



ANNUAL ENVIRONMENTAL REPORT

For

Muckish Landfill Site

(Waste Licence Reference W0126-1)

By

Donegal County Council

For

Environmental Protection Agency

Reporting Period: January 2011 to December 2011

March 2012

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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 material 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, 2011 to 31st December 2011.

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 material shall be accepted for the purposes of remediation, rehabilitation, enhancement and restoration of the facility. The maximum amount 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 material; (for use in restoration works) was accepted onto the site during 2004. The balance of restoration materials were imported during 2005 as shown in the table. No material has been imported since this time.

Table 1: Waste Quantities Accepted (tonnes)

Waste Type	1998	1999	2000	2001	2002	2003	2004	2005
Domestic Refuse*	4418	5639	7008	5729	0	0	0	0
Inert Waste	0	0	0	0	0	0	2,500	34,667
	2006	2007	2008	2009	2010	2011		
All mterial	0	0	0	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 BL523421/406 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.

5.1.3 Groundwater results show that levels of parameters indicative of groundwater contamination with leachate, such as ammonia and electrical conductivity, are similar than those detected in the last reporting period. Again this period, the only well showing any significant presence of parameters indicative of leachate is GW3 (max. ammonia = 2.7mg/l), 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 northeastern boundary of the landfill. Surface water monitoring is carried out at four monitoring locations as shown on Drawing No BL523421/406 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 eliminated since the capping of the site.

5.3 Leachate Composition

5.3.1 Leachate monitoring was previously carried out at one monitoring location point on the site as shown on Drawing No BL523421/406 Monitoring Locations. This well became inaccessible at during this period and leachate is now sampled from the leachate collection sump. Results show all parameters are consistent with typical leachate composition ranges (as presented in EPA Manual 'Landfill Operational Practices'), and leachate is similar in composition to that detected during the previous reporting period. Levels of leachate contaminants are lower this period but seasonal conditions should be accounted for.

5.4 Landfill gas

5.4.1 Landfill gas monitoring is undertaken at three locations (as shown on Drawing No BL523421/406 Monitoring Locations), which are 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.

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 (now inaccessible and replaced with collection sump)
Surface Water	SW1, SW2, SW3, SW4

6.3 Interpretation of Environmental Monitoring**6.3.1 Groundwater**

Condition 9 and Schedule D of the Licence require 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. Since restoration the Agency has agreed to reduce monitoring frequency to bi-annually, and to forego the need for List I/II parameters annually. 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.

Upstream

Levels of COD are slightly raised at GW1 relative to MAC.

Downstream

Monitoring at GW2 and GW3 detected elevated levels of Ammoniacal Nitrogen (max 2.7mg/l), and iron (max 1,290ug/l), pH (5.85) and Chloride (max. 40mg/l) during the reporting period.

These results generally indicate that a small amount of leachate was being released from the waste body into the immediate groundwater environment. The downstream wells, however, are very close to the waste body and ammonia levels are low.

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. Since restoration, bi-annual monitoring has been agreed with the Agency, and the annual requirement for List I/II has been dropped.

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. The only parameter detected in excess of MAC during this reporting period was Chloride. This was found at similar levels upstream and downstream (max. 43mg/l).

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

PARAMETER	Muckish Landfill Site 2011		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)	1.39	47	<0.2	1700	491
BOD	0	6.8	4.5	>4800	>834
COD	44	49	<10	33,700	3078
Chloride (mg/l)	232	240	27	3410	1256
Iron (ug/l)	N/A	N/A	0.4	664	54.4
Potassium(ug/l)	N/A	N/A	2.7	1480	491
TON (mg/l N)	<0.01	<0.01	/	/	/
Conductivity (mS/cm)	300	402	503	19,200	7789
pH	6.77	6.82	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 leachate composition is similar (slightly weaker) to that detected during the last reporting period, but seasonal factors should be taken into account.

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 46.4% to 61.3%. Carbon Dioxide levels range from 25.8% to 34.5%. 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 3270m³ of leachate was removed from the site and tankered to Donegal County Council's Wastewater Treatment Plant in Letterkenny. Table 7.1 below shows the monthly breakdown of tankering volumes relative to rainfall data.

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 2526m³. The water balance calculation is attached in Appendix B.

Table 7.1 Breakdown of leachate volumes by month in 2011 relative to rainfall at Malin Head		
Month	Leachate Volume (m³)	Rainfall at Main Head (mm)
January	290	89.6
February	185.5	105.4
March	271	59.0
April	297	66.2
May	330	100.4
June	264	84.5
July	252	49.9
August	300	79.0
September	240	133.0
October	240	177.1
November	360	103.7
December	240	184.2
Totals	3270m³	1232.0mm

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.

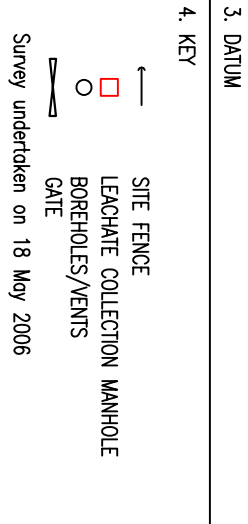
10. REVIEW OF NUISANCE CONTROLS

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

1. VERIFYING DIMENSIONS: THE CONTRACTOR SHALL VERIFY DIMENSIONS AGAINST SUCH OTHER DRAWINGS OR SITE CONDITIONS AS PERTAIN TO THIS PART OF THE WORK.
2. SERVICES: APPROVED OPENINGS FOR SERVICES THROUGH THE STRUCTURE ARE INCORPORATED ON THE DRAWINGS. ANY ADDITIONAL OPENINGS OF A MINOR NATURE REQUIRED BY THE MAIN CONTRACTOR OR HIS SUBCONTRACTORS MUST BE SUBMITTED ON A DRAWING FOR APPROVAL BEFORE WORK COMMENCES.
3. DATUM
4. KEY



REV	DESCRIPTION	BY DATE	CHECK DATE

DRAWN BY AMB CHECK BY DD APPROVED DD
 DATE JAN '08 DATE JAN '08 DATE JAN '08

PLOT SCALE 1:1000 SCHEDULES SHEET SIZE A3

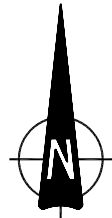
CLIENT
 DONEGAL DOUNTY COUNCIL

PROJECT
 MUCKISH LANDFILL SITE

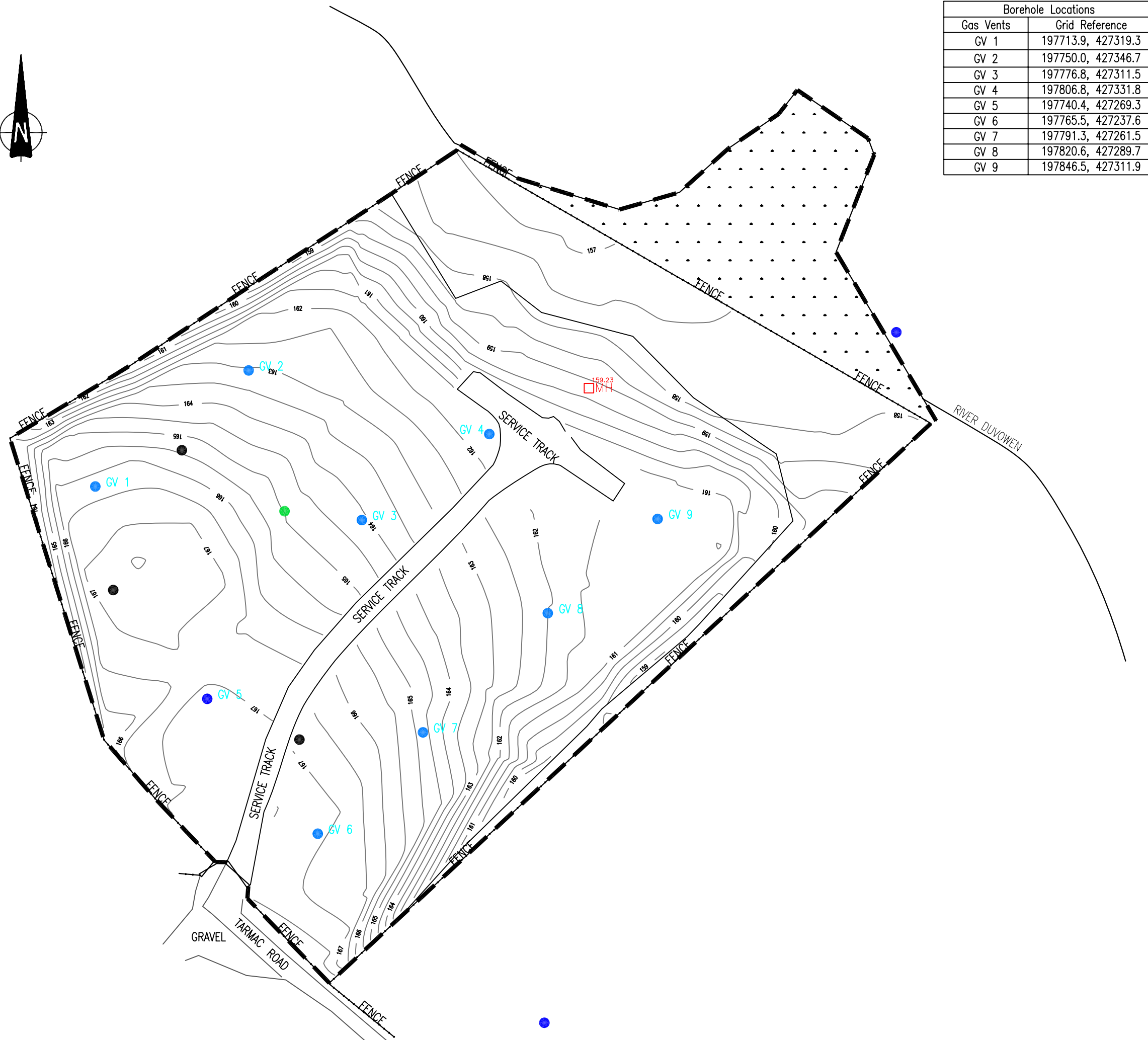
TITLE
 MUCKISH SITE SURVEY
 (Post Works)

TEL: 074 91 61927 www.rpsgroup.com/ireland FAX: 074 91 61928
 THE ENTERPRISE FUND BUSINESS CENTRE, BALLYFRANK, LETTERKENNY, CO. DONEGAL.

ARCHITECT	DWG. STATUS
DRAWING No. BL523421/402	PRELIM.
REVISION	TENDER
	CONST.
	RECORD



Borehole Locations	
Gas Vents	Grid Reference
GV 1	197713.9, 427319.3
GV 2	197750.0, 427346.7
GV 3	197776.8, 427311.5
GV 4	197806.8, 427331.8
GV 5	197740.4, 427269.3
GV 6	197765.5, 427237.6
GV 7	197791.3, 427261.5
GV 8	197820.6, 427289.7
GV 9	197846.5, 427311.9



NOTES

1. NEW BOREHOLES

● PASSIVE GAS VENTS

2. EXISTING BOREHOLES

GRID REFERENCE B 9780E, 2729N

● 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

REV	DESCRIPTION	BY DATE	CHECK DATE

DRAWN BY AMB DATE JAN '08	CHECK BY DD DATE JAN '08	APPROVED DD DATE JAN '08
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PLOT SCALE 1:1000	SCHEDULES	SHEET SIZE A3
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CLIENT
DONEGAL DOUNTY COUNCIL

PROJECT
MUCKISH LANDFILL SITE

TITLE
MONITORING POINTS

RPS Consulting Engineers
 TEL: 074 91 61927 www.rpsgroup.com/ireland FAX: 074 91 61928
 THE ENTERPRISE FUND BUSINESS CENTRE, BALLYRAINE, LETTERKENNY, Co. DONEGAL

ARCHITECT	DWG. STATUS
DRAWING No. BL523421/406	PRELIM. <input type="checkbox"/>
REVISION	TENDER <input type="checkbox"/>
	CONST. <input type="checkbox"/>
	RECORD <input checked="" type="checkbox"/>

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				1794							5407		
pH				7.19							7.60		
Temp	C			11.90							14.50		
Electrical Conductivity	uS/cm			78							75		
Ammonical Nitrogen	mg/l			0.04							<0.01		
COD	mg/l			7							21		
BOD	mg/l			0.45							0.14		
Dissolved Oxygen	mg/l			11.39							9.16		
SS	mg/l			0.00							0.4		
Residue on Evaporator	mg/l												
Calcium	ug/l												
Cadmium	ug/l												
Chromium	ug/l												
Chloride	mg/l										41		
Chlorine	mg/l												
Copper	ug/l												
Cyanide	mg/l												
Dissolved Iron	ug/l												
Lead	ug/l												
Magnesium	ug/l												
Manganese	ug/l												
Mercury	ug/l												
Nickel	mg/l												
Potassium	mg/l												
Sodium	mg/l												
Sulphate	mg/l												
Zinc	ug/l												
Total Alkalinity as CaCO3	mg/l												
Total Organic Carbon	mg/l												
Total Oxidised Nitrogen	mg/l			<0.01							0.11		
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			<0.01							<0.01		
Nitrate	mg/l			<0.01							<0.01		
Phosphate - ORTHO	mg/l			<0.01							0.021		
Phosphate - TOTAL	mg/l												
Total Coliforms													
Facel Coliforms													
Depth	m												

--- not applicable

Location		<i>Muckish, Falcarragh, Co Donegal</i>											
Sample Type		surface water											
Site No		SW2											
Date of Sample		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Lab No				1795							5408		
pH				7.20							7.27		
Temp	C			13.00							16.30		
Electrical Conductivity	uS/cm			72							74		
Ammonical Nitrogen	mg/l			0.04							<0.01		
COD	mg/l			17							30		
BOD	mg/l			0.33							0.16		
Dissolved Oxygen	mg/l			10.22							9.18		
SS	mg/l			0.0							0.4		
Residue on Evaporator	mg/l												
Calcium	ug/l												
Cadmium	ug/l												
Chromium	ug/l												
Chloride	mg/l			22							43		
Chlorine	mg/l												
Copper	ug/l												
Cyanide	mg/l												
Dissolved Iron	ug/l												
Lead	ug/l												
Magnesium	ug/l												
Manganese	ug/l												
Mercury	ug/l												
Nickel	mg/l												
Potassium	mg/l												
Sodium	mg/l												
Sulphate	mg/l												
Zinc	ug/l												
Total Alkalinity as CaCO3	mg/l												
Total Organic Carbon	mg/l												
Total Oxidised Nitrogen	mg/l			<0.01							0.002		
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			<0.01							<0.01		
Nitrate	mg/l			<0.01							<0.01		
Phosphate - ORTHO	mg/l			<0.01							<0.01		
Phosphate - TOTAL	mg/l												
Total Coliforms													
Facel Coliforms													
Depth	m												

--- not applicable

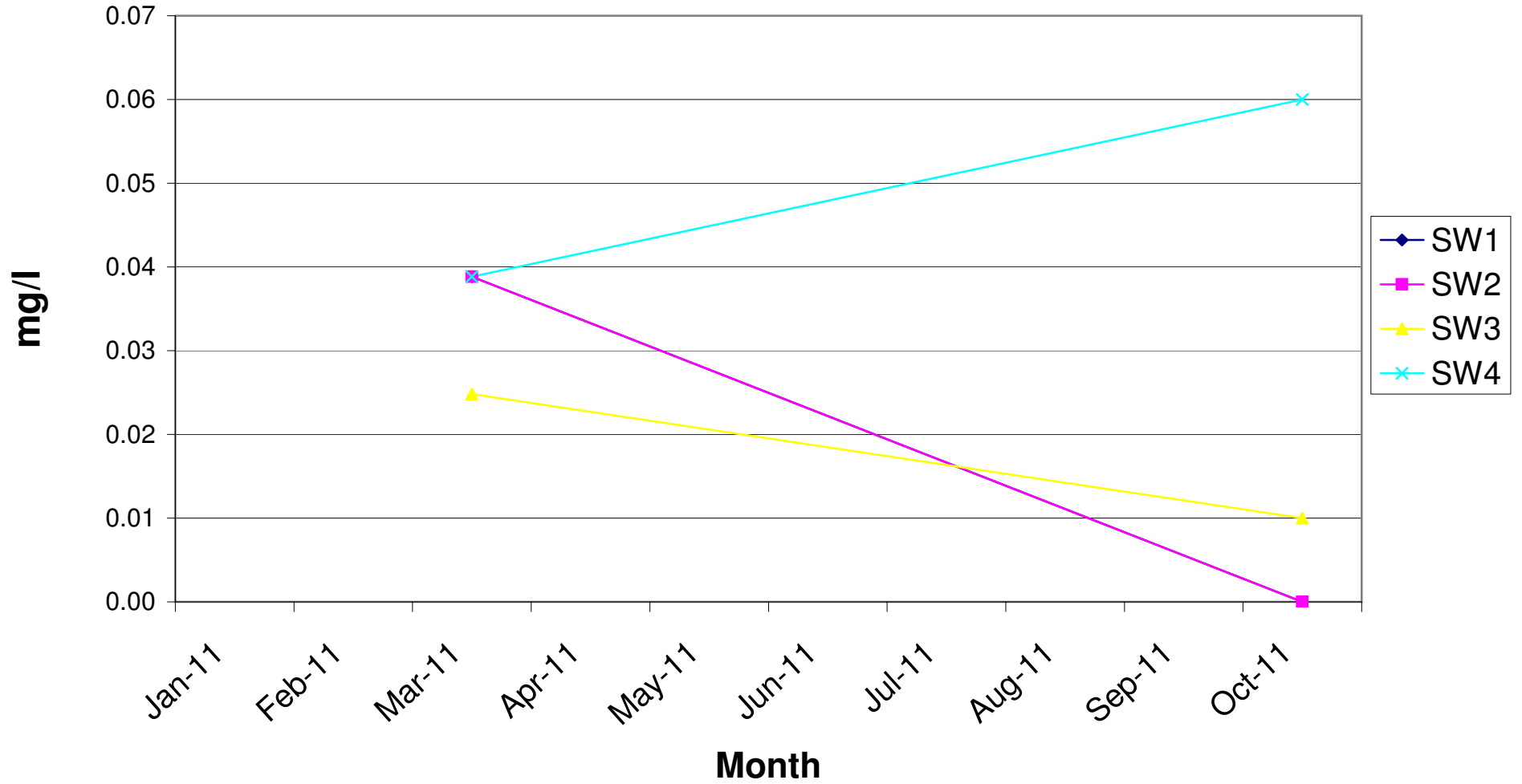
Location		<i>Muckish, Falcarragh, Co Donegal</i>											
Sample Type		surface water											
Site No		SW3											
Date of Sample		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Lab No				1796							5409		
pH				7.64							7.16		
Temp	C			13.40							14.10		
Electrical Conductivity	uS/cm			84							75		
Ammonical Nitrogen	mg/l			0.02							0		
COD	mg/l			10							20		
BOD	mg/l			0.30							0.29		
Dissolved Oxygen	mg/l			10.62							8.62		
SS	mg/l			0.0							3.2		
Residue on Evaporator	mg/l												
Calcium	ug/l												
Cadmium	ug/l												
Chromium	ug/l												
Chloride	mg/l			21							42		
Chlorine	mg/l												
Copper	ug/l												
Cyanide	mg/l												
Dissolved Iron	ug/l												
Lead	ug/l												
Magnesium	ug/l												
Manganese	ug/l												
Mercury	ug/l												
Nickel	mg/l												
Potassium	mg/l												
Sodium	mg/l												
Sulphate	mg/l												
Zinc	ug/l												
Total Alkalinity as CaCO3	mg/l												
Total Organic Carbon	mg/l												
Total Oxidised Nitrogen	mg/l			<0.01							0.11		
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			<0.01							<0.01		
Nitrate	mg/l			<0.01							<0.01		
Phosphate - ORTHO	mg/l			<0.01							0.018		
Phosphate - TOTAL	mg/l												
Total Coliforms													
Facel Coliforms													
Depth	m												

--- not applicable

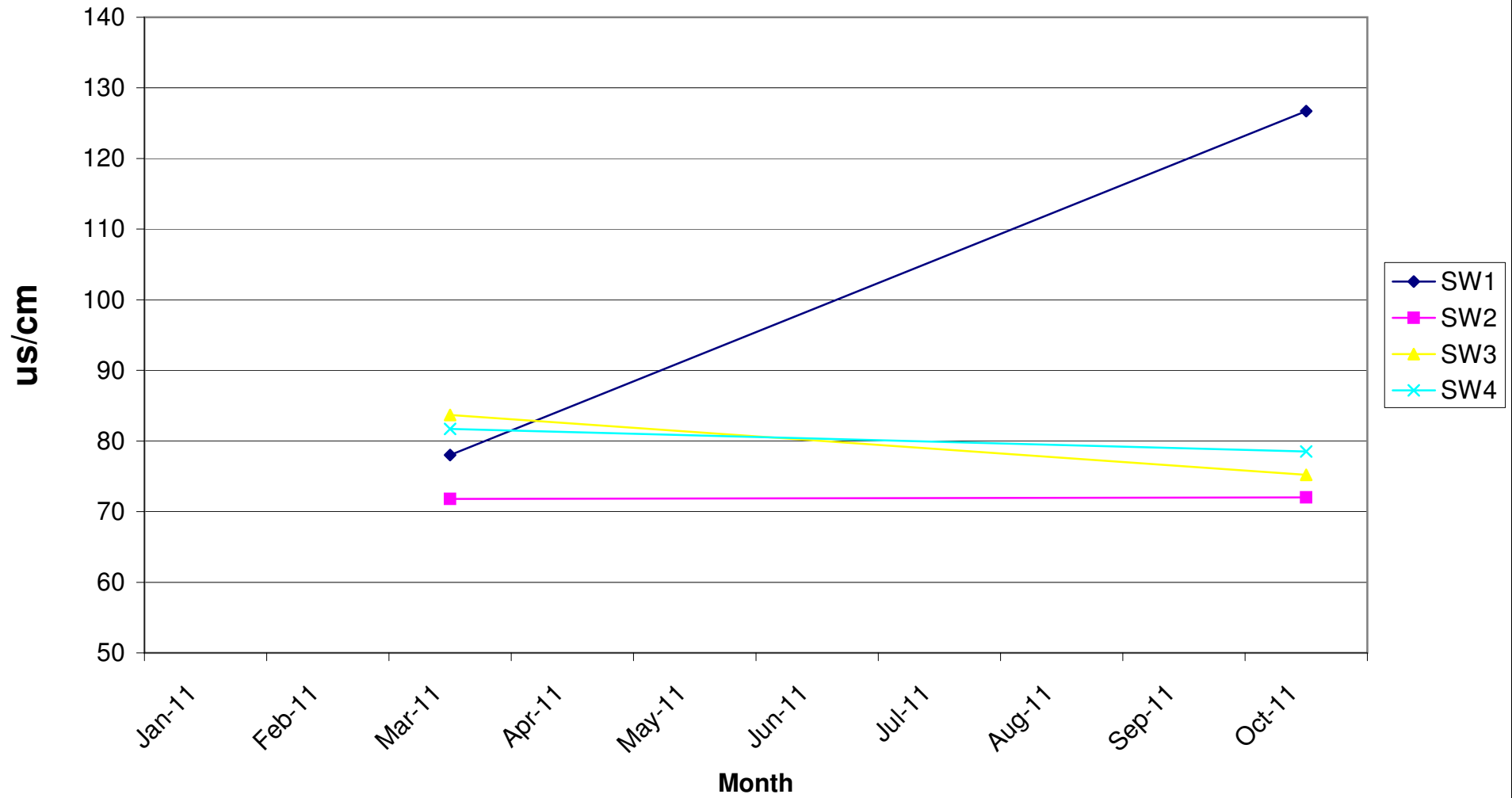
Location		<i>Muckish, Falcarragh, Co Donegal</i>											
Sample Type		surface water											
Site No		SW4											
Date of Sample		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Lab No				1797							5410		
pH				7.12							7.14		
Temp	C			14.20							15.90		
Electrical Conductivity	uS/cm			82							78		
Ammonical Nitrogen	mg/l			0.04							0.06		
COD	mg/l			32							18		
BOD	mg/l			0.33							0.10		
Dissolved Oxygen	mg/l			10.62							8.32		
SS	mg/l			0.0							4.8		
Residue on Evaporator	mg/l												
Calcium	ug/l												
Cadmium	ug/l												
Chromium	ug/l												
Chloride	mg/l			22							42		
Chlorine	mg/l												
Copper	ug/l												
Cyanide	mg/l												
Dissolved Iron	ug/l												
Lead	ug/l												
Magnesium	ug/l												
Manganese	ug/l												
Mercury	ug/l												
Nickel	mg/l												
Potassium	mg/l												
Sodium	mg/l												
Sulphate	mg/l												
Zinc	ug/l												
Total Alkalinity as CaCO3	mg/l												
Total Organic Carbon	mg/l												
Total Oxidised Nitrogen	mg/l			<0.01							0.17		
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												
Micrtox	Toxic Units												
Nitrite	mg/l			<0.01							<0.01		
Nitrate	mg/l			<0.01							<0.01		
Phosphate - ORTHO	mg/l			<0.01							0.015		
Phosphate - TOTAL	mg/l												
Total Coliforms													
Facel Coliforms													
Depth	m												

--- not applicable

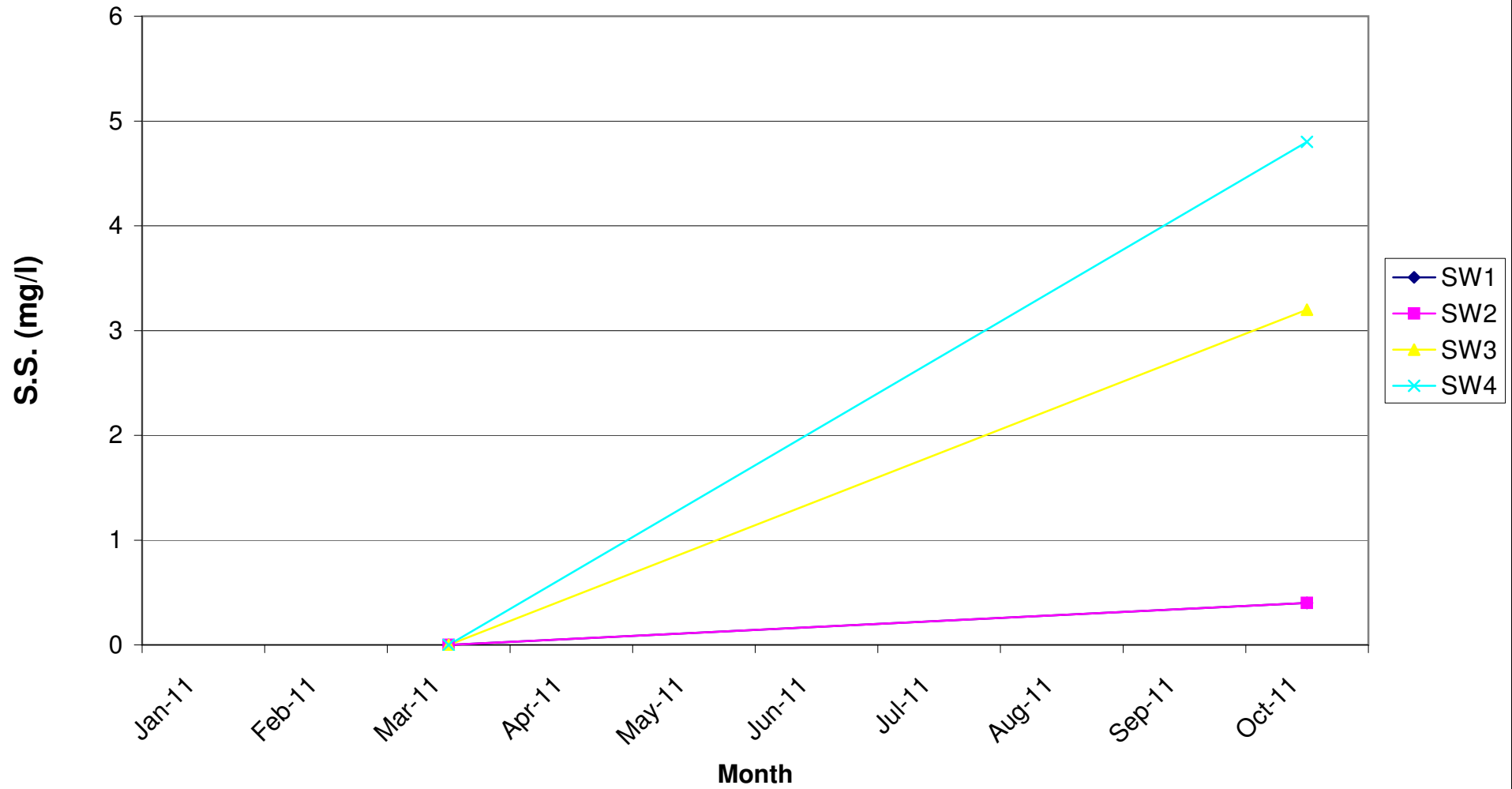
Surfacewater Ammonical Nitrogen Content



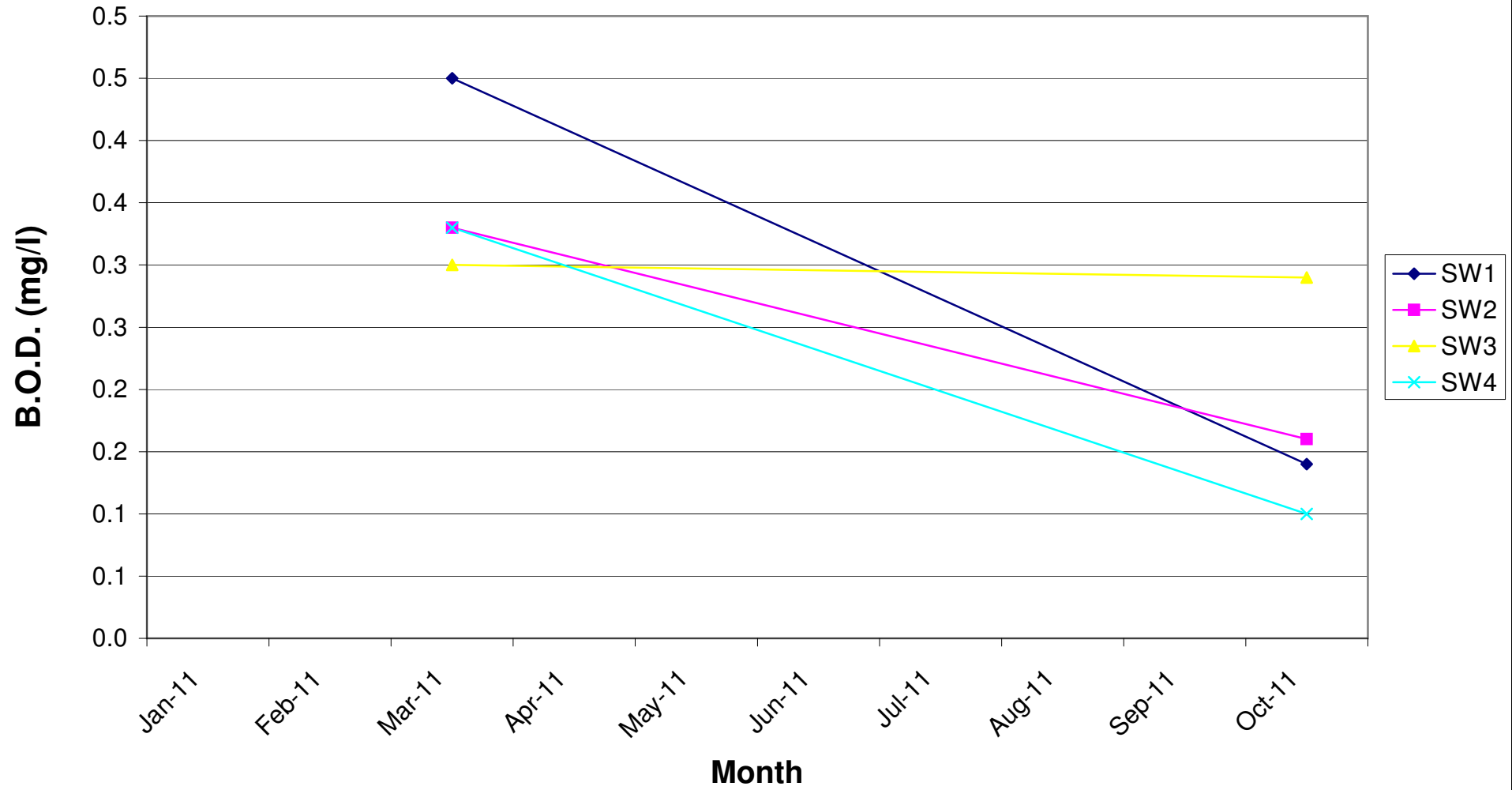
Surfacewater Electrical Conductivity



Surfacewater Suspended Solids



Surfacewater B.O.D.



Location		<i>Muckish, Falcarragh, Co Donegal</i>											
Sample Type		groundwater											
Site No		GW1											
Date of Sample		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Lab No				1837							5429		
pH				6.67							6.72		
Temp	C			13.00							14.00		
Electrical Conductivity	uS/cm			150							176		
Ammonical Nitrogen	mg/l			0.04							0.04		
COD	mg/l			48									
BOD	mg/l												
Dissolved Oxygen	mg/l			10.56							10.44		
SS	mg/l												
Residue on Evaporator	mg/l												
Calcium	ug/l												
Cadmium	ug/l												
Chromium	ug/l												
Chloride	mg/l			25							26		
Chlorine	mg/l												
Copper	ug/l												
Cyanide	mg/l												
Dissolved Iron	mg/l										0.03		
Lead	ug/l												
Magnesium	ug/l												
Manganese	ug/l												
Mercury	ug/l												
Nickel	mg/l												
Potassium	mg/l										<2.34		
Sodium	mg/l										8.77		
Sulphate	mg/l												
Zinc	ug/l												
Total Alkalinity as CaCO3	mg/l												
Total Organic Carbon	mg/l										13.20		
Total Oxidised Nitrogen	mg/l			<0.01							<0.01		
Arsenic	mg/l												
Barium	mg/l												
Boron	ug/l												
Flouride	mg/l												
Total Phenols	mg/l										<0.016		
Phosphorous	mg/l												
Selenium	mg/l												
Silver	mg/l												
Mircrotox	Toxic Units												
Micrtox	Toxic Units												
Nitrite	mg/l			<0.01							<0.01		
Nitrate	mg/l			<0.01							<0.01		
Phosphate - ORTHO	mg/l			<0.01							<0.01		
Phosphate - TOTAL	mg/l										0.0		
Total Coliforms											<1		
Facel Coliforms											<1		
Depth	m			2.6							2.4		

--- not applicable

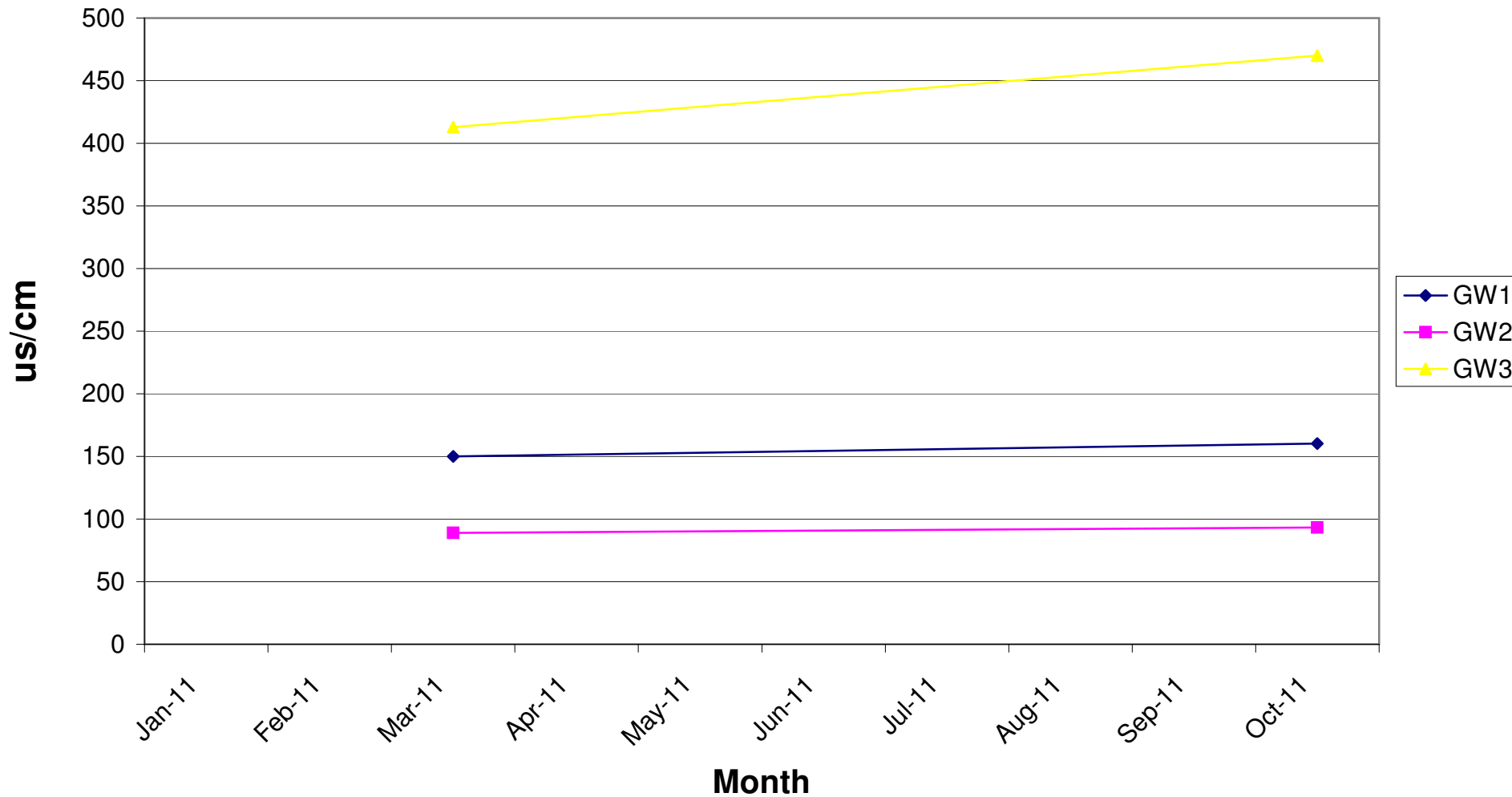
Location		<i>Muckish, Falcarragh, Co Donegal</i>											
Sample Type		groundwater											
Site No		GW2											
Date of Sample		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Lab No				1838							5430		
pH				5.85							6.02		
Temp	C			12.30							13.60		
Electrical Conductivity	uS/cm			89							92		
Ammonical Nitrogen	mg/l			0.10							0.14		
COD	mg/l			85									
BOD	mg/l												
Dissolved Oxygen	mg/l			3.89							3.65		
SS	mg/l												
Residue on Evaporator	mg/l												
Calcium	ug/l												
Cadmium	ug/l												
Chromium	ug/l												
Chloride	mg/l			24							40		
Chlorine	mg/l												
Copper	ug/l												
Cyanide	mg/l												
Dissolved Iron	mg/l										1.29		
Lead	ug/l												
Magnesium	ug/l												
Manganese	ug/l												
Mercury	ug/l												
Nickel	mg/l												
Potassium	mg/l										<2.34		
Sodium	mg/l										13.70		
Sulphate	mg/l												
Zinc	ug/l												
Total Alkalinity as CaCO3	mg/l												
Total Organic Carbon	mg/l										21.400		
Total Oxidised Nitrogen	mg/l			<0.01							<0.01		
Arsenic	mg/l												
Barium	mg/l												
Boron	ug/l												
Flouride	mg/l												
Total Phenols	mg/l										<0.016		
Phosphorous	mg/l												
Selenium	mg/l												
Silver	mg/l												
Mircrotox	Toxic Units												
Micrtox	Toxic Units												
Nitrite	mg/l			<0.01							<0.01		
Nitrate	mg/l			<0.01							<0.01		
Phosphate - ORTHO	mg/l			<0.01									
Phosphate - TOTAL	mg/l												
Total Coliforms											<1		
Facel Coliforms											<1		
Depth	m			0.25							0.20		

--- not applicable

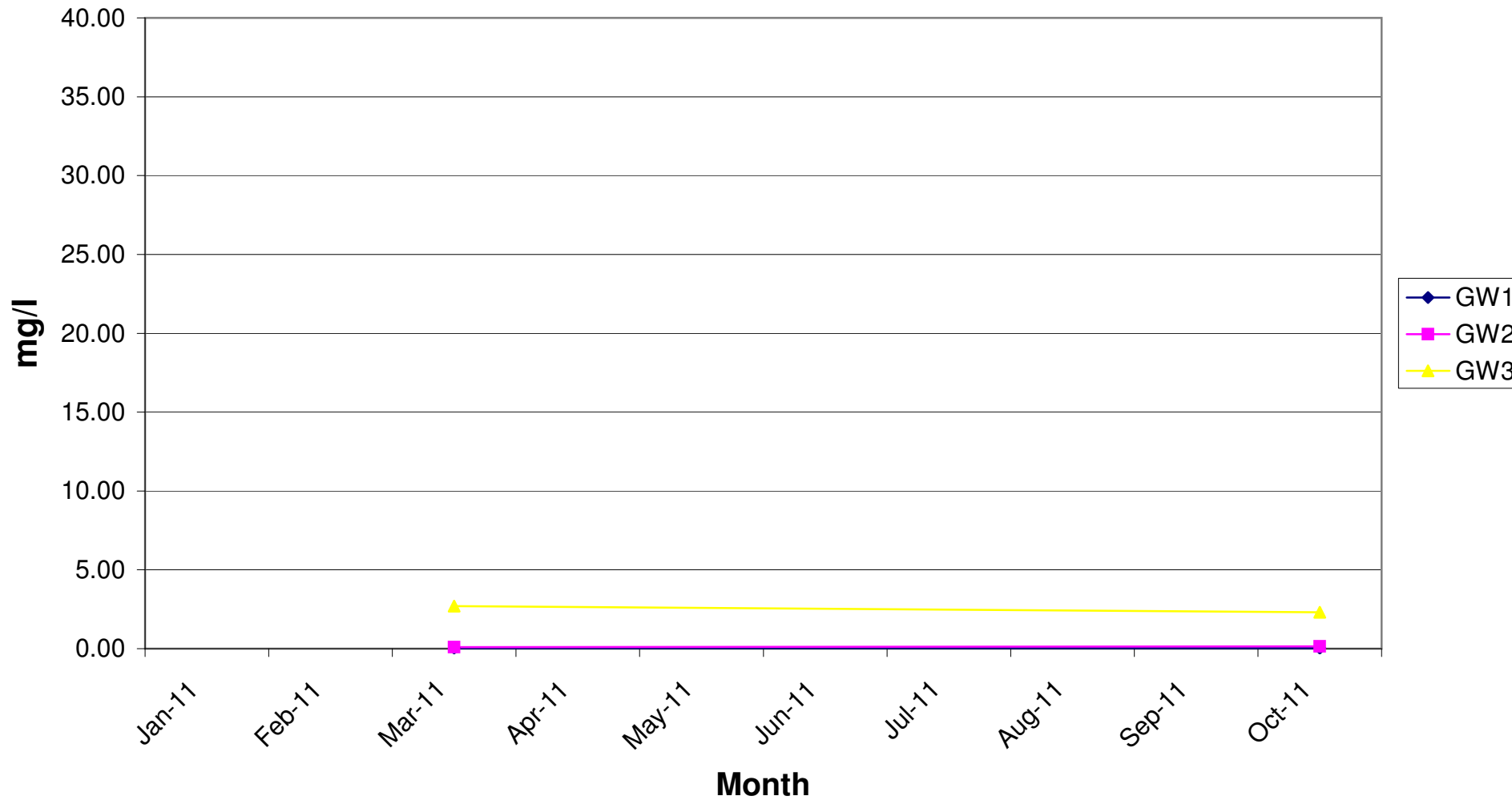
Location		<i>Muckish, Falcarragh, Co Donegal</i>											
Sample Type		groundwater											
Site No		GW3											
Date of Sample		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Lab No				1839							5431		
pH				6.71							6.84		
Temp	C			11.70							12.90		
Electrical Conductivity	uS/cm			413							422		
Ammonical Nitrogen	mg/l			2.70							2.30		
COD	mg/l			39									
BOD	mg/l												
Dissolved Oxygen	mg/l			3.47							3.20		
SS	mg/l												
Residue on Evaporator	mg/l												
Calcium	ug/l												
Cadmium	ug/l												
Chromium	ug/l												
Chloride	mg/l			25							35		
Chlorine	mg/l												
Copper	ug/l												
Cyanide	mg/l												
Dissolved Iron	mg/l										0.81		
Lead	ug/l												
Magnesium	ug/l												
Manganese	ug/l												
Mercury	ug/l												
Nickel	mg/l												
Potassium	mg/l										6.59		
Sodium	mg/l										20.00		
Sulphate	mg/l												
Zinc	ug/l												
Total Alkalinity as CaCO ₃	mg/l												
Total Organic Carbon	mg/l										17.600		
Total Oxidised Nitrogen	mg/l			<0.01							<0.01		
Arsenic	mg/l												
Barium	mg/l												
Boron	ug/l												
Flouride	mg/l												
Total Phenols	mg/l										<0.016		
Phosphorous	mg/l												
Selenium	mg/l												
Silver	mg/l												
Mircrotox	Toxic Units												
Micrtox	Toxic Units												
Nitrite	mg/l			<0.01							<0.01		
Nitrate	mg/l			<0.01							<0.01		
Phosphate - ORTHO	mg/l			<0.01									
Phosphate - TOTAL	mg/l												
Total Coliforms											<1		
Facel Coliforms											<1		
Depth	m			0.20							0.20		

--- not applicable

Groundwater Electrical Conductivity



Groundwater Ammonical Nitrogen Content

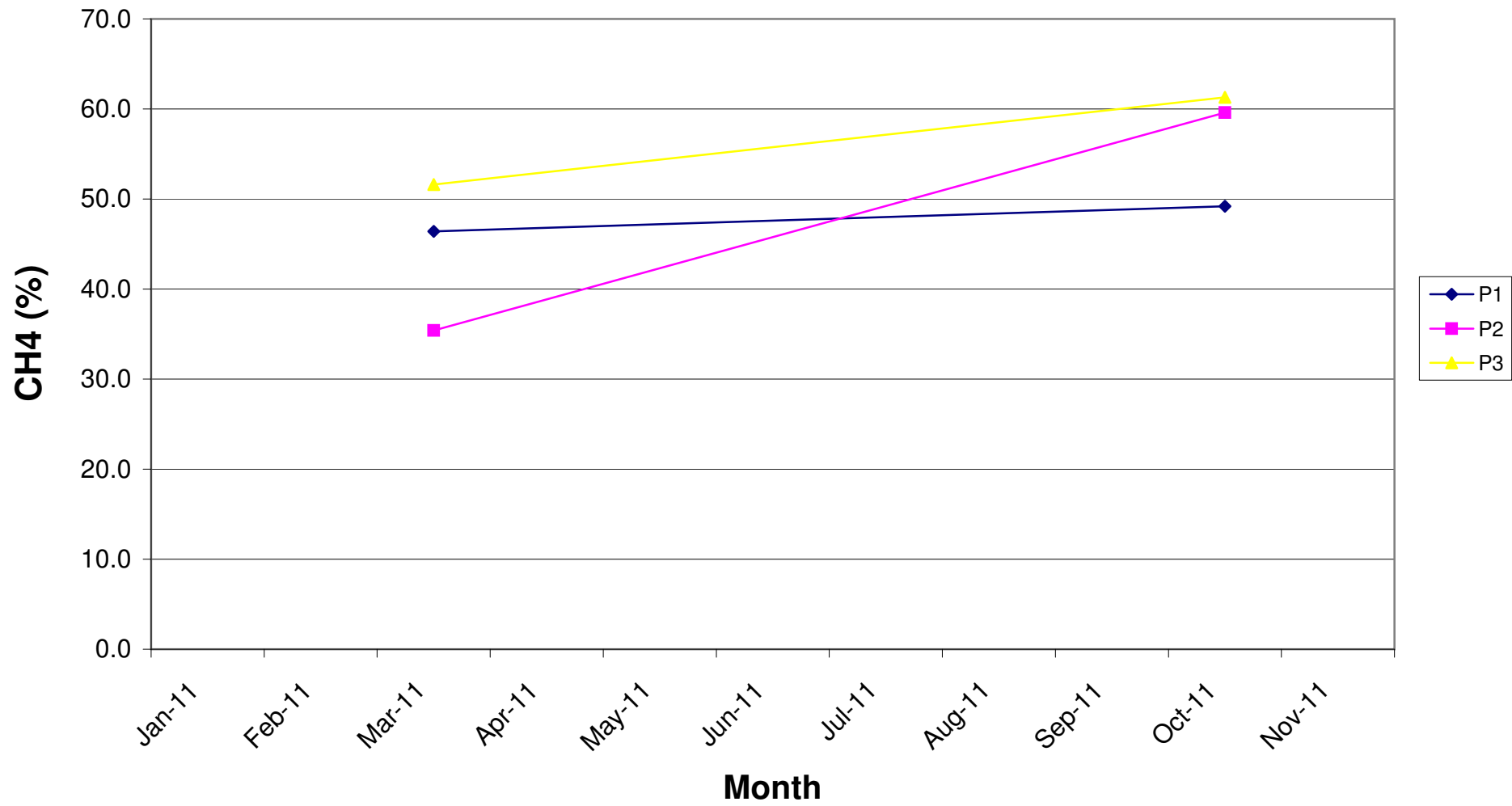


Location		<i>Muckish Landfill, Muckish, Co Donegal</i>											
Sample Type		Landfill Gas levels											
Site No		P1											
Date of Sample													
Parameters	Units	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Methane	%			46.4							49.2		
Carbon Dioxide	%			27.2							25.8		
Oxygen	%			0.8							1.2		
Atmos. Pressure	mBar			1022							997		

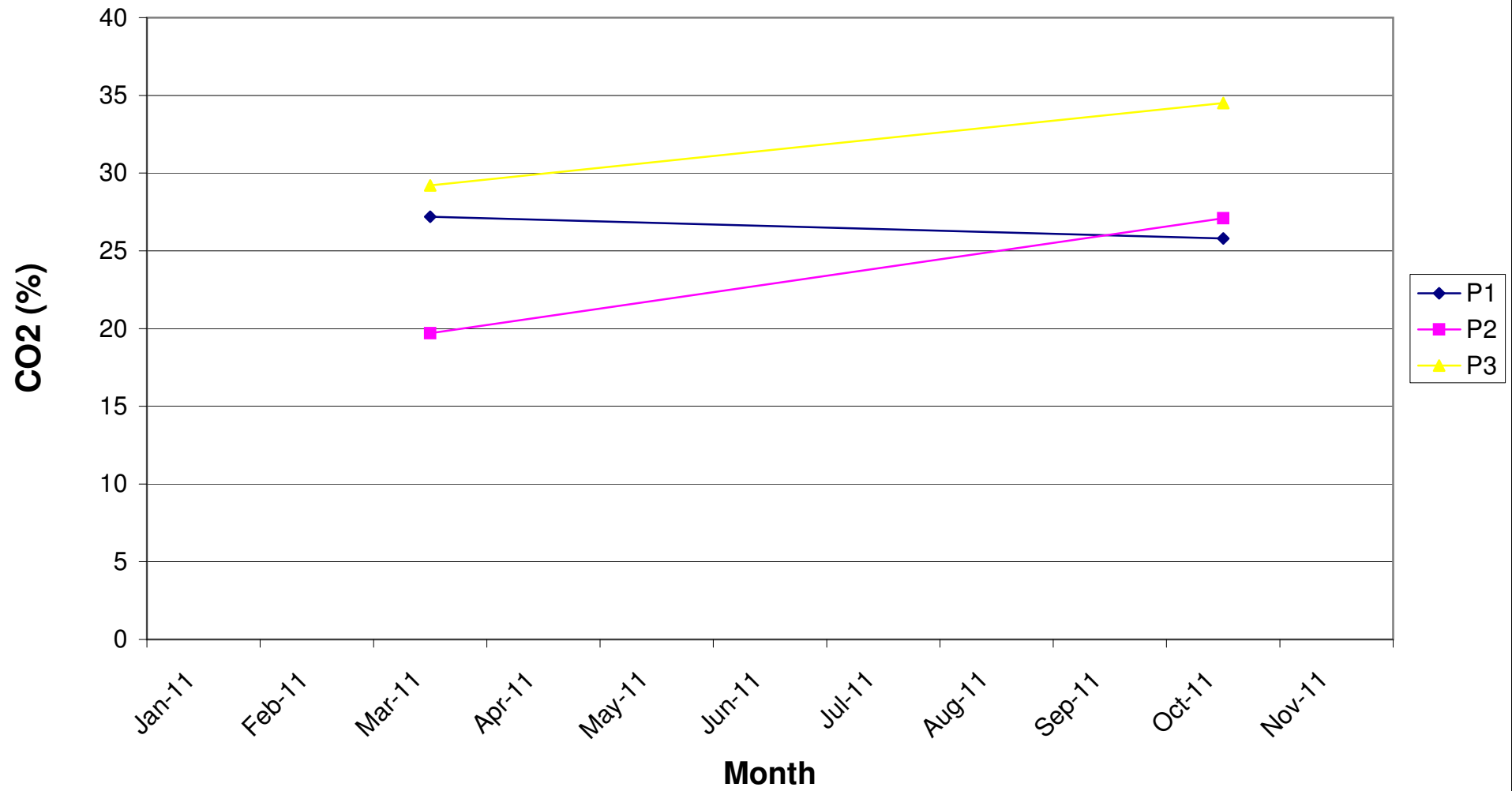
Location		<i>Muckish Landfill, Muckish, Co Donegal</i>											
Sample Type		Landfill Gas levels											
Site No		P2											
Date of Sample													
Parameters	Units	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Methane	%			35.4							59.6		
Carbon Dioxide	%			19.7							27.1		
Oxygen	%			15.1							1.2		
Atmos. Pressure	mBar			1022							997		

Location		<i>Muckish Landfill, Muckish, Co Donegal</i>											
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
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Methane	%			51.6							61.3		
Carbon Dioxide	%			29.2							34.5		
Oxygen	%			2.4							1.1		
Atmos. Pressure	mBar			1022							997		

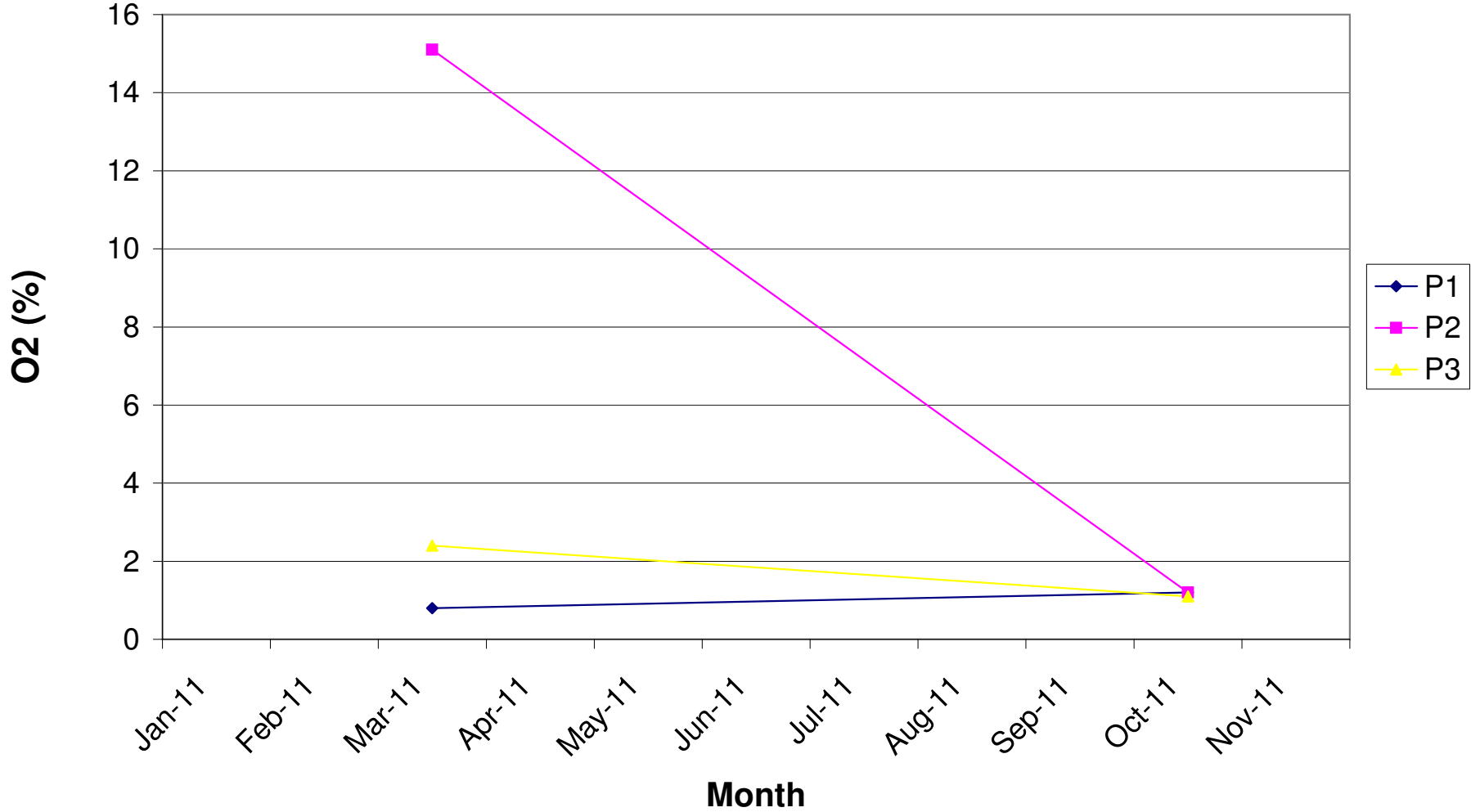
Methane Levels



Carbon Dioxide Levels



Oxygen Levels



Location		<i>Muckish, Falcarragh, Co Donegal</i>											
Sample Type		leachate											
Site No		L1											
Date of Sample		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Lab No				1840							5432		
pH				6.77							6.82		
Temp	C			11.70							12.70		
Electrical Conductivity	uS/cm			300							402		
Ammonical Nitrogen	mg/l			1.39							47.00		
COD	mg/l			44							49		
BOD	mg/l			0.0							6.80		
Dissolved Oxygen	mg/l			8.02									
SS	mg/l												
Residue on Evaporator	mg/l												
Calcium	ug/l												
Cadmium	ug/l												
Chromium	ug/l												
Chloride	mg/l			240							232		
Chlorine	mg/l												
Copper	ug/l												
Cyanide	mg/l												
Dissolved Iron	mg/l												
Lead	ug/l												
Magnesium	ug/l												
Manganese	ug/l												
Mercury	ug/l												
Nickel	mg/l												
Potassium	mg/l												
Sodium	mg/l												
Sulphate	mg/l												
Zinc	ug/l												
Total Alkalinity as CaCO ₃	mg/l												
Total Organic Carbon	mg/l												
Total Oxidised Nitrogen	mg/l			<0.01							<0.01		
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			<0.01							<0.01		
Nitrate	mg/l			<0.01							<0.01		
Phosphate - ORTHO	mg/l			<0.01									
Phosphate - TOTAL	mg/l												
Total Coliforms													
Facel Coliforms													
Depth	m												

--- not applicable

APPENDIX B
WATER BALANCE CALCULATION

MUCKISH WATER BALANCE CALCULATION

Year	Status	Rainfall (mm)	Temp Restored area Area	Temp Restored area infiltration IRCA(m3)	Restored area Area	Restored area infiltration IRCA(m3)	Total Water	Leachate produced Lo(m3)
2011	Closed	1,232	0		40,500	4,990	4,990	4,990
Total		1,232						4,990

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.	1232.0	mm

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2012	135.4	38.9											174.3
2011	89.6	105.4	59	66.2	100.4	84.5	49.9	79	133	177.1	103.7	184.2	1232
mean	114.2	76.6	86.5	57.5	58.9	65	71.8	91.6	102.1	118.7	114.7	102.9	1060.6

APPENDIX C
E-PRTR Regulations
(AER Electronic Reporting System)



[Guidance to completing the PRTR workbook](#)

AER Returns Workbook

Version 1.1.13

REFERENCE YEAR	2011
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1. FACILITY IDENTIFICATION

Parent Company Name	Donegal County Council
Facility Name	Muckish Landfill Site
PRTR Identification Number	W0126
Licence Number	W0126-01

Waste or IPPC Classes of Activity

No.	class name
3.1	The initial melting or production of iron and steel
3.13	Storage prior to submission to any activity referred to in a preceding paragraph of this Schedule, other than temporary storage, pending collection, on the premises where the waste concerned is produced.

Address 1	Muckish
Address 2	Falcarragh
Address 3	Co Donegal
Address 4	
	Donegal
Country	Ireland
Coordinates of Location	-8.03537 55.0931
River Basin District	GBNIIENW
NACE Code	3821
Main Economic Activity	Treatment and disposal of non-hazardous waste
AER Returns Contact Name	
AER Returns Contact Email Address	
AER Returns Contact Position	
AER Returns Contact Telephone Number	
AER Returns Contact Mobile Phone Number	
AER Returns Contact Fax Number	
Production Volume	0.0
Production Volume Units	
Number of Installations	0
Number of Operating Hours in Year	0
Number of Employees	0
User Feedback/Comments	
Web Address	

2. PRTR CLASS ACTIVITIES

Activity Number	Activity Name
50.1	General
50.1	General

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

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

4.1 RELEASES TO AIR

[Link to previous years emissions data](#)

SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS

POLLUTANT		METHOD			QUANTITY			
No. Annex II	Name	M/C/E	Method Used		Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
			Method Code	Designation or Description				
					0.0	0.0	0.0	0.0

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

SECTION B : REMAINING PRTR POLLUTANTS

POLLUTANT		METHOD			QUANTITY			
No. Annex II	Name	M/C/E	Method Used		Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
			Method Code	Designation or Description				
01	Methane (CH4)	M	OTH	landgem-v 302	0.0	71860.0	0.0	71860.0
03	Carbon dioxide (CO2)	M	OTH	landgem-v 302	0.0	197200.0	0.0	197200.0
55	1,1,1-trichloroethane	M	OTH	landgem-v 302	0.0	0.5738	0.0	0.5738
56	1,1,2,2-tetrachloroethane	M	OTH	landgem-v 302	0.0	1.654	0.0	1.654
34	1,2-dichloroethane (EDC)	M	OTH	landgem-v 302	0.0	0.3635	0.0	0.3635
62	Benzene	M	OTH	landgem-v 302	0.0	1.333	0.0	1.333
02	Carbon monoxide (CO)	M	OTH	landgem-v 302	0.0	35.13	0.0	35.13
35	Dichloromethane (DCM)	M	OTH	landgem-v 302	0.0	10.65	0.0	10.65
65	Ethyl benzene	M	OTH	landgem-v 302	0.0	4.375	0.0	4.375
21	Mercury and compounds (as Hg)	M	OTH	landgem-v 302	0.0	0.0005213	0.0	0.0005213
73	Toluene	M	OTH	landgem-v 302	0.0	32.19	0.0	32.19
60	Vinyl chloride	M	OTH	landgem-v 302	0.0	4.088	0.0	4.088
78	Xylenes	M	OTH	landgem-v 302	0.0	11.41	0.0	11.41

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

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

POLLUTANT		METHOD			QUANTITY			
Pollutant No.	Name	M/C/E	Method Used		Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
			Method Code	Designation or Description				
					0.0	0.0	0.0	0.0

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

Additional Data Requested from Landfill operators

For the purposes of the National Inventory on Greenhouse Gases, landfill operators are requested to provide summary data on landfill gas (Methane) flared or utilised on their facilities to accompany the figures for total methane generated. Operators should only report their Net methane (CH4) emission to the environment under T(total) KG/yr for Section A: Sector specific PRTR pollutants above. Please complete the table below:

Landfill:	Muckish Landfill Site				
Please enter summary data on the quantities of methane flared and / or utilised	T (Total) kg/Year	M/C/E	Method Used		Facility Total Capacity m3 per hour
	Total estimated methane generation (as per site model)	71860.0			N/A
	Methane flared	0.0			0.0 (Total Flaring Capacity)
	Methane utilised in engine/s	0.0			0.0 (Total Utilising Capacity)
	Net methane emission (as reported in Section A above)	71860.0			N/A

4.2 RELEASES TO WATERS

[Link to previous years emissions data](#)

| PRTR# : W0126 | Facility Name : Muckish Landfill Site | Filename : W0126_2011.xls | Return Year : 2011 |

04/04/2012 15:13

SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS

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

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

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

SECTION B : REMAINING PRTR POLLUTANTS

POLLUTANT		RELEASERS TO WATERS			Please enter all quantities in this section in KGs			
No. Annex II	Name	M/C/E	Method Used		QUANTITY			
			Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
79	Chlorides (as Cl)	M	CRM	DCC-SOP	0.0	1177.64	0.0	1177.64

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

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

POLLUTANT		RELEASERS TO WATERS			Please enter all quantities in this section in KGs			
Pollutant No.	Name	M/C/E	Method Used		QUANTITY			
			Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
238	Ammonia (as N)	M	CRM	DCC-SOP	0.0	0.0	0.0	0.0
303	BOD	M	CRM	DCC-SOP	0.0	16.96	0.0	16.96
306	COD	M	CRM	DCC-SOP	0.0	232.0	0.0	232.0
327	Nitrate (as N)	M	CRM	DCC-SOP	0.0	0.049	0.0	0.049
387	Ortho-phosphate (as P)	M	CRM	DCC-SOP	0.0	0.049	0.0	0.049

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

4.3 RELEASES TO WASTEWATER OR SEWER

[Link to previous years emissions data](#)

SECTION A : PRTR POLLUTANTS

OFFSITE TRANSFER OF POLLUTANTS DESTINED FOR WASTE-WATER TREATMENT OR SEWER					Please enter all quantities in this section in KGs			
POLLUTANT		METHOD			QUANTITY			
No. Annex II	Name	M/C/E	Method Used		Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
			Method Code	Designation or Description				
					0.0	0.0	0.0	0.0

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

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

OFFSITE TRANSFER OF POLLUTANTS DESTINED FOR WASTE-WATER TREATMENT OR SEWER					Please enter all quantities in this section in KGs			
POLLUTANT		METHOD			QUANTITY			
Pollutant No.	Name	M/C/E	Method Used		Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
			Method Code	Designation or Description				
					0.0	0.0	0.0	0.0

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

4.4 RELEASES TO LAND

[Link to previous years emissions data](#)

| PRTR# : W0126 | Facility Name : Muckish Landfill Site | Filename : W0126_2011.xls | Return Year : 2011 |

04/04/2012 15:15

SECTION A : PRTR POLLUTANTS

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

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

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

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

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

5. ONSITE TREATMENT & OFFSITE TRANSFERS OF WASTE

| PRTR#: W0126 | Facility Name : Muckish Landfill Site | Filename : W0126_2011.xls | Return Year : 2011 |

04/04/2012 15:16

Please enter all quantities on this sheet in Tonnes

5

Transfer Destination	European Waste Code	Hazardous	Quantity (Tonnes per Year)	Description of Waste	Waste Treatment Operation	Method Used		Location of Treatment	Haz Waste : Name and Licence/Permit No of Next Destination Facility Non Haz Waste: Name and Licence/Permit No of Recover/Disposer	Haz Waste : Address of Next Destination Facility Non Haz Waste: Address of Recover/Disposer	Name and License / Permit No. and Address of Final Recoverer / Disposer (HAZARDOUS WASTE ONLY)	Actual Address of Final Destination i.e. Final Recovery / Disposal Site (HAZARDOUS WASTE ONLY)
						M/C/E	Method Used					
Within the Country	19 07 03	No	3269.0 in 19 07 02	landfill leachate other than those mentioned	D8	M	Weighed	Offsite in Ireland	Donegal County Council,D0009-01	Thorn rd,Magheranan,Letterkenny, Co.Donegal,Ireland		

* Select a row by double-clicking the Description of Waste then click the delete button

[Link to previous years waste data](#)

[Link to previous years waste summary data & percentage change](#)

