ANNUAL ENVIRONMENTAL REPORT

For

Muckish Landfill Site

(Waste Licence Reference W0126-1)

By
Donegal County Council
For
Environmental Protection Agency

Reporting Period: January 2012 to December 2012

May 2013

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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, 2012 to 31st December 2012.

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	2012	
All mterial	0	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. Wells GW2 & GW3 show low levels of ammonia present (max. ammonia = 3.9mg/l), however it should be noted that both wells are 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 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 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 2011 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.

5.4 Landfill gas

5.4.1 Landfill gas monitoring is undertaken at three locations (as shown on drawing no 5234.20/04 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 annual parameters. 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

No parameters exceed MAC.

Downstream

Monitoring at GW2 and GW3 detected elevated levels of Ammoniacal Nitrogen (max 3.9mg/l), and iron (max 24,200ug/l), pH (5.85) and Chloride (max. 45mg/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 requirement for annual parameters 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 COD (max. 48mg/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

	Muckish Landfill Site 2012		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)	0.56	43	<0.2	1700	491
BOD	0.4	3.6	4.5	>4800	>834
COD	52	70	<10	33,700	3078
Chloride (mg/l)	41	186	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)	161	1521	503	19,200	7789
pH	6.41	6.69	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.

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 35.4% to 61.7%. Carbon Dioxide levels range from 23.5% to 34.2%. 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 2922m^3 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 2355m^3. The water balance calculation is attached in Appendix B.

Table 7.1 Breakdown of leachate volumes by month in 2012 relative to rainfall at Malin Head

Month	Leachate Volume (m^3)	Rainfall at Main Head (mm)
January	240.0	134.7
February	232.1	68.1
March	272.1	29.8
April	241.0	46.3
May	302.4	50.7
June	238.7	141.1
July	215.7	91.4
August	269.7	87.3
September	211.3	139.2
October	213.7	123.5
November	269.3	87.4
December	215.5	149.3
Totals	**2922m^3**	**1149mm**

8. CAPPING AND RESTORATION OF COMPLETED CELLS / PHASES

8.1 The site is fully restored.

9. REPORTED INCIDENTS AND COMPLAINTS SUMMARIES

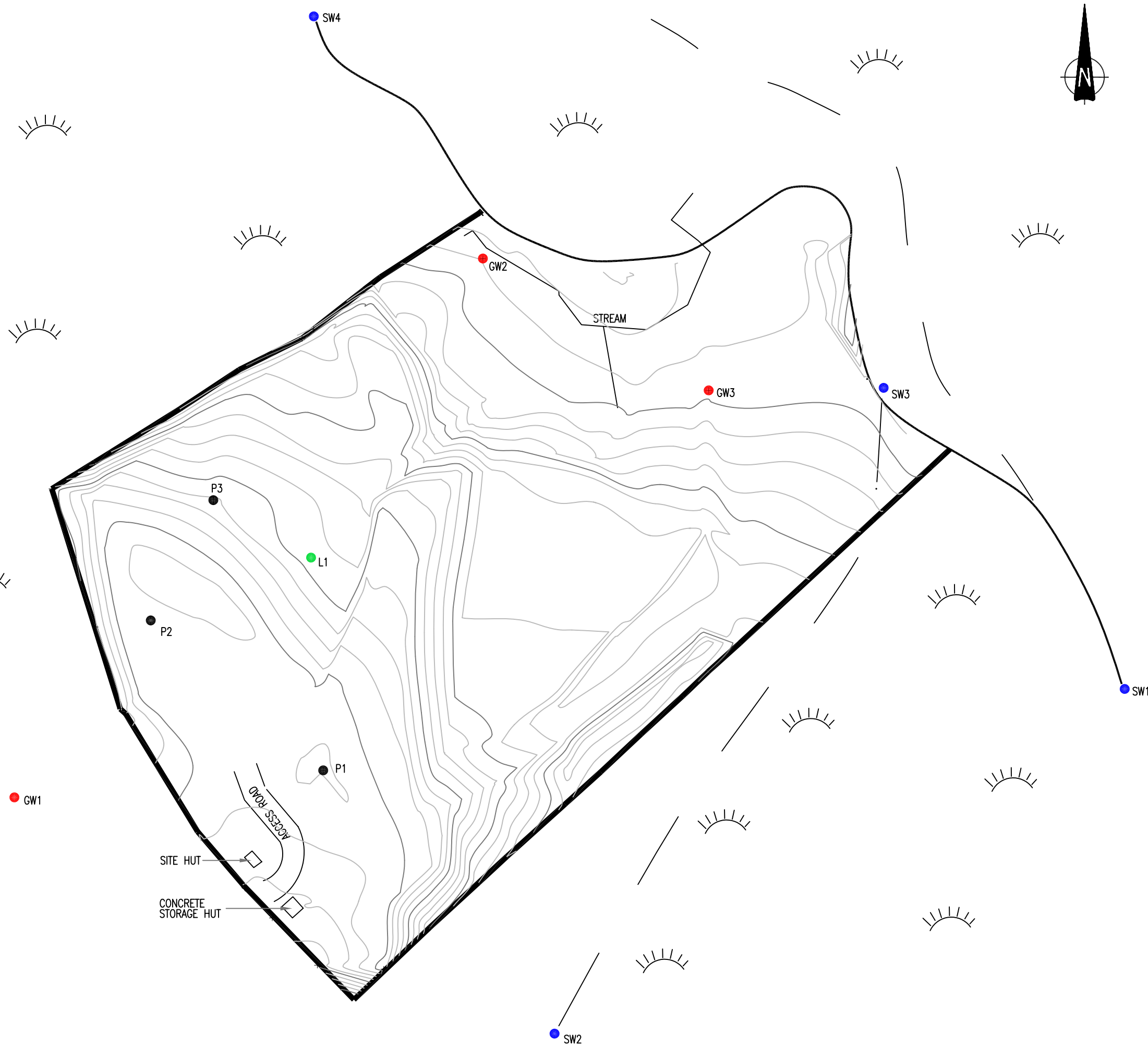
9.1 Donegal County Council reports to the EPA emissions exceedances on an on-going basis. In the case of Muckish, there are no perimeter gas wells, but levels of ammonia in excess of 0.2mg/l in either surface water or groundwater monitoring locations are reported as incidents with each bi-annual report.

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						2727			4596				5908
pH						6.59			6.62				6.51
Temp	C					15.10			12.10				5.60
Electrical Conductivity	uS/cm					61			60				49
Ammonical Nitrogen	mg/l					<0.01			<0.01				0.11
COD	mg/l					19			19				17
BOD	mg/l					0.31			0.65				1.13
Dissolved Oxygen	mg/l					10.39			11.90				12.73
SS	mg/l					1			3.0				1.0
Residue on Evaporator	mg/l												
Calcium	ug/l												
Cadmium	ug/l												
Chromium	ug/l												
Chloride	mg/l					20			21				20
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					0.23			0.12				<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												
Nitrate	mg/l												
Phosphate - ORTHO	mg/l												
Phosphate - TOTAL	mg/l												
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						2728			4597				5909
pH						6.35			6.47				5.81
Temp	C					15.50			12.20				6.00
Electrical Conductivity	uS/cm					70			57				44
Ammonical Nitrogen	mg/l					<0.01			<0.01				0.17
COD	mg/l					48			45				32
BOD	mg/l					0.08			0.79				1.39
Dissolved Oxygen	mg/l					9.56			10.87				11.59
SS	mg/l					1.0			2.0				2.0
Residue on Evaporator	mg/l												
Calcium	ug/l												
Cadmium	ug/l												
Chromium	ug/l												
Chloride	mg/l					21			21				19
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					0.15			0.14				<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							0.000		
Nitrate	mg/l			<0.01							0.0000		
Phosphate - ORTHO	mg/l			<0.01							0.000		
Phosphate - TOTAL	mg/l												
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						2729			4598				5910
pH						6.65			6.79				6.01
Temp	C					15.40			12.10				5.80
Electrical Conductivity	uS/cm					64			59				45
Ammonical Nitrogen	mg/l					0.11			<0.01				0.10
COD	mg/l					23			22				22
BOD	mg/l					0.01			0.42				1.17
Dissolved Oxygen	mg/l					10.59			11.97				12.13
SS	mg/l					1.0			2.0				2.0
Residue on Evaporator	mg/l												
Calcium	ug/l												
Cadmium	ug/l												
Chromium	ug/l												
Chloride	mg/l					22			24				20
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					0.23			0.10				<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												
Nitrate	mg/l												
Phosphate - ORTHO	mg/l												
Phosphate - TOTAL	mg/l												
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						2730			4599				5911
pH						6.67			6.64				6.27
Temp	C					14.90			12.20				5.60
Electrical Conductivity	uS/cm					68			62				46
Ammonical Nitrogen	mg/l					0.12			<0.01				<0.01
COD	mg/l					24			21				20
BOD	mg/l					0.72			0.45				1.20
Dissolved Oxygen	mg/l					10.72			11.90				12.44
SS	mg/l					1			1.0				1.0
Residue on Evaporator	mg/l												
Calcium	ug/l												
Cadmium	ug/l												
Chromium	ug/l												
Chloride	mg/l					23			23				23
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					0.20			0.28				<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												
Nitrate	mg/l												
Phosphate - ORTHO	mg/l												
Phosphate - TOTAL	mg/l												
Total Coliforms													
Facel Coliforms													
Depth	m												

--- not applicable

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						2731							5912
pH						6.56							6.70
Temp	C					12.60							8.30
Electrical Conductivity	uS/cm					136							96
Ammonical Nitrogen	mg/l					0.10							0.12
COD	mg/l												
BOD	mg/l												
Dissolved Oxygen	mg/l					7.06							7.34
SS	mg/l												
Residue on Evaporator	mg/l												
Calcium	ug/l												
Cadmium	ug/l												
Chromium	ug/l												
Chloride	mg/l					20							16
Chlorine	mg/l												
Copper	ug/l												
Cyanide	mg/l												
Dissolved Iron	mg/l					0.04							0.05
Lead	ug/l												
Magnesium	ug/l												
Manganese	ug/l												
Mercury	ug/l												
Nickel	mg/l												
Potassium	mg/l					<2.34							<2.34
Sodium	mg/l					12.2							14.60
Sulphate	mg/l												
Zinc	ug/l												
Total Alkalinity as CaCO3	mg/l												
Total Organic Carbon	mg/l					14.3							7.5
Total Oxidised Nitrogen	mg/l					0.28							<0.01
Arsenic	mg/l												
Barium	mg/l												
Boron	ug/l												
Flouride	mg/l												
Total Phenols	mg/l					<0.002							<0.002
Phosphorous	mg/l												
Selenium	mg/l												
Silver	mg/l												
Mircrotox	Toxic Units												
Microtox	Toxic Units												
Nitrite	mg/l												
Nitrate	mg/l												
Phosphate - ORTHO	mg/l												
Phosphate - TOTAL	mg/l												
Total Coliforms													
Facel Coliforms													
Depth	m					4.8							3.7

--- 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						2732							5913
pH						5.68							5.89
Temp	C					13.00							5.80
Electrical Conductivity	uS/cm					80							60
Ammonical Nitrogen	mg/l					3.20							1.59
COD	mg/l												
BOD	mg/l												
Dissolved Oxygen	mg/l					2.23							2.44
SS	mg/l												
Residue on Evaporator	mg/l												
Calcium	ug/l												
Cadmium	ug/l												
Chromium	ug/l												
Chloride	mg/l					45							40
Chlorine	mg/l												
Copper	ug/l												
Cyanide	mg/l												
Dissolved Iron	mg/l					23.9							24.20
Lead	ug/l												
Magnesium	ug/l												
Manganese	ug/l												
Mercury	ug/l												
Nickel	mg/l												
Potassium	mg/l					2.69							
Sodium	mg/l					14.80							3.47
Sulphate	mg/l												16.20
Zinc	ug/l												
Total Alkalinity as CaCO3	mg/l												
Total Organic Carbon	mg/l					40.9							26.30
Total Oxidised Nitrogen	mg/l					0.06							<0.01
Arsenic	mg/l												
Barium	mg/l												
Boron	ug/l												
Flouride	mg/l												
Total Phenols	mg/l					<0.002							<0.002
Phosphorous	mg/l												
Selenium	mg/l												
Silver	mg/l												
Mircrotox	Toxic Units												
Microtox	Toxic Units												
Nitrite	mg/l												
Nitrate	mg/l												
Phosphate - ORTHO	mg/l												
Phosphate - TOTAL	mg/l												
Total Coliforms													
Facel Coliforms													
Depth	m					1.37							0.80

--- 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						2733							5914
pH						6.45							6.82
Temp	C					13.10							6.00
Electrical Conductivity	uS/cm					291							206
Ammonical Nitrogen	mg/l					3.90							0.12
COD	mg/l												
BOD	mg/l												
Dissolved Oxygen	mg/l					1.88							1.57
SS	mg/l												
Residue on Evaporator	mg/l												
Calcium	ug/l												
Cadmium	ug/l												
Chromium	ug/l												
Chloride	mg/l					45							40
Chlorine	mg/l												
Copper	ug/l												
Cyanide	mg/l												
Dissolved Iron	mg/l					0.37							
Lead	ug/l												
Magnesium	ug/l												
Manganese	ug/l												
Mercury	ug/l												
Nickel	mg/l												
Potassium	mg/l					8.9							
Sodium	mg/l					24.3							
Sulphate	mg/l												
Zinc	ug/l												
Total Alkalinity as CaCO3	mg/l												
Total Organic Carbon	mg/l					17							
Total Oxidised Nitrogen	mg/l					0.40							<0.01
Arsenic	mg/l												
Barium	mg/l												
Boron	ug/l												
Flouride	mg/l												
Total Phenols	mg/l					<0.002							
Phosphorous	mg/l												
Selenium	mg/l												
Silver	mg/l												
Mircrotox	Toxic Units												
Microtox	Toxic Units												
Nitrite	mg/l												
Nitrate	mg/l												
Phosphate - ORTHO	mg/l												
Phosphate - TOTAL	mg/l												
Total Coliforms													
Facel Coliforms													
Depth	m					1.28							0.60

--- not applicable

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						2734			4600				5915
pH						6.41			6.64				6.69
Temp	C					14.50			13.30				6.50
Electrical Conductivity	uS/cm					1521			775				161
Ammonical Nitrogen	mg/l					43			40.00				0.56
COD	mg/l					70			66				52
BOD	mg/l					3.60			1.68				0.4
Dissolved Oxygen	mg/l					3.37			3.89				4.12
SS	mg/l												
Residue on Evaporator	mg/l												
Calcium	ug/l												
Cadmium	ug/l												
Chromium	ug/l												
Chloride	mg/l					186			120				41
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 CaCO3	mg/l												
Total Organic Carbon	mg/l												
Total Oxidised Nitrogen	mg/l					<0.01			<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												
Nitrate	mg/l												
Phosphate - ORTHO	mg/l												
Phosphate - TOTAL	mg/l												
Total Coliforms													
Facel Coliforms													
Depth	m												

--- 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**
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Methane	**%**					42.2		35.4		37.8			44.1
Carbon Dioxide	**%**					26.3		23.5		25.6			25.5
Oxygen	**%**					0.3		0.2		0.3			0.1
Atmos. Pressure	**mBar**					999		999		990			972.0

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**
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Methane	**%**					55.5		55.1		55.3			61.7
Carbon Dioxide	**%**					28.7		28.9		29.1			34.2
Oxygen	**%**					0.7		0.3		0.3			0.1
Atmos. Pressure	**mBar**					999		998		990			972

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**
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Methane	**%**					53.8		58.2		57.4			61.7
Carbon Dioxide	**%**					32.7		33.1		32.9			34.2
Oxygen	**%**					0.3		0.9		0.6			0.1
Atmos. Pressure	**mBar**					999		998		990			972

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)
2012	Closed	1,149	0		20,500	2,355	2,355	2,355
Total		1,149						2,355

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.	1148.8	mm

APPENDIX C

E-PRTR Regulations

(AER Electronic Reporting System)

Environmental Protection Agency

Guidance to completing the PRTR workbook

AER Returns Workbook

Version 1.1.16

REFERENCE YEAR	2012

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	Don Smith
AER Returns Contact Email Address	don.smith@donegalcoco.ie
AER Returns Contact Position	Envoromental Technician
AER Returns Contact Telephone Number	0749122787
AER Returns Contact Mobile Phone Number	0876860295
AER Returns Contact Fax Number	0749161304
Production Volume	0.0
Production Volume Units	
Number of Installations	0
Number of Operating Hours in Year	0
Number of Employees	1
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. WASTE IMPORTED/ACCEPTED ONTO SITE Guidance on waste imported/accepted onto site

Do you import/accept waste onto your site for on-site treatment (either recovery or disposal activities) ?	

This question is only applicable if you are an IPPC or Quarry site

4.1 RELEASES TO AIR

Link to previous years emissions data

SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS

RELEASES TO AIR					Please enter all quantities in this section in KGs			
POLLUTANT		METHOD			QUANTITY			
			Method Used					
No. Annex II	Name	M/C/E	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

RELEASES TO AIR					Please enter all quantities in this section in KGs			
POLLUTANT		METHOD			QUANTITY			
			Method Used					
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
01	Methane (CH4)	C	OTH	landgem-v302	0.0	69040.0	0.0	69040.0
02	Carbon monoxide (CO)	C	OTH	landgem-v302	0.0	33.76	0.0	33.76
03	Carbon dioxide (CO2)	C	OTH	landgem-v302	0.0	189400.0	0.0	189400.0
21	Mercury and compounds (as Hg)	C	OTH	landgem-v302	0.0	0.0005008	0.0	0.0005008
34	1,2-dichloroethane (EDC)	C	OTH	landgem-v302	0.0	0.3493	0.0	0.3493
35	Dichloromethane (DCM)	C	OTH	landgem-v302	0.0	10.24	0.0	10.24
55	1,1,1-trichloroethane	C	OTH	landgem-v302	0.0	0.5513	0.0	0.5513
56	1,1,2,2-tetrachloroethane	C	OTH	landgem-v302	0.0	1.589	0.0	1.589
60	Vinyl chloride	C	OTH	landgem-v302	0.0	3.928	0.0	3.928
62	Benzene	C	OTH	landgem-v302	0.0	1.278	0.0	1.278
65	Ethyl benzene	C	OTH	landgem-v302	0.0	4.204	0.0	4.204
73	Toluene	C	OTH	landgem-v302	0.0	30.93	0.0	30.93
78	**Xylenes**	C	OTH	landgem-v302	0.0	10.97	0.0	10.97

* 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)

RELEASES TO AIR					Please enter all quantities in this section in KGs			
POLLUTANT		METHOD			QUANTITY			
			Method Used					
Pollutant No.	Name	M/C/E	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

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**	
			Method Code	**Designation or Description**		
Total estimated methane generation (as per site model)	69040.0	C	OTH	landgem-v302	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)	69040.0	C	OTH	landgem-v302	N/A	

4.2 RELEASES TO WATERS

Link to previous years emissions data

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 co

RELEASES TO WATERS					Please enter all quantities in this section in KGs			
POLLUTANT					QUANTITY			
			Method Used					
No. Annex II	Name	M/C/E	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

RELEASES TO WATERS					Please enter all quantities in this section in KGs			
POLLUTANT					QUANTITY			
			Method Used					
No. Annex II	Name	M/C/E	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 C : REMAINING POLLUTANT EMISSIONS (as required in your Licence)

RELEASES TO WATERS					Please enter all quantities in this section in KGs			
POLLUTANT					QUANTITY			
			Method Used					
Pollutant No.	Name	M/C/E	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

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			
			Method Used					
No. Annex II	Name	M/C/E	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 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			
			Method Used					
Pollutant No.	Name	M/C/E	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

4.4 RELEASES TO LAND

Link to previous years emissions data

SECTION A : PRTR POLLUTANTS

RELEASES TO LAND					Please enter all quantities in this section in KGs		
POLLUTANT		METHOD			QUANTITY		
			Method Used				
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		
			Method Used				
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

Please enter all quantities on this sheet in Tonnes

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	2921.0	landfill leachate other than those mentioned in 19 07 02	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