Muckish, Falcarragh, Co Donegal											
Sample Type		leachate											
Site No		L1											
Date of Sample		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Lab No		1307	—	2230	---	3179	3844	—	5005	---	6702	—	7636
pH		7.14	—	7.23	---	7.28	7.17	---	7.30	—	7.42	---	7.16
Temp	C	10.12	---	10.01	—	13.46	14.26	—	14.46	---	9.21	—	11.57
Electrical Conductivity	uS/cm	5460	—	5170	---	5150	5320	—	5420	---	5040	—	5551
Ammonical Nitrogen	mg/l	448.00	—	319.60	---	346.11	398.00	---	357.00	—	371.00	---	324.00
COD	mg/l	476	---	637	---	863	542	---	870	---	1402	---	512
BOD	mg/l	24.00	—	24.0	---	5.70	30.80	—	24.75	---	34.7	—	7.8
Dissolved Oxygen	mg/l	3.60	---	2.40	---	1.64	0.76	---	2.62	—	0.91	---	0.22
SS	mg/l	1256	—	1365	---	1704	1738	—	866	---	638	---	884
Residue on Evaporator	mg/l	—	—	---	---	---	—	---	---	---	---	---	---
Calcium	ug/l	—	---	---	---	---	96200	---	—	—	---	---	---
Cadmium	ug/l	---	—	—	---	---	<0.4	—	—	---	---	---	---
Chromium	ug/l	—	—	---	---	---	<0.05	---	---	---	—	---	---
Chloride	mg/l	—	---	---	---	—	444	---	357	—	290	---	---
Chlorine	mg/l	---	---	---	---	---	---	---	—	—	---	---	---
Copper	ug/l	---	—	—	---	---	4.00	—	—	---	---	---	---
Cyanide	mg/l	—	---	---	---	—	<0.05	---	---	—	---	---	---
Dissolved Iron	ug/l	---	---	---	—	—	3983	---	—	—	---	---	---
Lead	ug/l	---	---	---	---	---	7	—	—	---	---	---	---
Magnesium	ug/l	—	—	---	---	—	116700	—	---	---	—	---	---
Manganese	ug/l	—	---	---	---	—	474	---	---	—	—	---	---
Mercury	ug/l	---	—	—	---	---	<0.05	—	---	---	---	---	—
Nickel	mg/l	—	---	---	---	—	—	---	---	---	—	---	---
Potassium	mg/l	---	—	—	---	---	223.3	—	—	---	---	---	---
Sodium	mg/l	---	---	---	—	—	367.5	---	—	—	---	---	---
Sulphate	mg/l	---	—	—	---	---	88.0	—	---	---	---	—	---
Zinc	ug/l	—	---	---	---	—	44.0	---	---	---	—	---	---
Total Alkalinity as CaCO3	mg/l	---	---	---	—	—	2100.0	---	—	—	---	---	---
Total Organic Carbon	mg/l	—	—	—	---	---	---	—	---	---	---	—	—
Total Oxidised Nitrogen	mg/l	0.00	—	0.56	---	0.0	0.0	—	0.0	---	0.0	—	0.0
Arsenic	mg/l	—	---	---	---	—	---	---	---	—	—	—	---
Barium	mg/l	—	---	---	---	—	---	---	---	—	—	---	---
Boron	ug/l	---	—	—	---	---	1792.0	—	—	---	---	---	—
Flouride	mg/l	—	—	---	---	—	0.4	—	---	---	—	—	---
Total Phenols	mg/l	---	---	—	---	---	---	---	—	---	---	---	—
Phosphorous	mg/l	—	—	---	---	---	---	—	---	---	---	—	—
Selenium	mg/l	---	---	---	—	—	---	---	—	—	---	---	---
Silver	mg/l	---	—	—	—	---	---	—	—	—	---	---	---
Mircrotox	Toxic Units	—	—	---	---	—	—	—	---	---	---	—	---
Microtox	Toxic Units	—	—	---	---	—	—	---	---	---	—	—	---
Nitrite	mg/l	0.00	---	0.00	—	0.0	0.0	---	0.0	—	0.0	---	0.00
Nitrate	mg/l	0.00	—	0.56	---	0.0	0.0	—	0.0	---	0.0	---	0.00
Phosphate - ORTHO	mg/l	0.050	---	0.560	---	1.190	0.062	---	0.220	---	0.230	—	0.64
Phosphate - TOTAL	mg/l	—	---	0.0	---	—	1.3358	---	---	---	---	—	---
Total Coliforms		---	—	—	---	---	---	—	—	---	---	---	---
Facel Coliforms		---	—	—	---	---	---	—	—	---	---	---	—
Depth	m	4	—	4.0	—	4.3	3.9	—	3.8	—	4.1	---	3.8

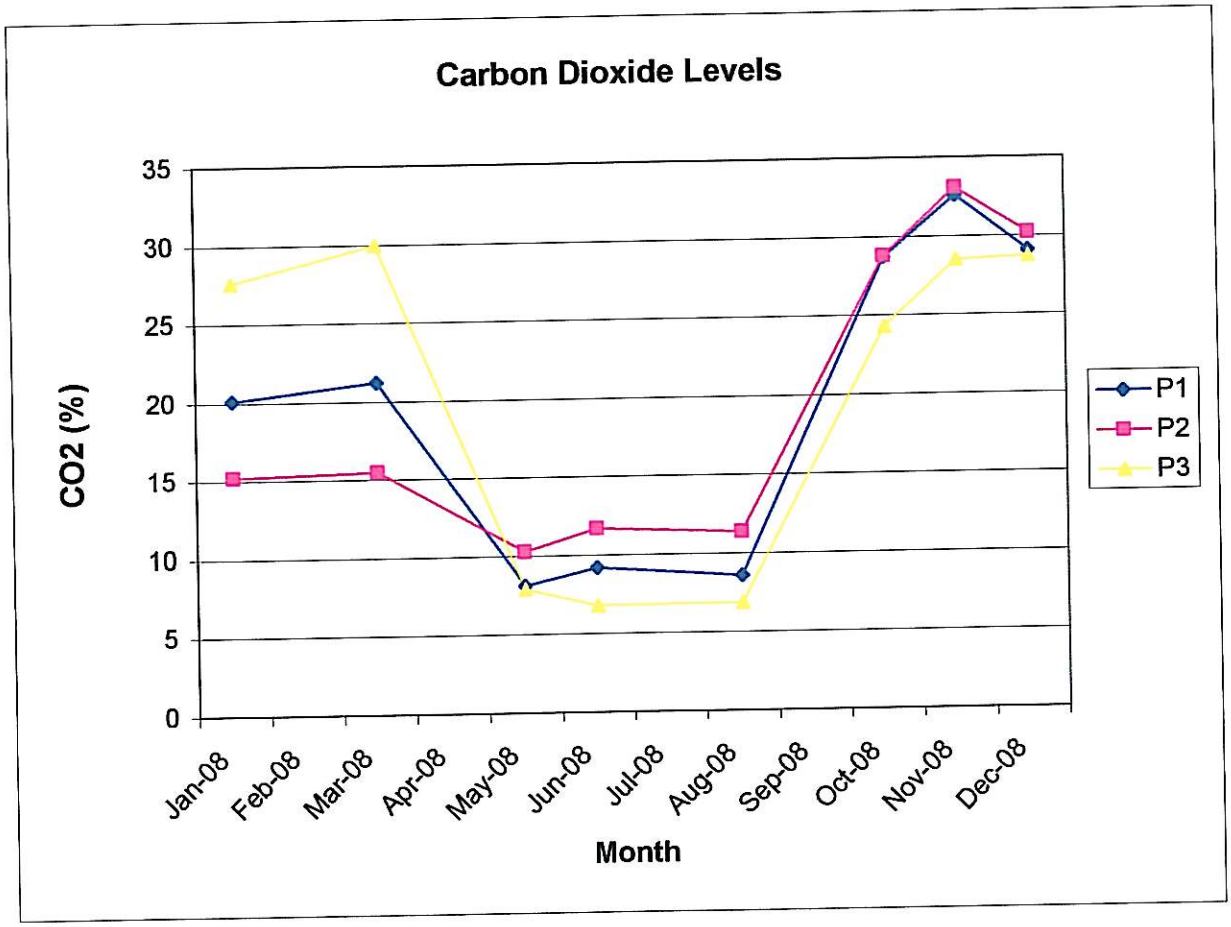
--- not applicable

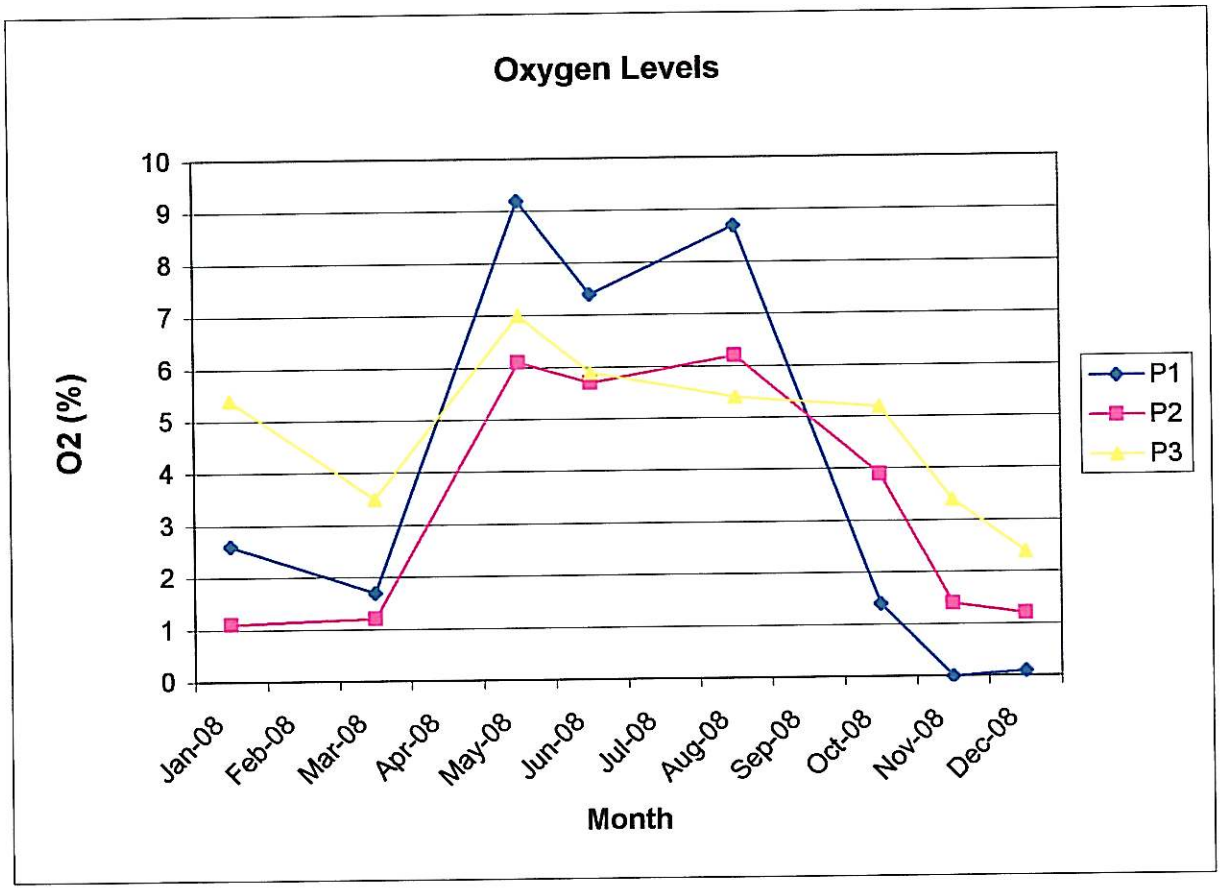
Location		*Muckish Landfill, Muckish, Co Donegal*											
Sample Type		Landfill Gas levels											
Site No		P1											
Date of Sample													
Parameters	**Units**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**	**Date**
		30-Jan-08	---	27-Mar-08	---	21-May-08	24-Jun-08	---	07-Aug-08	---	07-Oct-08	05-Nov-08	10-Dec-08
Methane	%	52.3	---	43.0	---	50.1	52.6	---	55.7	---	48.8	62.3	49.3
Carbon Dioxide	%	20.1	---	21.2	---	8.1	9.2	---	8.6	---	28.7	32.6	29.1
Oxygen	%	2.6	---	1.7	---	9.2	7.4	---	8.7	---	1.4	0.0	0.1
Atmos. Pressure	mBar	1006	---	998	---	989	986	---	999	---	1010	1002	998

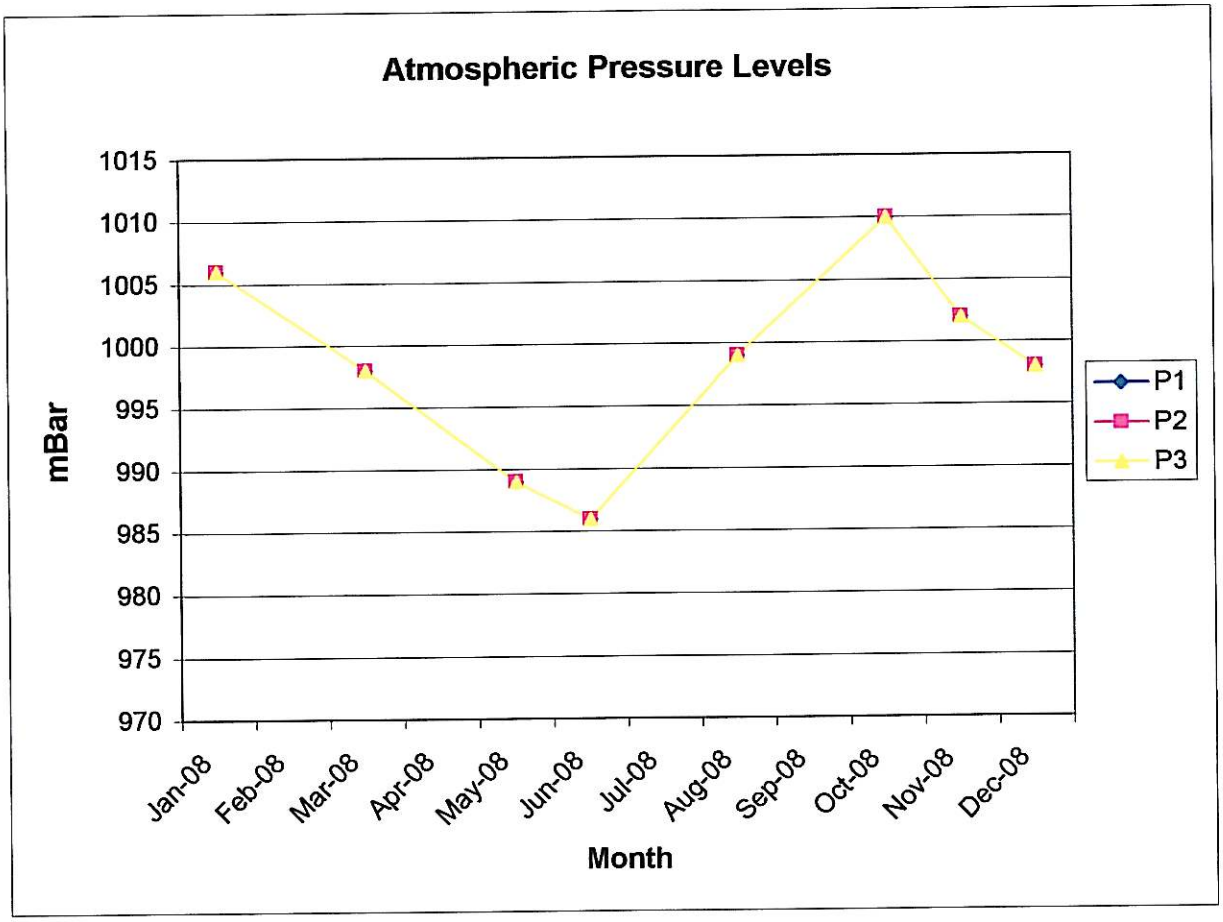
Location		Muckish Landfill, Muckish, Co Donegal											
Sample Type		Landfill Gas levels											
Site No		P2											
Date of Sample													
Parameters	Units	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date
		30-Jan-08	---	27-Mar-08	---	21-May-08	24-Jun-08	---	07-Aug-08	---	07-Oct-08	05-Nov-08	10-Dec-08
Methane	%	18.7	---	18.0	---	26.4	24.7	---	61.2	---	51.6	55.2	52.6
Carbon Dioxide	%	15.2	---	15.5	---	10.3	11.7	---	11.4	---	28.8	33.1	30.2
Oxygen	%	1.1	---	1.2	---	6.1	5.7	---	6.2	---	3.9	1.4	1.2
Atmos. Pressure	mBar	1006	---	998	---	989	986	---	999	---	1010	1002	998

Location		*Muckish Landfill, Muckish, Co Donegal*											
Sample Type		Landfill Gas levels											
Site No		P3											
Date of Sample													
Parameters	Units	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date
		30-Jan-08	---	27-Mar-08	---	21-May-08	24-Jun-08	---	07-Aug-08	---	07-Oct-08	05-Nov-08	10-Dec-08
Methane	%	39.6	---	47.2	---	34.2	36.9	---	62.7	---	61.7	60.9	63.7
Carbon Dioxide	%	27.6	---	30.0	---	7.9	6.8	---	6.9	---	24.3	28.5	28.7
Oxygen	%	5.4	---	3.5	---	7.0	5.9	---	5.4	---	5.2	3.4	2.4
Atmos. Pressure	mBar	1006	---	998	---	989	986	---	999	---	1010	1002	998


Methane Levels
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
CH4 (%)
Jan-08
Feb-08
Mar-08
Apr-08
May-08
Jun-08
Jul-08
Aug-08
Sep-08
Oct-08
Nov-08
Dec-08
Month
P1
P2
P3


Carbon Dioxide Levels
35
30
25
20
15
10
5
0
CO2 (%)
Jan-08
Feb-08
Mar-08
Apr-08
May-08
Jun-08
Jul-08
Aug-08
Sep-08
Oct-08
Nov-08
Dec-08
Month
P1
P2
P3


Oxygen Levels
O2 (%)
10
9
8
7
6
5
4
3
2
1
0
Jan-08
Feb-08
Mar-08
Apr-08
May-08
Jun-08
Jul-08
Aug-08
Sep-08
Oct-08
Nov-08
Dec-08
Month
P1
P2
P3


Atmospheric Pressure Levels
mBar
1015
1010
1005
1000
995
990
985
980
975
970
Jan-08
Feb-08
Mar-08
Apr-08
May-08
Jun-08
Jul-08
Aug-08
Sep-08
Oct-08
Nov-08
Dec-08
Month
P1
P2
P3

APPENDIX B

WATER BALANCE CALCULATION

MUCKISH WATER BALANCE CALCULATION

YEAR	Status	Active Area A(m^2)	Waste Input t/month	Rainfall	Active Area Infiltration R(A)(m^2)	Liquid Waste LW(m3)	Temp Restored Area	Temp Restored Infiltration IRCA(m3)	Restored area Area	Restored area Infiltration IRCA(m3)	Total Water	Leachate produced Lo(m3)
2008	Closed	0	0	1242.6	0	0	0		20,500	2547	2547	2547
Total				1243								2547

Assumptions

IRCA=	Fully Capped/Restored area infiltration of rainfall estimated (2-10%),EPA Manual	10%	%
Restored area	Area capped is 20,500.	20,500	m^2
Rainfall Data	Data taken from Met Eireann Station Malin Head, Total Rainfall used.	1242.6	mm

APPENDIX C

E-PRTR Regulations

(AER Electronic Reporting System)

At the time of reporting passwords for 2009 for the EPA's web-based database have not been issued. A hard copy of the return will be forwarded to the Agency under separate cover when passwords are issued.