

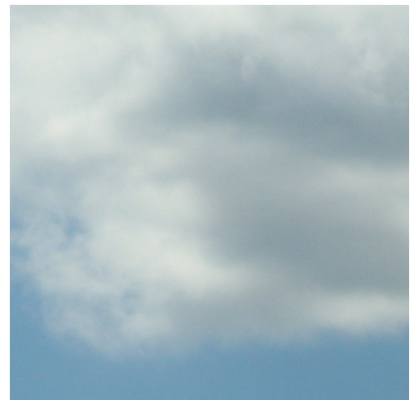
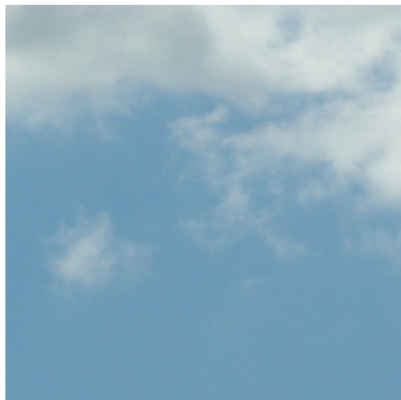
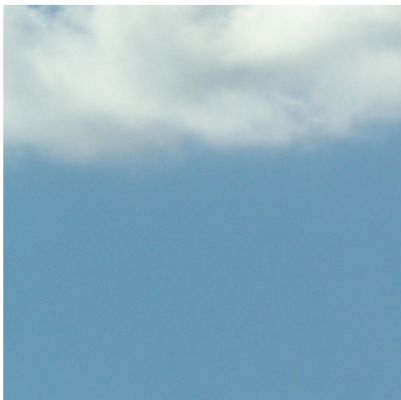
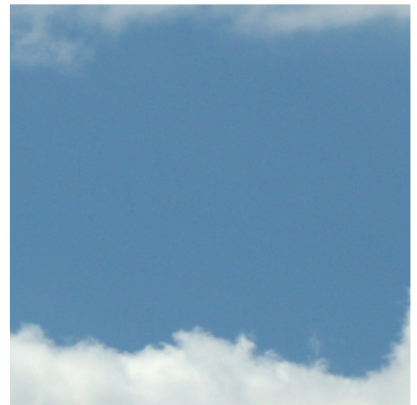
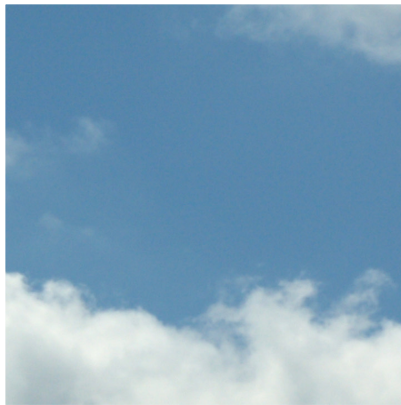
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Annual Environmental Report 2016

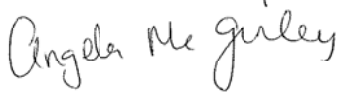

Muckish Landfill Site

IBR0859 / March 2017



Document Control Sheet

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Project Title	Annual Environmental Report 2016					
Document Title	Muckish Landfill Site (W0126-01)					
Document No.	IBR0859					
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Contents

1	Introduction	1
2	Reporting Period	2
3	Waste Activities Carried Out at the Facility	3
3.1	Type of Waste	3
4	Quantities of Waste	4
5	Summary Report on Emissions	5
5.1	Environmental Monitoring Requirements	5
5.2	Monitoring Results	5
5.3	Groundwater	5
5.4	Surface Water	9
5.5	Leachate Composition	12
5.6	Landfill Gas	12
6	Volume of Leachate Produced and Volume of Leachate Discharged	14
7	Capping and Restoration of Completed Cells / Phases	15
8	Reported Incidents and Complaints Summaries	16
9	Review of Nuisance Controls	17
10	Management Structure of the Site	18
10.1	Organisation	18
10.2	Management Responsibility	18

Appendices

Appendix A - Drawings

Appendix B - Monitoring Information

Appendix C - Results of Monitoring

Appendix D - Water Balance Calculation

Appendix E - E-PRTR

1 Introduction

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.

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.

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.

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.

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.

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

A summary of Facility Information is provided in Table 1.1 below.

Table 1.1 Facility Information Summary

AER Reporting Year	2016
Licence Register Number	W00126-01
Name of site	Muckish Landfill Site
Site Location	Muckish, Falcarragh, County Donegal
NACE Code	3821
Class/Classes of Activity	Landfill

2 Reporting Period

This report refers to the period from 1st January, 2016 to 31st December 2016.

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

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 4.1. 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 4.1 Waste Quantities Accepted (Tonnes)

Waste Types	1998	1999	2000	2001	2002	2003	2004	2005
Municipal Waste ¹ (20 03 01)	4,418	5,639	7,008	5,729	0	0	0	0
Inert Waste	0	0	0	0	0	0	2,500	34,667

¹ Figures based on estimates.

5 Summary Report on Emissions

5.1 Environmental Monitoring Requirements

There is no continuous air, groundwater, surface water or wastewater (sewer) monitoring at Muckish Landfill site. Periodic / non-continuous monitoring of groundwater, surface water, leachate and landfill gas is carried out at the site as per the Schedule, and as agreed with the EPA, as set out in Tables A1, A2, A3 and A4 of Appendix B. It should be noted that annual parameters are in abeyance as agreed with the Agency, and in addition it was agreed that the frequency of regular monitoring would reduce from quarterly to bi-annual. Details of the monitoring locations are shown on Drawing IBR0859/009.

5.2 Monitoring Results

Laboratory results certificates for groundwater, surface water, leachate and gas monitoring for the period are contained in Appendix C. Trend graphs for key parameters are also provided.

5.3 Groundwater

The groundwater results contained in this report were assessed against the following:

- EPA Interim Guideline Values² (IGV);
- SI No 278 of 2007 EC (Drinking Water) Regulations (DWR); and
- SI No 9 of 2010 European Communities Environmental Objectives (Groundwater) Regulations 2010 as amended (GTV).

Groundwater monitoring is carried out at three locations (GW1, GW2 and GW3) as shown on Drawing IBR0859/009. These groundwater monitoring boreholes were installed at the landfill early in 2000 as per licence requirements. Monitoring location GW1 is representative of water quality up-gradient conditions and monitoring locations GW2 and GW3 are down gradient but close to the waste body in the space between the waste and the river. The results are highlighted in Table 5.1 below and in graph format in Appendix C.

²EPA (2003) Towards setting guideline values for the protection of groundwater in Ireland. Interim Report

Groundwater flow is interpreted to flow in a northeastern direction towards the Ray Duvowen River and is consistent with the local topography of the area. Groundwater flow is shown on Figure 6 in Appendix A.

Table 5.1 Groundwater Concentrations 2016

Station	Date	Ammonia (as N)	Chloride	Conductivity @ 20°C	Dissolved Oxygen	Potassium	Temperature	Faecal Coliforms (E. coli)	pH	Phenols	Coliform bacteria	Total Oxidised Nitrogen	Iron	Sodium	Depth	Total Organic Carbon	Orthophosphate
		mg/l	mg/l	µS/cm	mg/l	mg/l	Deg C	MPN/100mls	pH units	µg/l	MPN/100mls	mg/l	µg/l	mg/l	m	mg/l	mg/l
GW 1	21-Apr	< 0.04	24.82	167.4	9.3	1.7	10.5	4	6.8	< 100	13	0.063	49	11.7	3.8	14.82	
GW 2	21-Apr	< 0.04	27.79	92.8	7.1	2.2	10.3	145	5.9	< 100	145	0.074	1400	12.1	0.9	32.42	
GW 3	21-Apr	5.61	32.76	403	2.8	8.6	10.3	21	6.5	< 100	28	0.114	70	23.6	0.6	10.56	
GW 1	18-Oct	0.384	9.92	171.8	5.6	1.4 ***	11.1	> 2420	6.9	< 0.1 ***	> 2420	0.271	< 20 ***	8.7 ***	4.4	19.15	0.023
GW 2	18-Oct	0.363	19.85	125.1 *	4.8	0.7 ***	10.5	147	5.6 *	< 0.1 ***	248	0.013	890 ***	11.9 ***	1.5	27.63	0.031
GW 3	18-Oct	1.06	24.81	377	2.4	7.2 ***	10.1	649	6.6	< 0.1 ***	1120	1.12	280 ***	15.7 ***	1.8	12.59	0.031

* Accredited ** Sub-Contract *** Accredited & Sub-Contract

The GTV value for ammonium is 0.175 mg/l N. Elevated concentrations of ammonia (as N) relative to the screening value were recorded in all groundwater boreholes at times during the monitoring period. GW3 recorded the highest concentrations during the monitoring period when values of 5.61 mg/l and 1.06 mg/l were recorded.

The GTV guideline value for iron is 200 µg/l. Elevated concentrations of iron relative to the screening value were recorded in GW2 and GW3 as shown in Table 5.1. It should be noted that iron occurs naturally in Donegal groundwater as they are associated with naturally occurring conditions such as iron rich bedrock or the presence of reducing conditions, that is, anaerobic environment such as peat.

Slightly elevated concentrations of potassium above the IGV guideline value of 5 mg/l were recorded in GW3 throughout the monitoring period with values ranging from 7.2 mg/l to 8.6 mg/l.

Slightly elevated concentrations of ortho phosphate above the IGV guideline value of 0.03 mg/l were recorded in GW2 and GW3 in October.

Elevated Faecal Coliforms (E.Coli) levels above the IGV (0 counts per 100ml) were recorded in all groundwater boreholes throughout the monitoring period ranging from 4 to >2,420 MPN/100mls. The highest level was recorded upstream in GW1 in October (> 2,420 MPN/100mls).

Coliform bacteria levels exceeded the IGV of 0 counts per 100ml in all groundwater boreholes throughout the monitoring period. Coliform bacteria levels ranged from 13 to >2,420 MPN/100mls.

No elevated concentrations, relative to the appropriate screening values, of the remaining parameters measured were recorded up gradient or down gradient of the site during the monitoring period.

A hydrogeological risk assessment was undertaken in 2015 and submitted to the EPA. The report found that overall there appears to be a clear decreasing trend in contaminant levels in downgradient monitoring wells with GW3 and a steady trend within GW2. The reducing trends over time confirm the success of the capping and leachate management operations at the site.

A series of proposed mitigation measures and additional investigation have been proposed to address the data gaps at the site, to facilitate a more detailed understanding of the hydrogeological regime and to assess the risk posed to downgradient receptors.

Plans for all actions identified in the hydrogeological risk assessment across all 6 sites are being developed. The overall plan is being finalised at present and will be issued to the Agency when complete.

Willow planting has been undertaken at the site in 2017 to remediate historical peat leachate entrainment between the waste body and the River Ray.

5.4 Surface Water

The surface water results contained in this report were assessed against the following:

- SI No 294 of 1989 European Communities (Quality of Surface Water Intended for the Abstraction of Drinking Water) Regulations (SWQS); and
- SI No 272 of 2009 European Communities Environmental Objectives (Surface Water) Regulations 2009 (EQS).

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 north-eastern boundary of the landfill. Surface water monitoring is carried out at four monitoring locations as shown on Drawing IBR0859/009 Monitoring Locations. Monitoring points SW1 and SW2 are upstream of the waste body. Monitoring points SW3 and SW4 are mid / downstream locations. The results of monitoring are highlighted in Table 5.2 below and presented in graphical format in Appendix C.

The EQS 2009 guideline value for total ammonia for good status is 0.140 mg N/l. Elevated concentrations of ammonia (as N) were recorded upstream (SW1) and downstream of the site at surface water monitoring point SW4 (within the River Ray) during the monitoring period. The highest concentration was recorded in SW4 (2.06 mg/l) in April. It is unclear whether the elevated level of ammonia at SW4 results from a landfill emission or an alternative source. The source of this contamination is under investigation.

The EQS guideline value for BOD for good status is 2.6 mg/l. Elevated BOD concentrations were recorded at downstream surface waste monitoring points SW3 and SW4 at times. Concentrations ranged from 3 mg/l in SW3 (October) to 9 mg/l in SW4 (April).

No elevated concentrations, relative to the appropriate screening values, of the remaining parameters measured were recorded upstream or downstream of the site during the monitoring period.

The hydrogeological risk assessment in 2016 found that the site is currently impacting the surface water quality within the Ray River by saturated peat entrained with leachate between the waste body and the River Ray. Runoff from this area appears to discharge into the river in the northern region of the site during periods of prolonged rainfall only. Based on downstream surface water quality over time, the extent of the impact has notably reduced over time, particularly since capping was completed in 2006.

Table 5.2 Surface Water Concentrations 2016

Station	Date	Ammonia (as N) mg/l	Chloride mg/l	Conductivity @ 20°C µS/cm	Dissolved Oxygen (Measurement) mg/l	pH pH units	Temperature C	BOD mg/l	Chemical Oxygen Demand mg/l	Suspended Solids mg/l	Nitrate (as N) mg/l	Nitrite (as N) mg/l	Orthophosphate mg/l
SW 1	21-Apr	0.531	21.84	77.8	10.2	7.4	9.3	< 1	9	< 6			
SW 2	21-Apr	< 0.04	25.81	79.2	10.9	6.7	9.3	< 1	12	< 6			
SW 3	21-Apr	< 0.04	23.82	78.7	10.9	7	9.5	< 1	5	< 6			
SW 4	21-Apr	2.06	25.81	102	10.9	6.8	9.5	9	8	< 6			
SW 1	18-Oct	< 0.04	12.9	63.9 *	11.1	6.6 *	8.8	< 1	13 *	< 6 *	< 0.1	< 0.01	< 0.01
SW 2	18-Oct	< 0.04	9.92	61.3 *	9.4	5.9 *	10.1	1	25 *	< 6 *	< 0.1	< 0.01	< 0.01
SW 3	18-Oct	< 0.04	9.92	63.6 *	11.1	6.7 *	8.8	3	16 *	< 6 *	0.109	< 0.01	< 0.01
SW 4	18-Oct	1.35	10.91	79 *	11.3	6.7 *	8.8	4	12 *	< 6 *	0.142	< 0.01	< 0.01

* Accredited ** Sub-Contract *** Accredited & Sub-Contract

5.5 Leachate Composition

Leachate monitoring was previously carried out at one monitoring location on the site (L1) as shown on Drawing IBR0859/009 Monitoring Locations. This well became inaccessible during 2011 and leachate is now sampled from the leachate collection sump. Laboratory results certificates from this are presented in Appendix C. Some characteristic parameters have been compared with those of 'typical' raw leachate in Table 5.3 below.

Table 5.3 Raw Leachate Concentrations 2016

PARAMETER	Muckish Landfill Site		From 30 samples from UK/Irish landfills accepting domestic waste Results in mg/l		
	Min Conc	Max Conc	Min Conc	Max Conc	Mean
Ammonia (mg/N)	6.69	30.7	<0.2	1700	491
BOD	3	6.95	4.5	>4800	>834
COD	64	87	<10	33,700	3078
Chloride (mg/l)	19.85	52.61	27	3410	1256
TON (mg/l N)	< 0.11	0.016	/	/	/
Conductivity (μ S/cm)	281	996	503	19,200	7789
pH (pH units)	6.6	6.6	6.4	8.0	7.2

Table 5.3 compares raw leachate concentrations detected at Muckish with 'typical leachate composition from 30 samples from UK / Irish Landfills accepting mainly domestic waste' (taken from EPA Manual for Landfill Operational Practices). Parameters measured are all consistent with typical leachate ranges shown.

5.6 Landfill Gas

Landfill gas monitoring is undertaken at three locations P1, P2 & P3 (as shown on Drawing IBR0859/009 Monitoring Locations), all of which are within the site boundary in waste.

Monitoring of the landfill gas was undertaken during April and December of the monitoring period and results are shown in Table 5.4 below. These wells generally show similar production levels of carbon dioxide and methane gas throughout the monitoring period. These results are consistent with levels detected in previous periods. Laboratory results certificates are contained in Appendix C.

Table 5.4 Landfill Gas Results 2016

Station	Sample Date	Methane	Carbon Dioxide	Oxygen	Atmospheric Pressure
P1	21-Apr	51.6	23.7	1.4	1001
P2	21-Apr	57.9	24.4	0.4	1001
P3	21-Apr	55.7	29.2	0.5	1001
P1	18-Dec	51.6	23.7	1.4	990
P2	18-Dec	57.9	24.4	0.4	990
P3	18-Dec	55.7	29.2	0.5	990

6 Volume of Leachate Produced and Volume of Leachate Discharged

Leachate is been tankered on a weekly basis from the collection sump on site. Records show that during this period 1,482.67 m³ of leachate was removed from the site and tankered off site to the Letterkenny Sludge Treatment Centre. Table 6.1 below shows the monthly breakdown of tankering volumes.

A water balance calculation has been produced for this period and is shown in Appendix D. This indicates that the estimated volume of leachate being produced at the site for the reporting period is 2,199 m³.

Table 6.1 Breakdown of Leachate Volumes by Month in 2016

Month	Leachate Volume (m3)
January	92.26
February	126.46
March	157.56
April	121.26
May	128.23
June	120.32
July	156.24
August	94.22
September	150.28
October	123.7
November	120.06
December	92.08
Total:	1482.67

7 Capping and Restoration of Completed Cells / Phases

The site is fully restored.

8 Reported Incidents and Complaints Summaries

Other than the reporting of on-going emissions exceedances detected in the routine monitoring programme (4 in total), no other incidents occurred during the monitoring period and no complaints were received.

DCC currently reports all Ammonia exceedances when compared to relevant regulations/guidance values at any groundwater or surface water monitoring point as incidents for all licensed landfill sites in Donegal via EDEN to the EPA. Results are currently screened using the following regulations/guidance.

- SI No 9 of 2010 European Communities Environmental Objectives (Groundwater) Regulations (GTV),
- SI No 272 of 2009 European Communities Environmental Objectives (Surface Water) Regulations 2009 (EQS).

Revised screening levels for incident reporting based on a combination of compliance points derived from the hydrogeological review, or standards as appropriate to each site and location have been submitted to the EPA for approval.

A site visit was undertaken by the EPA on the 05/09/2016. Samples were taken from GW1, GW2, GW3, SW1, and SW4 for analysis.

9 Review of Nuisance Controls

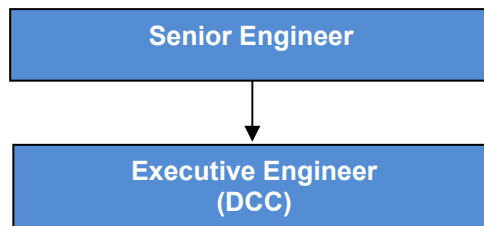
The site is inspected regularly for all types of nuisances (flies, pests, dust, litter and illegal dumping, birds and odours) and where any action is deemed necessary the appropriate steps are taken in accordance with the EMS.

10 Management Structure of the Site

10.1 Organisation

The Management Structure of Muckish Landfill site is set out in Figure 11.1 below.

Figure 11.1 Management Structure



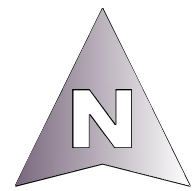
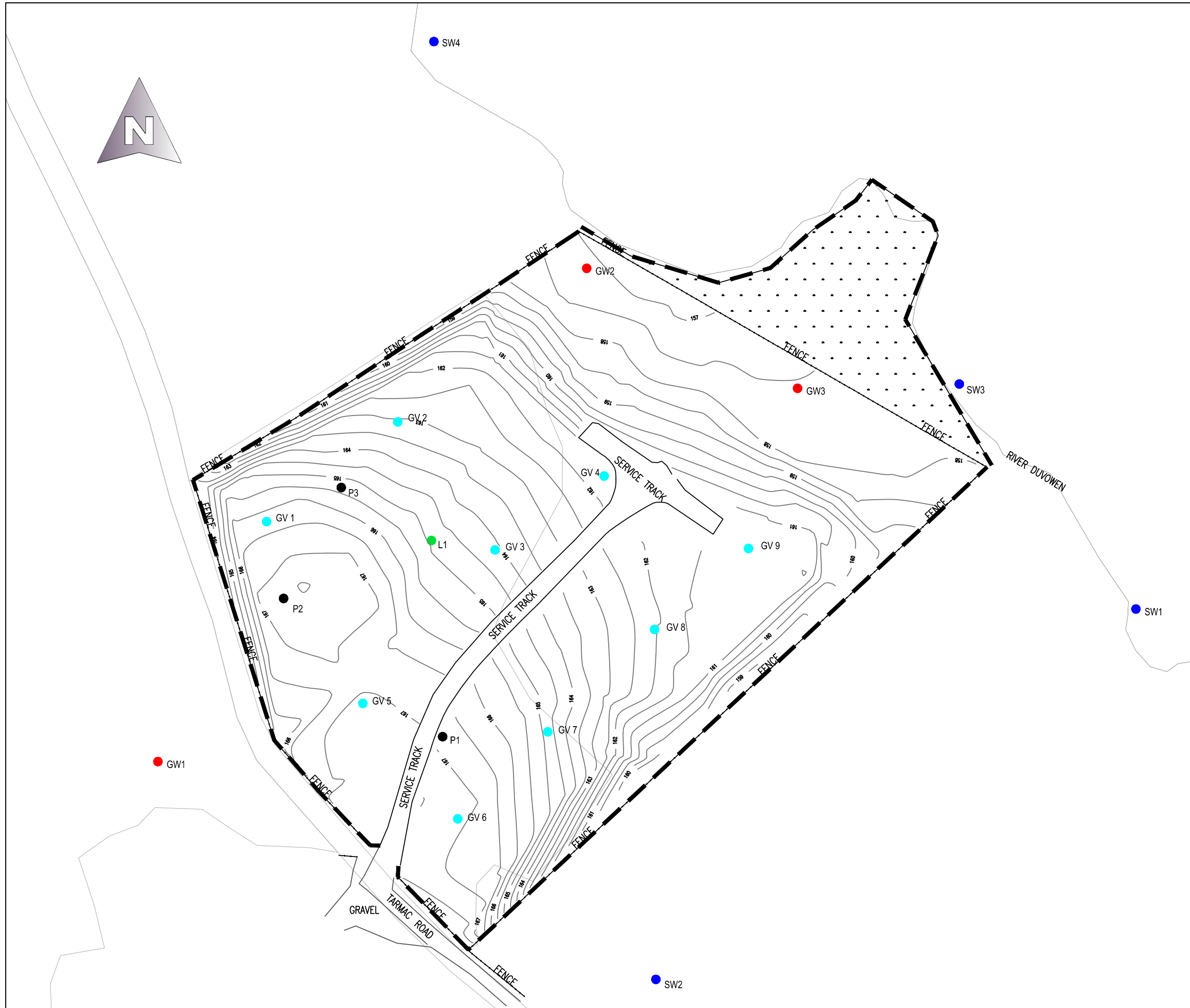
An Environmental Liability Risk Assessment has not been carried out at this facility as the landfill site is closed it is not a requirement of the licence.

10.2 Management Responsibility

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

Executive Engineer: Responsible for overall compliance with EPA Licence.

Appendix A Drawings



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. Existing Services.
Any information concerning the location of existing services indicated on this drawing is intended for general guidance only. It shall be the responsibility of the contractor to determine and verify the exact horizontal and vertical alignment of all cables, pipes, etc. (both underground and overhead) before work commences.
3. Issue of Drawings.
Hard copies, dwf and pdf will form a controlled issue of the drawing. All other formats (dwg, dxf etc.) are deemed to be an uncontrolled issue and any work carried out based on these files is at the recipients own risk. RPS will not accept any responsibility for any errors arising from the use of these files, either by human error by the recipient, listing of un-dimensioned measurements, compatibility issues with the recipient's software, and any errors arising when these files are used to aid the recipients drawing production, or setting out on site.

4. Keys:

- GV Gas Vents Locations
- GW Groundwater Monitoring Boreholes
- L Leachate Monitoring Location
- SW Surfacewater monitoring Locations
- P Gas Monitoring Locations

rev	amendments	drawn	date

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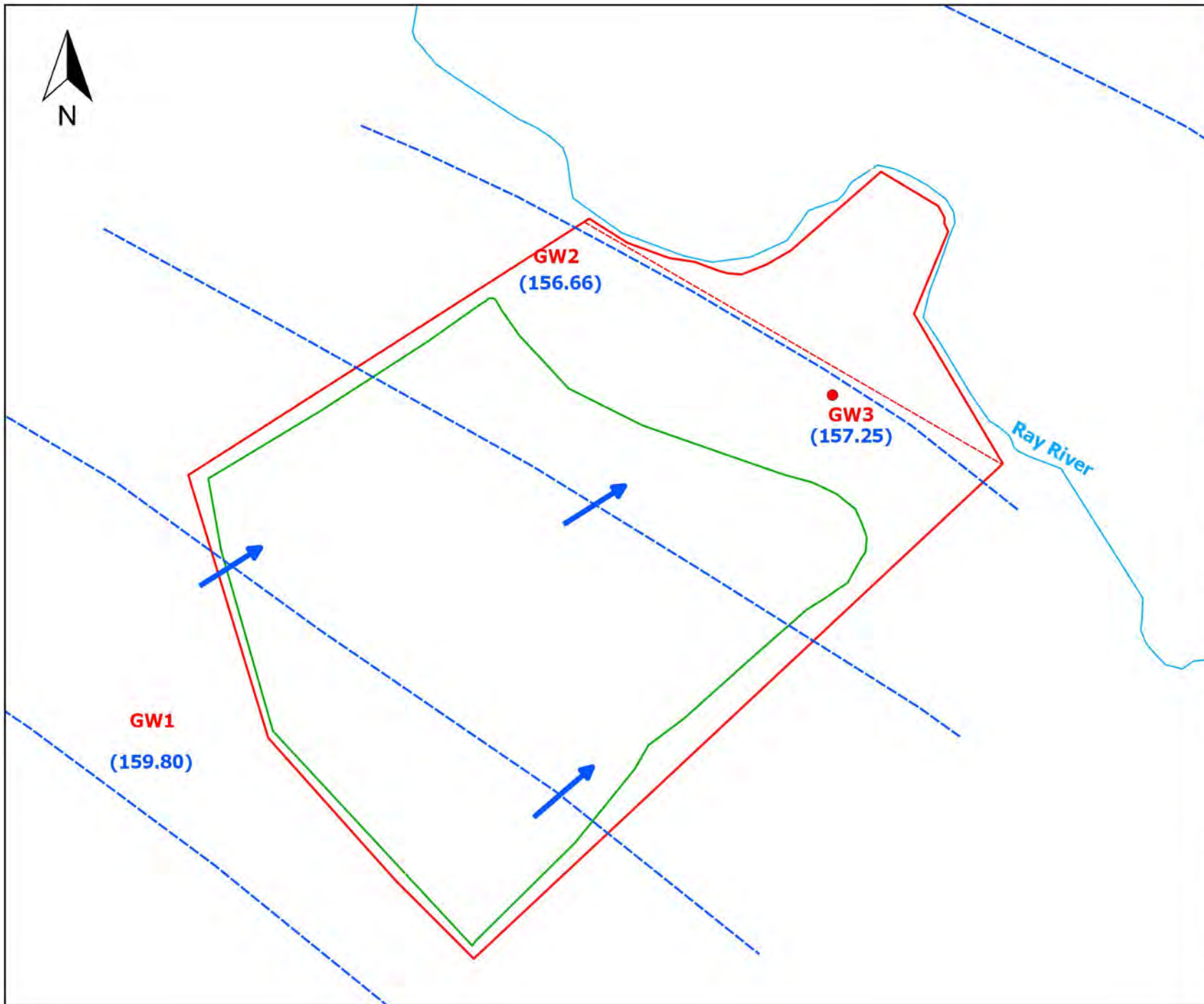
Project
Donegal Landfill Site Reporting 2016

Title
Muckish LFS - Monitoring Points

Drawing Status Preliminary	Sheet Size A3	Drawing Scale 1:1000
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Drawing Number IBR0859 /009	Rev 0
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Project Leader AMcG	Drawn By AMB	Date May '15	Initial Review CG
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Legend	
	Site boundary
	waste outline
	Site fence
	Groundwater Contours May 2012
	Groundwater Monitoring Wells
	Groundwater Flow Direction
	Groundwater Level (mOD)

Project	
Muckish Landfill Hydrogeological Risk Assessment	
Client	Donegal County Council
Drawing	Figure 6
Title	Groundwater Contours Dec 2012

The Hydrogeological and Contaminated Land Consultancy	
T 00353 863856884 E admin@bluerockenv.ie W www.bluerockenvironmental.ie	
File Ref :	BRE14022
Drawing Ref :	BRE14022DG06
Revision :	V01
Date :	11/05/2015
Scale :	NTS
Drawn by :	SH
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Appendix B

Monitoring Information

Appendix A - Monitoring Information

Table A1 Groundwater Parameters and Monitoring Frequencies

Bi-Annually
Visual Inspection
Temperature
Groundwater Level
pH
Electrical Conductivity
Ammoniacal Nitrogen
Dissolved Oxygen
Chloride
Iron
Potassium
TOC
TON
Phenols
Sodium

Table A2 Surface Water Parameters and Monitoring Frequencies

Bi-Annually
Visual Inspection
Temperature
Total Suspended Solids
pH
Electrical Conductivity
Ammoniacal Nitrogen
Dissolved Oxygen
Chloride
BOD
COD

Table A3 Leachate Parameters and Monitoring Frequencies

Bi-Annually
Visual Inspection
Leachate Level
Temperature

pH
Electrical Conductivity
Ammoniacal Nitrogen
COD
BOD
Chloride
Dissolved Oxygen
TON
Iron

Table A4 Landfill Gas Parameters and Monitoring Frequencies

Bi-Annually
Atmospheric Pressure
Carbon Dioxide
Methane
Oxygen
Temperature

Table A5 Monitoring Point Grid Co Ordinates

Station Purpose	Station Name	Northing	Easting
Landfill Monitoring - Leachates	Leachate Holding Lagoon	427313	197759
Landfill Monitoring - Groundwater	Muckish GW 1	427305	197674
Landfill Monitoring - Groundwater	Muckish GW 2	427389	197802
Landfill Monitoring - Groundwater	Muckish GW 3	427356	197860
Landfill Monitoring - Leachates	Muckish L 1	427313	197759
Landfill Monitoring - Air Quality	Muckish P1	427260	197762
Landfill Monitoring - Air Quality	Muckish P2	427332	197719
Landfill Monitoring - Air Quality	Muckish P3	427328	197734
Landfill Monitoring - Surface Water	Muckish SW 1	427330	197962
Landfill Monitoring - Surface Water	Muckish SW 2	427242	197817
Landfill Monitoring - Surface Water	Muckish SW 3	427411	197903
Landfill Monitoring - Surface Water	Muckish SW 4	427505	197754

Appendix C

Results of Monitoring



Comhairle Contae Dhún na nGall
Donegal County Council
Central Laboratory, The Kube
Magheranan
Letterkenny
 074-9122787

Sample No.:	162501280	Sample Date/Time:	21/04/2016 @ 10:40
Category:	Landfill Monitoring	Sample Method:	Grab
Entity:	Muckish Landfill	Sampled By:	Eddie Carr
Station:	Muckish Sw 1	Laboratory:	Donegal Co Council
Template:	Muckish Biannual SW	Analyst:	Donegal CoCo

Sample Notes:			
Customer Name:	Landfill Monitoring Donegal Co. Council	Sample No. - Laboratory:	162501280
Contact Details:	Julie McMahon Central Lab The Kube, Magheranan Letterkenny 0749122787: 0872861096 julie.mcmahon@donegalcoco.ie	Sample No. - Customer:	
		Date Received:	21/04/2016
		Mode Of Delivery:	Cooler Box
		Condition On Delivery:	OK
		Date Started:	21/04/2016
		Report Date:	07/06/2016
Customer Reference:	Landfill Compliance Monitoring	Report Reference:	Original Test Report

Parameter/Unit	Test Method	Maximum Limit	Minimum Limit	Test Date	RESULT
					Accredited* Sub-Contract**
Ammonia (as N) mg/l		--	--	09/05/16	0.531
BOD mg/l		--	--	21/04/16	< 1
Chemical Oxygen Demand mg/l		--	--	21/04/16	9
Chloride mg/l		--	--	26/04/16	21.84
Conductivity @ 20°C µS/cm		--	--	21/04/16	77.8
pH pH units		--	--	21/04/16	7.4
Suspended Solids mg/l		--	--	25/04/16	< 6
Dissolved Oxygen (Measurement) keep mg/l		--	--	21/04/16	10.2
Temperature Degrees C		--	--	21/04/16	9.3
Visual Inspection Descriptive		--	--	21/04/16	0

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Notes 4.....

Notes 5.....



Comhairle Contae Dhún na nGall
Donegal County Council
Central Laboratory, The Kube
Magheranan
Letterkenny
 074-9122787

Sample No.:	162501281	Sample Date/Time:	21/04/2016 @ 10:50
Category:	Landfill Monitoring	Sample Method:	Grab
Entity:	Muckish Landfill	Sampled By:	Eddie Carr
Station:	Muckish Sw 2	Laboratory:	Donegal Co Council
Template:	Muckish Biannual SW	Analyst:	Donegal CoCo

Sample Notes:			
Customer Name:	Landfill Monitoring Donegal Co. Council	Sample No. - Laboratory:	162501281
Contact Details:	Julie McMahon Central Lab The Kube, Magheranan Letterkenny 0749122787: 0872861096 julie.mcmahon@donegalcoco.ie	Sample No. - Customer:	
		Date Received:	21/04/2016
		Mode Of Delivery:	Cooler Box
		Condition On Delivery:	OK
		Date Started:	21/04/2016
		Report Date:	07/06/2016
Customer Reference:	Landfill Compliance Monitoring	Report Reference:	Original Test Report

Parameter/Unit	Test Method	Maximum Limit	Minimum Limit	Test Date	RESULT Accredited* Sub-Contract**
Ammonia (as N) mg/l		--	--	06/05/16	< 0.04
BOD mg/l		--	--	21/04/16	< 1
Chemical Oxygen Demand mg/l		--	--	21/04/16	12
Chloride mg/l		--	--	26/04/16	25.81
Conductivity @ 20°C µS/cm		--	--	21/04/16	79.2
pH pH units		--	--	21/04/16	6.7
Suspended Solids mg/l		--	--	25/04/16	< 6
Dissolved Oxygen (Measurement) keep mg/l		--	--	21/04/16	10.9
Temperature Degrees C		--	--	21/04/16	9.3
Visual Inspection Descriptive		--	--	21/04/16	0

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Sample No.:	162501282	Sample Date/Time:	21/04/2016 @ 10:30
Category:	Landfill Monitoring	Sample Method:	Grab
Entity:	Muckish Landfill	Sampled By:	Eddie Carr
Station:	Muckish Sw 3	Laboratory:	Donegal Co Council
Template:	Muckish Biannual SW	Analyst:	Donegal CoCo
Sample Notes:			
Customer Name:	Landfill Monitoring Donegal Co. Council	Sample No. - Laboratory:	162501282
Contact Details:	Julie McMahon Central Lab The Kube, Magheranan Letterkenny 0749122787: 0872861096 julie.mcmahon@donegalcoco.ie	Sample No. - Customer:	
		Date Received:	21/04/2016
		Mode Of Delivery:	Cooler Box
		Condition On Delivery:	OK
		Date Started:	21/04/2016
		Report Date:	07/06/2016
Customer Reference:	Landfill Compliance Monitoring	Report Reference:	Original Test Report

Parameter/Unit	Test Method	Maximum Limit	Minimum Limit	Test Date	RESULT Accredited* Sub-Contract**
Ammonia (as N) mg/l		--	--	06/05/16	< 0.04
BOD mg/l		--	--	21/04/16	< 1
Chemical Oxygen Demand mg/l		--	--	21/04/16	5
Chloride mg/l		--	--	26/04/16	23.82
Conductivity @ 20°C µS/cm		--	--	21/04/16	78.7
pH pH units		--	--	21/04/16	7
Suspended Solids mg/l		--	--	25/04/16	< 6
Dissolved Oxygen (Measurement) keep mg/l		--	--	21/04/16	10.9
Temperature Degrees C		--	--	21/04/16	9.5
Visual Inspection Descriptive		--	--	21/04/16	0

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Sample No.:	162501283	Sample Date/Time:	21/04/2016 @ 10:05
Category:	Landfill Monitoring	Sample Method:	Grab
Entity:	Muckish Landfill	Sampled By:	Eddie Carr
Station:	Muckish Sw 4	Laboratory:	Donegal Co Council
Template:	Muckish Biannual SW	Analyst:	Donegal CoCo

Sample Notes:			
Customer Name:	Landfill Monitoring Donegal Co. Council	Sample No. - Laboratory:	162501283
Contact Details:	Julie McMahon Central Lab The Kube, Magheranan Letterkenny 0749122787: 0872861096 julie.mcmahon@donegalcoco.ie	Sample No. - Customer:	
		Date Received:	21/04/2016
		Mode Of Delivery:	Cooler Box
		Condition On Delivery:	OK
		Date Started:	21/04/2016
		Report Date:	07/06/2016
Customer Reference:	Landfill Compliance Monitoring	Report Reference:	Original Test Report

Parameter/Unit	Test Method	Maximum Limit	Minimum Limit	Test Date	RESULT
					Accredited* Sub-Contract**
Ammonia (as N) mg/l		--	--	06/05/16	2.06
BOD mg/l		--	--	21/04/16	9
Chemical Oxygen Demand mg/l		--	--	21/04/16	8
Chloride mg/l		--	--	26/04/16	25.81
Conductivity @ 20°C µS/cm		--	--	21/04/16	102
pH pH units		--	--	21/04/16	6.8
Suspended Solids mg/l		--	--	25/04/16	< 6
Dissolved Oxygen (Measurement) keep mg/l		--	--	21/04/16	10.9
Temperature Degrees C		--	--	21/04/16	9.5

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 Notes 5.....



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Sample No.:	162501284	Sample Date/Time:	21/04/2016 @ 09:55
Category:	Landfill Monitoring	Sample Method:	Grab
Entity:	Muckish Landfill	Sampled By:	Eddie Carr
Station:	Muckish Gw 1	Laboratory:	Donegal Co Council
Template:	Muckish Biannual GW	Analyst:	Donegal CoCo

Sample Notes:			
Customer Name:	Landfill Monitoring Donegal Co. Council	Sample No. - Laboratory:	162501284
Contact Details:	Julie McMahon Central Lab The Kube, Magheranan Letterkenny 0749122787: 0872861096 julie.mcmahon@donegalcoco.ie	Sample No. - Customer:	
		Date Received:	21/04/2016
		Mode Of Delivery:	Cooler Box
		Condition On Delivery:	OK
		Date Started:	21/04/2016
		Report Date:	07/06/2016
Customer Reference:	Landfill Compliance Monitoring	Report Reference:	Original Test Report

Parameter/Unit	Test Method	Maximum Limit	Minimum Limit	Test Date	RESULT	
					Accredited*	Sub-Contract**
Ammonia (as N) mg/l		--	--	06/05/16	< 0.04	
Chloride mg/l		--	--	26/04/16	24.82	
Conductivity @ 20°C µS/cm		--	--	21/04/16	167.4	
Iron µg/l		--	--	24/05/16	49	***
pH pH units		--	--	21/04/16	6.8	
Phenols µg/l		--	--	24/05/16	< 100	***
Potassium mg/l		--	--	24/05/16	1.7	***
Sodium mg/l		--	--	21/04/16	11.7	***
Total Oxidised Nitrogen mg/l		--	--	06/05/16	0.063	
Depth m		--	--	21/04/16	3.8	
Dissolved Oxygen (Measurement) keep mg/l		--	--	21/04/16	9.3	
Faecal Coliforms (E. coli) MPN/100mls		--	--	21/04/16	4	
Temperature Degrees C		--	--	21/04/16	10.5	
Coliform bacteria.. MPN/100mls		--	--	21/04/16	13	
Total Organic Carbon mg/l		--	--	21/04/16	14.82	
Visual Inspection Descriptive		--	--	21/04/16	0	
Phenols mg/l		--	--	21/04/16	< 0.1	***
Dissolved Iron µg/l		--	--	21/04/16	49	***

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Notes 4.....

Notes 5.....



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Sample No.:	162501285	Sample Date/Time:	21/04/2016 @ 10:15
Category:	Landfill Monitoring	Sample Method:	Grab
Entity:	Muckish Landfill	Sampled By:	Eddie Carr
Station:	Muckish Gw 2	Laboratory:	Donegal Co Council
Template:	Muckish Biannual GW	Analyst:	Donegal CoCo
Sample Notes:			
Customer Name:	Landfill Monitoring Donegal Co. Council	Sample No. - Laboratory:	162501285
Contact Details:	Julie McMahon Central Lab The Kube, Magheranan Letterkenny 0749122787: 0872861096 julie.mcmahon@donegalcoco.ie	Sample No. - Customer:	
		Date Received:	21/04/2016
		Mode Of Delivery:	Cooler Box
		Condition On Delivery:	OK
		Date Started:	21/04/2016
		Report Date:	07/06/2016
Customer Reference:	Landfill Compliance Monitoring	Report Reference:	Original Test Report

Parameter/Unit	Test Method	Maximum Limit	Minimum Limit	Test Date	RESULT
					Accredited* Sub-Contract**
Ammonia (as N) mg/l		--	--	06/05/16	< 0.04
Chloride mg/l		--	--	26/04/16	27.79
Conductivity @ 20°C µS/cm		--	--	21/04/16	92.8
Iron µg/l		--	--	21/04/16	1400 ***
pH pH units		--	--	21/04/16	5.9
Phenols µg/l		--	--	24/05/16	< 100 ***
Potassium mg/l		--	--	21/04/16	2.2 ***
Sodium mg/l		--	--	21/04/16	12.1 ***
Total Oxidised Nitrogen mg/l		--	--	06/05/16	0.074
Depth m		--	--	21/04/16	0.9
Dissolved Oxygen (Measurement) keep mg/l		--	--	21/04/16	7.1
Faecal Coliforms (E. coli) MPN/100mls		--	--	21/04/16	145
Temperature Degrees C		--	--	21/04/16	10.3
Coliform bacteria.. MPN/100mls		--	--	21/04/16	145
Total Organic Carbon mg/l		--	--	21/04/16	32.42
Visual Inspection Descriptive		--	--	24/05/16	0
Phenols mg/l		--	--	21/04/16	< 0.1 ***
Dissolved Iron µg/l		--	--	21/04/16	1400 ***

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Sample No.:	162501286	Sample Date/Time:	21/04/2016 @ 10:25
Category:	Landfill Monitoring	Sample Method:	Grab
Entity:	Muckish Landfill	Sampled By:	Eddie Carr
Station:	Muckish Gw 3	Laboratory:	Donegal Co Council
Template:	Muckish Biannual GW	Analyst:	Donegal CoCo

Sample Notes:			
Customer Name:	Landfill Monitoring Donegal Co. Council	Sample No. - Laboratory:	162501286
Contact Details:	Julie McMahon Central Lab The Kube, Magheranan Letterkenny 0749122787: 0872861096 julie.mcmahon@donegalcoco.ie	Sample No. - Customer:	
		Date Received:	21/04/2016
		Mode Of Delivery:	Cooler Box
		Condition On Delivery:	OK
		Date Started:	21/04/2016
		Report Date:	07/06/2016
Customer Reference:	Landfill Compliance Monitoring	Report Reference:	Original Test Report

Parameter/Unit	Test Method	Maximum Limit	Minimum Limit	Test Date	RESULT	
					Accredited*	Sub-Contract**
Ammonia (as N) mg/l		--	--	06/05/16	5.61	
Chloride mg/l		--	--	26/04/16	32.76	
Conductivity @ 20°C µS/cm		--	--	21/04/16	403	
Iron µg/l		--	--	24/05/16	70	***
pH pH units		--	--	21/04/16	6.5	
Phenols µg/l		--	--	24/05/16	< 100	***
Potassium mg/l		--	--	21/04/16	8.6	***
Sodium mg/l		--	--	21/04/16	23.6	***
Total Oxidised Nitrogen mg/l		--	--	06/05/16	0.114	
Depth m		--	--	21/04/16	0.6	
Dissolved Oxygen (Measurement) keep mg/l		--	--	21/04/16	2.8	
Faecal Coliforms (E. coli) MPN/100mls		--	--	21/04/16	21	
Temperature Degrees C		--	--	21/04/16	10.3	
Coliform bacteria.. MPN/100mls		--	--	21/04/16	28	
Total Organic Carbon mg/l		--	--	21/04/16	10.56	
Visual Inspection Descriptive		--	--	24/05/16	0	
Phenols mg/l		--	--	21/04/16	< 0.1	***
Dissolved Iron µg/l		--	--	21/04/16	70	***

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 074-9122787

Sample No.:	162501287	Sample Date/Time:	21/04/2016 @ 11:00
Category:	Landfill Monitoring	Sample Method:	Grab
Entity:	Muckish Landfill	Sampled By:	Eddie Carr
Station:	Leachate Holding Lagoon	Laboratory:	Donegal Co Council
Template:	Muckish Biannual Leachate	Analyst:	Donegal CoCo

Sample Notes:			
Customer Name:	Landfill Monitoring Donegal Co. Council	Sample No. - Laboratory:	162501287
Contact Details:	Julie McMahon Central Lab The Kube, Magheranan Letterkenny 0749122787: 0872861096 julie.mcmahon@donegalcoco.ie	Sample No. - Customer:	
		Date Received:	21/04/2016
		Mode Of Delivery:	Cooler Box
		Condition On Delivery:	OK
		Date Started:	21/04/2016
		Report Date:	20/05/2016
Customer Reference:	Landfill Compliance Monitoring	Report Reference:	Original Test Report

Parameter/Unit	Test Method	Maximum Limit	Minimum Limit	Test Date	RESULT
					Accredited* Sub-Contract**
Ammonia (as N) mg/l		--	--	09/05/16	30.7
Chloride mg/l		--	--	26/04/16	52.61
Conductivity @ 20°C µS/cm		--	--	21/04/16	996
pH pH units		--	--	21/04/16	6.6
Total Oxidised Nitrogen mg/l		--	--	06/05/16	< 0.11
BOD mg/l		--	--	21/04/16	6.95
Chemical Oxygen Demand mg/l		--	--	21/04/16	64
Depth m		--	--	21/04/16	1.1
Temperature Degrees C		--	--	21/04/16	8.2
Visual Inspection Descriptive		--	--	21/04/16	0

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074-9122787**

Sample No.:	162501288	Sample Date/Time:	21/04/2016 @ 09:40
Category:	Landfill Monitoring	Sample Method:	Grab
Entity:	Muckish Landfill	Sampled By:	Eddie Carr
Station:	Muckish P1	Laboratory:	Donegal Co Council
Template:	Landfill Monitoring - Landfill Gas	Analyst:	Donegal CoCo
Sample Notes:			
Customer Name:	Landfill Monitoring Donegal Co. Council	Sample No. - Laboratory:	162501288
Contact Details:	Julie McMahon Central Lab The Kube, Magheranan Letterkenny 0749122787: 0872861096 julie.mcmahon@donegalcoco.ie	Sample No. - Customer:	
		Date Received:	21/04/2016
		Mode Of Delivery:	Field Test
		Condition On Delivery:	n/a
		Date Started:	21/04/2016
		Report Date:	20/05/2016
Customer Reference:	Landfill Compliance Monitoring	Report Reference:	Original Test Report

Parameter/Unit	Test Method	Maximum Limit	Minimum Limit	Test Date	RESULT
					Accredited* Sub-Contract**
Atmospheric Pressure mBar		--	--	21/04/16	1001
Carbon Dioxide %		--	--	21/04/16	23.7
Methane %		--	--	21/04/16	51.6
Oxygen % O2		--	--	21/04/16	1.4

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 Notes 4.....
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074-9122787**

Sample No.:	162501289	Sample Date/Time:	21/04/2016 @ 09:45
Category:	Landfill Monitoring	Sample Method:	Grab
Entity:	Muckish Landfill	Sampled By:	Eddie Carr
Station:	Muckish P2	Laboratory:	Donegal Co Council
Template:	Landfill Monitoring - Landfill Gas	Analyst:	Donegal CoCo
Sample Notes:			
Customer Name:	Landfill Monitoring Donegal Co. Council	Sample No. - Laboratory:	162501289
Contact Details:	Julie McMahon Central Lab The Kube, Magheranan Letterkenny 0749122787: 0872861096 julie.mcmahon@donegalcoco.ie	Sample No. - Customer:	
		Date Received:	21/04/2016
		Mode Of Delivery:	Field Test
		Condition On Delivery:	n/a
		Date Started:	21/04/2016
		Report Date:	20/05/2016
Customer Reference:	Landfill Compliance Monitoring	Report Reference:	Original Test Report

Parameter/Unit	Test Method	Maximum Limit	Minimum Limit	Test Date	RESULT Accredited* Sub-Contract**
Atmospheric Pressure mBar		--	--	21/04/16	1001
Carbon Dioxide %		--	--	21/04/16	24.4
Methane %		--	--	21/04/16	57.9
Oxygen % O2		--	--	21/04/16	0.4

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074-9122787**

Sample No.:	162501290	Sample Date/Time:	21/04/2016 @ 09:50
Category:	Landfill Monitoring	Sample Method:	Grab
Entity:	Muckish Landfill	Sampled By:	Eddie Carr
Station:	Muckish P3	Laboratory:	Donegal Co Council
Template:	Landfill Monitoring - Landfill Gas	Analyst:	Donegal CoCo
Sample Notes:			
Customer Name:	Landfill Monitoring Donegal Co. Council	Sample No. - Laboratory:	162501290
Contact Details:	Julie McMahon Central Lab The Kube, Magheranan Letterkenny 0749122787: 0872861096 julie.mcmahon@donegalcoco.ie	Sample No. - Customer:	
		Date Received:	21/04/2016
		Mode Of Delivery:	Field test
		Condition On Delivery:	n/a
		Date Started:	21/04/2016
		Report Date:	20/05/2016
Customer Reference:	Landfill Compliance Monitoring	Report Reference:	Original Test Report

Parameter/Unit	Test Method	Maximum Limit	Minimum Limit	Test Date	RESULT Accredited* Sub-Contract**
Atmospheric Pressure mBar		--	--	21/04/16	1001
Carbon Dioxide %		--	--	21/04/16	29.2
Methane %		--	--	21/04/16	55.7
Oxygen % O2		--	--	21/04/16	0.5

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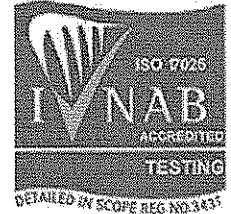
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 074-9122787



Sample No.:	162503391	Sample Date/Time:	18/10/2016 @ 13:05
Category:	Landfill Monitoring	Sample Method:	Grab
Entity:	Muckish Landfill	Sampled By:	Fionnuala Bonner
Station:	Leachate Holding Lagoon	Laboratory:	Donegal Co Co
Template:	Muckish Biannual Leachate	Analyst:	Fionnuala Bonner

Sample Notes:

Customer Name: Landfill Monitoring Donegal Co. Council
Contact Details: Julie McMahon
 Central Lab
 The Kube, Magheranan
 Letterkenny
 0749122787: 0872861096
 julie.mcmahon@donegalcoco.ie
Customer Ref: Landfill Compliance Monitoring

Sample No. Laboratory: 162503391
Sample No. Customer:
Date Received: 18/10/2016
Mode Of Delivery: cooler box
Condition On Delivery: ok
Date Started: 18/10/2016
Report Date: 23/11/2016
Report Reference: 17DL05

Parameter/Unit	Test Method	Maximum Limit	Minimum Limit	Test Date	Test RESULT
Ammonia (as N) mg/l	5.4P-TMC6	--	--	01/11/16	6.69
Chloride mg/l	5.4P-TMC14	--	--	19/10/16	19.85
Conductivity @ 20°C µS/cm	5.4P-TMC2	--	--	18/10/16	281
pH pH units	5.4P-TMC1	--	--	18/10/16	6.6
Total Oxidised Nitrogen mg/l	5.4P-TMC6	--	--	01/11/16	0.016
BOD mg/l	5.4P-TMC9	--	--	18/10/16	3
Depth m	5.4P-TMC27	--	--	18/10/16	0.9
Temperature Degrees C	5.4P-TMC1	--	--	18/10/16	11.2
Visual Inspection Descriptive	5.4P-TMC26	--	--	18/10/16	Nothing Observed
COD mg/l	5.4P-TMC3	--	--	19/10/16	87
Orthophosphate mg/l	5.4P-TMC6	--	--	01/11/16	0.03
Nitrite (as N) mg/l	5.4P-TMC6	--	--	01/11/16	0.016
Nitrate (as N) mg/l	5.4P-TMC6	--	--	01/11/16	< 0.1

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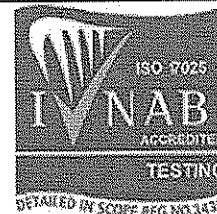
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Comhairle Contae Dhún na nGall
Donegal County Council
Central Laboratory, The Kube
Magheranan
Letterkenny
 074-9122787



Sample No.: 162503388
Category: Landfill Monitoring
Entity: Muckish Landfill
Station: Muckish Gw 1
Template: Muckish Biannual GW
Sample Notes:

Sample Date/Time: 18/10/2016 @ 12:10
Sample Method: Grab
Sampled By: Fionnuala Bonner
Laboratory: Donegal Co Co
Analyst: Fionnuala Bonner

Customer Name: Landfill Monitoring Donegal Co. Council
Contact Details: Julie McMahon
 Central Lab
 The Kube, Magheranan
 Letterkenny
 0749122787: 0872861096
 julie.mcmahon@donegalcoco.ie
Customer Ref: Landfill Compliance Monitoring

Sample No. Laboratory: 162503388
Sample No. Customer:
Date Received: 18/10/2016
Mode Of Delivery: cooler box
Condition On Delivery: ok
Date Started: 18/10/2016
Report Date: 21/12/2016
Report Reference: 17DL05

Parameter/Unit	Test Method	Maximum Limit	Minimum Limit	Test Date	Test RESULT
Ammonia (as N) mg/l	5.4P-TMC6	--	--	01/11/16	0.384
Chloride mg/l	5.4P-TMC14	--	--	19/10/16	9.92
Conductivity @ 20°C µS/cm	5.4P-TMC2	--	--	18/10/16	171.8
Iron µg/l		--	--	18/10/16	< 20 ***
pH pH units	5.4P-TMC1	--	--	18/10/16	6.9
Potassium mg/l		--	--	18/10/16	1.4 ***
Sodium mg/l		--	--	18/10/16	8.7 ***
Total Oxidised Nitrogen mg/l	5.4P-TMC6	--	--	01/11/16	0.271
Depth m	5.4P-TMC27	--	--	18/10/16	4.4
Dissolved Oxygen (Measurement) keep mg/l	5.4P-TMC18	--	--	18/10/16	5.6
Faecal Coliforms (E. coli) MPN/100mls	5.4P-TMM1	--	--	18/10/16	> 2420
Temperature Degrees C	5.4P-TMC1	--	--	18/10/16	11.1
Coliform bacteria.. MPN/100mls	5.4P-TMM1	--	--	18/10/16	> 2420
Total Organic Carbon mg/l	5.4P-TMC10	--	--	26/10/16	19.15
Visual Inspection Descriptive	5.4P-TMC26	--	--	18/10/16	Nothing Observed
Phenols mg/l		--	--	18/10/16	< 0.1 ***
Orthophosphate mg/l	5.4P-TMC6	--	--	01/11/16	0.023
Nitrite (as N) mg/l	5.4P-TMC6	--	--	01/11/16	0.015
Nitrate (as N) mg/l	5.4P-TMC6	--	--	01/11/16	0.256

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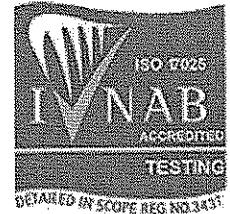
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074-9122787**



Sample No.: 162503389	Sample Date/Time: 18/10/2016 @ 12:30
Category: Landfill Monitoring	Sample Method: Grab
Entity: Muckish Landfill	Sampled By: Fionnuala Bonner
Station: Muckish Gw 2	Laboratory: Donegal Co Co
Template: Muckish Biannual GW	Analyst: Fionnuala Bonner

Sample Notes:	Sample No. Laboratory: 162503389
Customer Name: Landfill Monitoring Donegal Co. Council	Sample No. Customer:
Contact Details: Julie McMahon Central Lab The Kube, Magheranan Letterkenny 0749122787: 0872861096 julie.mcmahon@donegalcoco.ie	Date Received: 18/10/2016 Mode Of Delivery: cooler box Condition On Delivery: ok Date Started: 18/10/2016 Report Date: 21/12/2016 Report Reference: 17DL05
Customer Ref: Landfill Compliance Monitoring	

Parameter/Unit	Test Method	Maximum Limit	Minimum Limit	Test Date	Test RESULT
Ammonia (as N) mg/l	5.4P-TMC6	--	--	01/11/16	0.363
Chloride mg/l	5.4P-TMC14	--	--	19/10/16	19.85
Conductivity @ 20°C µS/cm	5.4P-TMC2	--	--	18/10/16	125.1 *
Iron µg/l		--	--	18/10/16	890 ***
pH pH units	5.4P-TMC1	--	--	18/10/16	5.6 *
Potassium mg/l		--	--	18/10/16	0.7 ***
Sodium mg/l		--	--	18/10/16	11.9 ***
Total Oxidised Nitrogen mg/l	5.4P-TMC6	--	--	01/11/16	0.013
Depth m	5.4P-TMC27	--	--	18/10/16	1.5
Dissolved Oxygen (Measurement) keep mg/l	5.4P-TMC18	--	--	18/10/16	4.8
Faecal Coliforms (E. coli) MPN/100mls	5.4P-TMM1	--	--	18/10/16	147
Temperature Degrees C	5.4P-TMC1	--	--	18/10/16	10.5
Coliform bacteria.. MPN/100mls	5.4P-TMM1	--	--	18/10/16	248
Total Organic Carbon mg/l	5.4P-TMC10	--	--	26/10/16	27.63
Visual Inspection Descriptive	5.4P-TMC26	--	--	18/10/16	Nothing Observed
Phenols mg/l		--	--	18/10/16	< 0.1 ***
Orthophosphate mg/l	5.4P-TMC6	--	--	01/11/16	0.031
Nitrite (as N) mg/l	5.4P-TMC6	--	--	01/11/16	0.013
Nitrate (as N) mg/l	5.4P-TMC6	--	--	01/11/16	< 0.1

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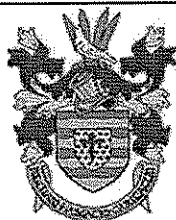
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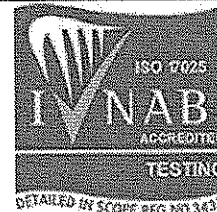
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 074-9122787



Sample No.: 162503390
Category: Landfill Monitoring
Entity: Muckish Landfill
Station: Muckish Gw 3
Template: Muckish Biannual GW
Sample Notes:

Sample Date/Time: 18/10/2016 @ 12:45
Sample Method: Grab
Sampled By: Fionnuala Bonner
Laboratory: Donegal Co Co
Analyst: Fionnuala Bonner

Customer Name: Landfill Monitoring Donegal Co. Council
Contact Details: Julie McMahon
 Central Lab
 The Kube, Magheranan
 Letterkenny
 0749122787: 0872861096
 julie.mcmahon@donegalcoco.ie
Customer Ref: Landfill Compliance Monitoring

Sample No. Laboratory: 162503390
Sample No. Customer:
Date Received: 18/10/2016
Mode Of Delivery: cooler box
Condition On Delivery: ok
Date Started: 18/10/2016
Report Date: 21/12/2016
Report Reference: 17DL05

Parameter/Unit	Test Method	Maximum Limit	Minimum Limit	Test Date	Test RESULT
Ammonia (as N) mg/l	5.4P-TMC6	--	--	01/11/16	1.06
Chloride mg/l	5.4P-TMC14	--	--	19/10/16	24.81
Conductivity @ 20°C µS/cm	5.4P-TMC2	--	--	18/10/16	377
Iron µg/l		--	--	18/10/16	280 ***
pH pH units	5.4P-TMC1	--	--	18/10/16	6.6
Potassium mg/l		--	--	18/10/16	7.2 ***
Sodium mg/l		--	--	18/10/16	15.7 ***
Total Oxidised Nitrogen mg/l	5.4P-TMC6	--	--	01/11/16	1.12
Depth m	5.4P-TMC27	--	--	18/10/16	1.8
Dissolved Oxygen (Measurement) keep mg/l	5.4P-TMC18	--	--	18/10/16	2.4
Faecal Coliforms (E. coli) MPN/100mls	5.4P-TMM1	--	--	18/10/16	649
Temperature Degrees C	5.4P-TMC1	--	--	18/10/16	10.1
Coliform bacteria, MPN/100mls	5.4P-TMM1	--	--	18/10/16	1120
Total Organic Carbon mg/l	5.4P-TMC10	--	--	26/10/16	12.59
Visual Inspection Descriptive	5.4P-TMC26	--	--	18/10/16	Nothing Observed
Phenols mg/l		--	--	18/10/16	< 0.1 ***
Orthophosphate mg/l	5.4P-TMC6	--	--	01/11/16	0.031
Nitrite (as N) mg/l	5.4P-TMC6	--	--	01/11/16	0.605
Nitrate (as N) mg/l	5.4P-TMC6	--	--	01/11/16	0.515

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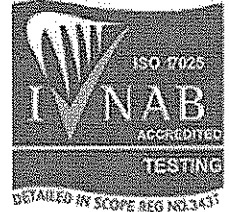
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**Comhairle Contae Dhún na nGall
Donegal County Council
Central Laboratory, The Kube
Magheranan
Letterkenny
074-9122787**



Sample No.: 162503384	Sample Date/Time: 18/10/2016 @ 12:50
Category: Landfill Monitoring	Sample Method: Grab
Entity: Muckish Landfill	Sampled By: Fionnuaila Bonner
Station: Muckish Sw 1	Laboratory: Donegal Co Co
Template: Muckish Biannual SW	Analyst: Fionnuaila Bonner
Sample Notes:	
Customer Name: Landfill Monitoring Donegal Co. Council	Sample No. Laboratory: 162503384
Contact Details: Julie McMahon Central Lab The Kube, Magheranan Letterkenny 0749122787: 0872861096 julie.mcmahon@donegalcoco.ie	Sample No. Customer: Date Received: 18/10/2016 Mode Of Delivery: cooler box Condition On Delivery: ok Date Started: 18/10/2016 Report Date: 23/11/2016
Customer Ref: Landfill Compliance Monitoring	Report Reference: 17DL05

Parameter/Unit	Test Method	Maximum Limit	Minimum Limit	Test Date	Test RESULT
Ammonia (as N) mg/l	5.4P-TMC5	--	--	07/11/16	< 0.04
BOD mg/l	5.4P-TMC9	--	--	19/10/16	< 1
Chloride mg/l	5.4P-TMC14	--	--	19/10/16	12.9
Conductivity @ 20°C µS/cm	5.4P-TMC2	--	--	18/10/16	63.9 *
pH pH units	5.4P-TMC1	--	--	18/10/16	6.6 *
Suspended Solids mg/l	5.4P-TMC4	--	--	19/10/16	< 6 *
Dissolved Oxygen (Measurement) keep mg/l	5.4P-TMC18	--	--	18/10/16	11.1
Temperature Degrees C	5.4P-TMC1	--	--	18/10/16	8.8
Visual Inspection Descriptive	5.4P-TMC26	--	--	18/10/16	Nothing Observed
COD mg/l	5.4P-TMC3	--	--	19/10/16	13 *
Orthophosphate mg/l	5.4P-TMC5	--	--	07/11/16	< 0.01
Nitrite (as N) mg/l	5.4P-TMC5	--	--	07/11/16	< 0.01
Nitrate (as N) mg/l	5.4PTMC5	--	--	07/11/16	< 0.1

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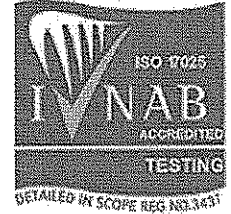
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**Comhairle Contae Dhún na nGall
Donegal County Council
Central Laboratory, The Kube
Magheranan
Letterkenny
074-9122787**



Sample No.: 162503385	Sample Date/Time: 18/10/2016 @ 13:10
Category: Landfill Monitoring	Sample Method: Grab
Entity: Muckish Landfill	Sampled By: Fionnuala Bonner
Station: Muckish Sw 2	Laboratory: Donegal Co Co
Template: Muckish Biannual SW	Analyst: Fionnuala Bonner
Sample Notes:	

Customer Name: Landfill Monitoring Donegal Co. Council	Sample No. Laboratory: 162503385
Contact Details: Julie McMahon Central Lab The Kube, Magheranan Letterkenny 0749122787: 0872861096 julie.mcmahon@donegalcoco.ie	Sample No. Customer: Date Received: 18/10/2016 Mode Of Delivery: cooler box Condition On Delivery: ok Date Started: 18/10/2016 Report Date: 23/11/2016
Customer Ref: Landfill Compliance Monitoring	Report Reference: 17DL05

Parameter/Unit	Test Method	Maximum Limit	Minimum Limit	Test Date	Test RESULT
Ammonia (as N) mg/l	5.4P-TMC5	--	--	07/11/16	< 0.04
BOD mg/l	5.4P-TMC9	--	--	19/10/16	1
Chloride mg/l	5.4P-TMC14	--	--	19/10/16	9.92
Conductivity @ 20°C µS/cm	5.4P-TMC2	--	--	18/10/16	61.3 *
pH pH units	5.4P-TMC1	--	--	18/10/16	5.9 *
Suspended Solids mg/l	5.4P-TMC4	--	--	19/10/16	< 6 *
Dissolved Oxygen (Measurement) keep mg/l	5.4P-TMC18	--	--	18/10/16	9.4
Temperature Degrees C	5.4P-TMC1	--	--	18/10/16	10.1
Visual Inspection Descriptive	5.4P-TMC26	--	--	18/10/16	OK
COD mg/l	5.4P-TMC3	--	--	19/10/16	25 *
Orthophosphate mg/l	5.4P-TMC5	--	--	07/11/16	< 0.01
Nitrite (as N) mg/l	5.4P-TMC5	--	--	07/11/16	< 0.01
Nitrate (as N) mg/l	5.4PTMC5	--	--	07/11/16	< 0.1

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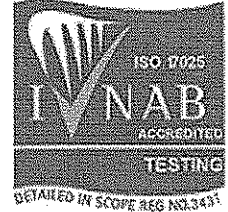
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Comhairle Contae Dhún na nGall
Donegal County Council
Central Laboratory, The Kube
Magheranan
Letterkenny
074-9122787



Sample No.: 162503386
Category: Landfill Monitoring
Entity: Muckish Landfill
Station: Muckish Sw 3
Template: Muckish Biannual SW
Sample Notes:

Sample Date/Time: 18/10/2016 @ 12:35
Sample Method: Grab
Sampled By: Fionnuala Bonner
Laboratory: Donegal Co Co
Analyst: Fionnuala Bonner

Customer Name: Landfill Monitoring Donegal Co. Council
Contact Details: Julie McMahon
Central Lab
The Kube, Magheranan
Letterkenny
0749122787: 0872861096
julie.mcmahon@donegalcoco.ie
Customer Ref: Landfill Compliance Monitoring

Sample No. Laboratory: 162503386
Sample No. Customer:
Date Received: 18/10/2016
Mode Of Delivery: cooler box
Condition On Delivery: ok
Date Started: 18/10/2016
Report Date: 23/11/2016
Report Reference: 17DL05

Parameter/Unit	Test Method	Maximum Limit	Minimum Limit	Test Date	Test RESULT
Ammonia (as N) mg/l	5.4P-TMC5	--	--	07/11/16	< 0.04
BOD mg/l	5.4P-TMC9	--	--	19/10/16	3
Chloride mg/l	5.4P-TMC14	--	--	19/10/16	9.92
Conductivity @ 20°C µS/cm	5.4P-TMC2	--	--	18/10/16	63.6 *
pH pH units	5.4P-TMC1	--	--	18/10/16	6.7 *
Suspended Solids mg/l	5.4P-TMC4	--	--	19/10/16	< 6 *
Dissolved Oxygen (Measurement) keep mg/l	5.4P-TMC18	--	--	18/10/16	11.1
Temperature Degrees C	5.4P-TMC1	--	--	18/10/16	8.8
Visual Inspection Descriptive	5.4P-TMC26	--	--	18/10/16	OK
COD mg/l	5.4P-TMC3	--	--	19/10/16	16 *
Orthophosphate mg/l	5.4P-TMC5	--	--	07/11/16	< 0.01
Nitrite (as N) mg/l	5.4P-TMC5	--	--	07/11/16	< 0.01
Nitrate (as N) mg/l	5.4PTMC5	--	--	07/11/16	0.109

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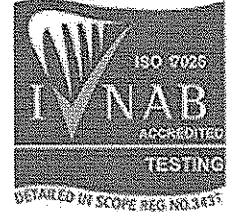
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 074-9122787



Sample No.:	162503387	Sample Date/Time:	18/10/2016 @ 12:15
Category:	Landfill Monitoring	Sample Method:	Grab
Entity:	Muckish Landfill	Sampled By:	Fionnuala Bonner
Station:	Muckish Sw 4	Laboratory:	Donegal Co Co
Template:	Muckish Biannual SW	Analyst:	Fionnuala Bonner
Sample Notes:			

Customer Name:	Landfill Monitoring Donegal Co. Council	Sample No. Laboratory:	162503387
Contact Details:	Julie McMahon Central Lab The Kube, Magheranan Letterkenny 0749122787: 0872861096 julie.mcmahon@donegalcoco.ie	Sample No. Customer:	
Customer Ref:	Landfill Compliance Monitoring	Date Received:	18/10/2016
		Mode Of Delivery:	cooler box
		Condition On Delivery:	ok
		Date Started:	18/10/2016
		Report Date:	23/11/2016
		Report Reference:	17DL05

Parameter/Unit	Test Method	Maximum Limit	Minimum Limit	Test Date	Test RESULT
Ammonia (as N) mg/l	5.4P-TMC5	--	--	07/11/16	1.35
BOD mg/l	5.4P-TMC9	--	--	19/10/16	4
Chloride mg/l	5.4P-TMC14	--	--	19/10/16	10.91
Conductivity @ 20°C µS/cm	5.4P-TMC2	--	--	18/10/16	79 *
pH pH units	5.4P-TMC1	--	--	18/10/16	6.7 *
Suspended Solids mg/l	5.4P-TMC4	--	--	19/10/16	< 6 *
Dissolved Oxygen (Measurement) keep mg/l	5.4P-TMC18	--	--	18/10/16	11.3
Temperature Degrees C	5.4P-TMC1	--	--	18/10/16	8.8
Visual Inspection Descriptive	5.4P-TMC26	--	--	18/10/16	OK
COD mg/l	5.4P-TMC3	--	--	19/10/16	12 *
Orthophosphate mg/l	5.4P-TMC5	--	--	07/11/16	< 0.01
Nitrite (as N) mg/l	5.4P-TMC5	--	--	07/11/16	< 0.01
Nitrate (as N) mg/l	5.4PTMC5	--	--	07/11/16	0.142

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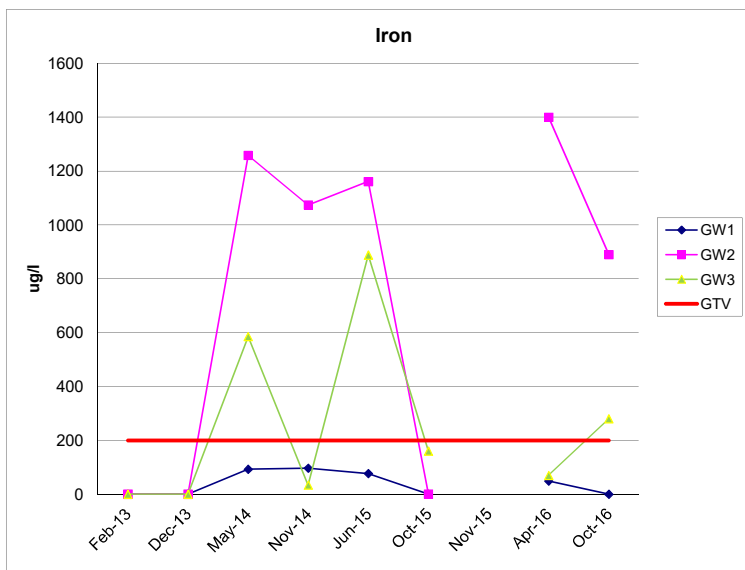
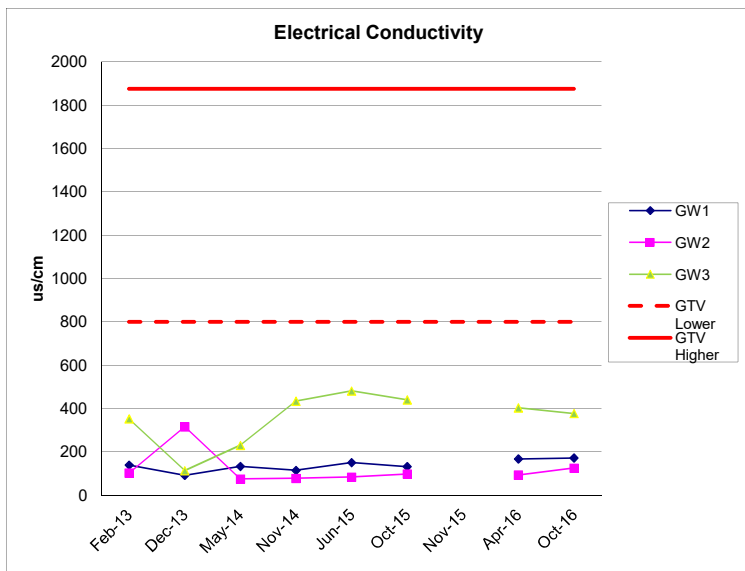
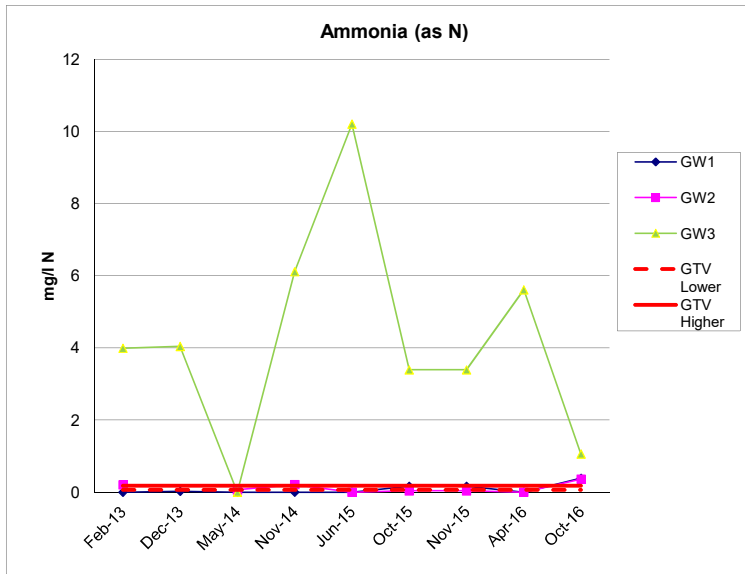
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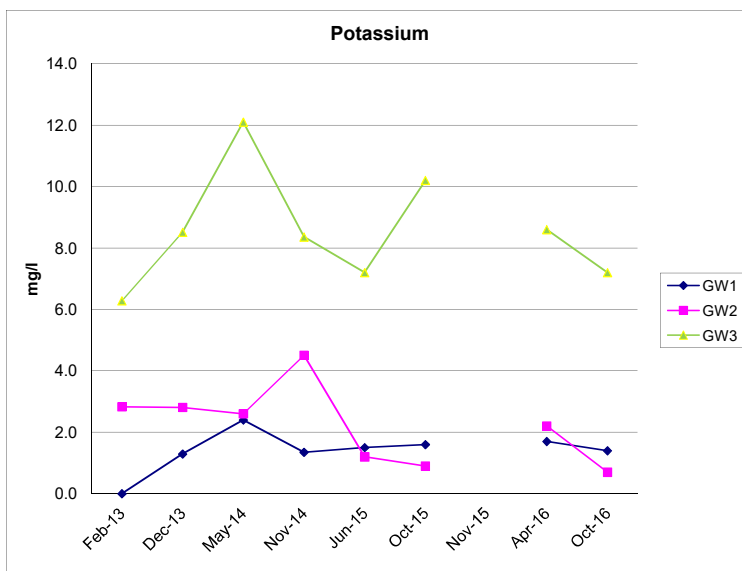
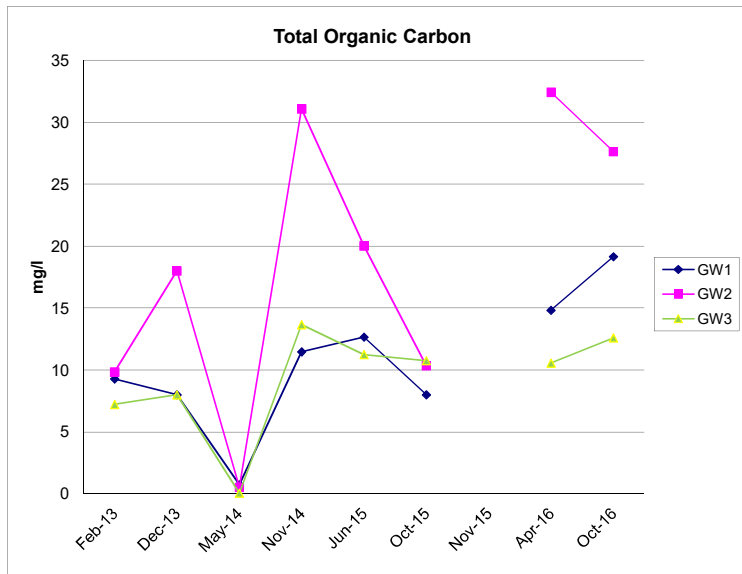
Geraldine Friel

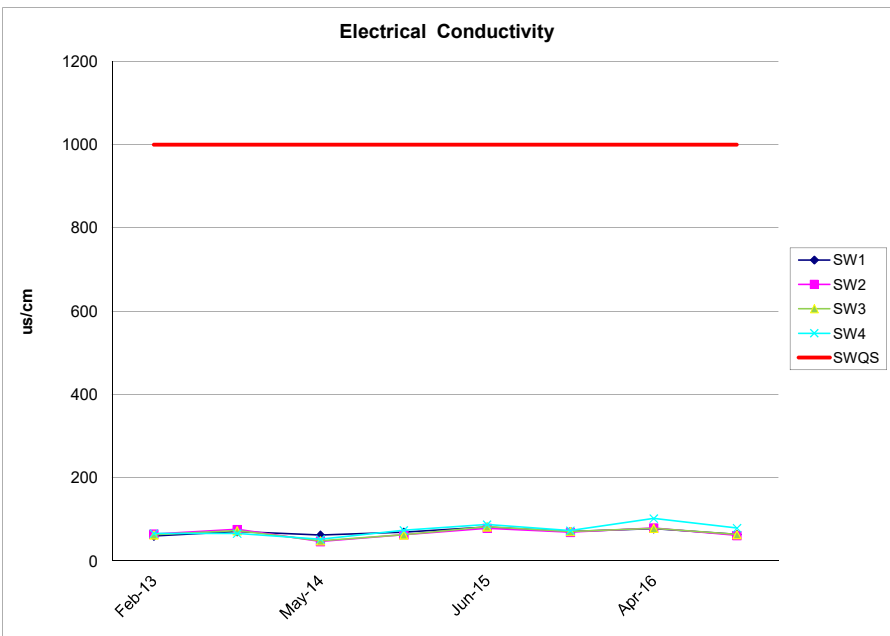
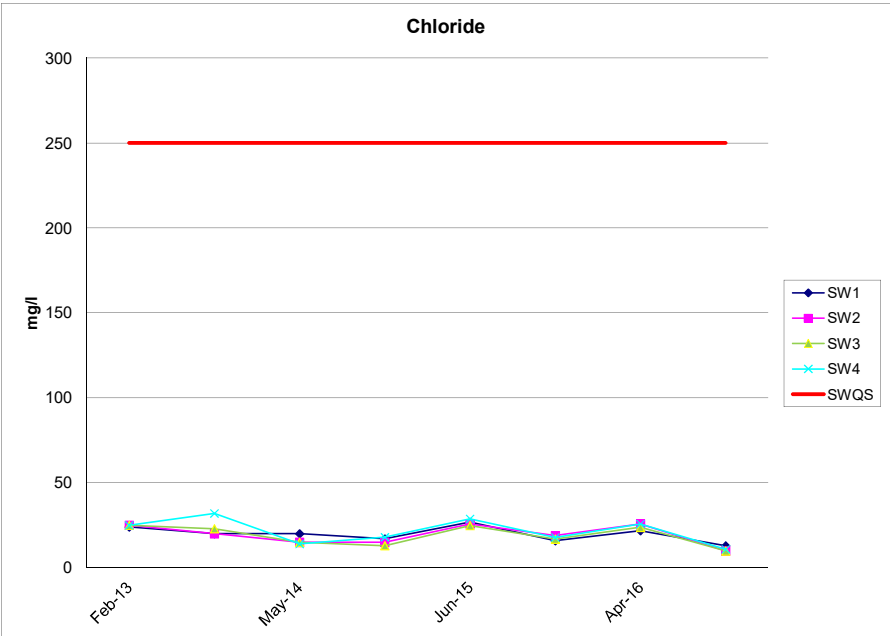
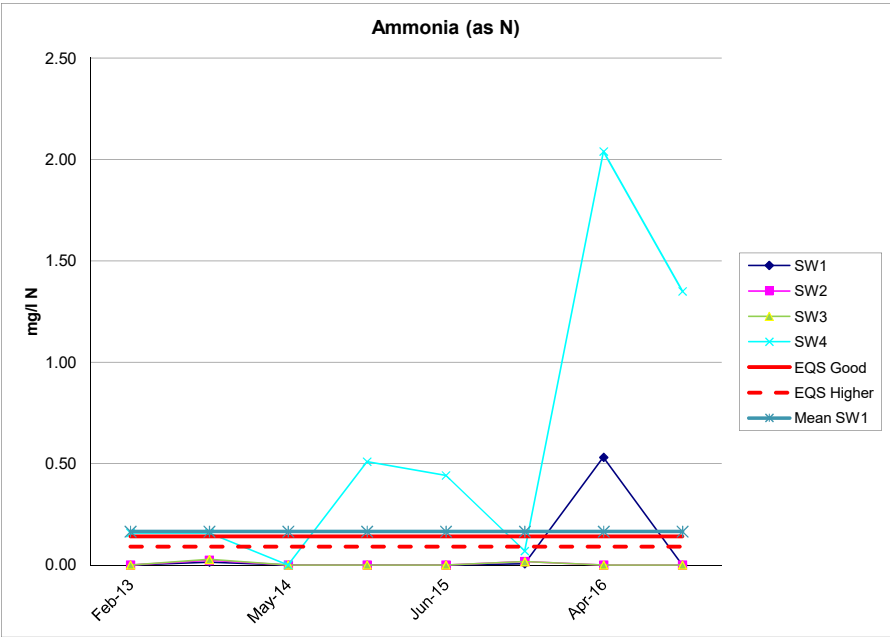
09/01/2017

Dr. Joe Ferry, Laboratory Manager

This report shall not be reproduced except in full, without the permission of the laboratory, and only relates to the items tested
 Any opinions, remarks and/or interpretations expressed above are outside the scope of accreditation
 Micro. parameters with units MPN/100mls are reported as zero for result of <1 MPN/100ml, i.e. none detected in volume tested
 Original Test Report, unless otherwise indicated by the insertion of Supplementary Test Report in Report Reference section
 In RESULT column, unaccredited in-house test result - no asterisk, *inhouse accredited, **unaccredited & subcontracted, *** accredited & sub-cont.







Appendix D

Water Balance Calculation

MUCKISH WATER BALANCE CALCULATION

Year	Status	Rainfall (mm)	Temp Area	Temp infiltration	Restored area Area	Restored area infiltration	Total Water	Leachate produced	Leachate Volume tankered
				IRCA(m3)		IRCA(m3)		Lo(m3)	Lo(m3)
2016	Closed	1,073			20,500	2,199	2,199	2,199	1482.67
Total		1,073						2,199	1482.67

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.	1072.6	mm

Total rainfall in millimetres for Malin_head	Year	2016	2015	2014	2013	2012
	Jan	166.3	176.0	162.2	140.9	134.7
	Feb	130.7	85.8	189.9	74.1	68.1
	Mar	72.7	123.1	71.6	61.7	29.8
	Apr	52.9	64.7	33.4	61.6	46.3
	May	65.6	137.0	86.8	102.5	50.7
	Jun	72.4	56.1	48.6	85.5	141.1
	Jul	109.9	132.7	86.0	56.5	91.4
	Aug	79.9	111.0	95.3	92.6	87.3
	Sep	94.7	29.7	23.0	69.7	139.2
	Oct	37.6	71.9	131.4	103.8	123.5
	Nov	113.9	222.9	134.4	116.0	87.4
	Dec	76.0	272.9	150.5	178.6	149.3
	Annual	1072.6	1483.8	1213.1	1143.5	1148.8

Appendix E

E-PRTR

(AER Electronic Reporting System)

[Guidance to completing the PRTR workbook](#)

PRTR Returns Workbook

Version 1.1.19

REFERENCE YEAR	2016
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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

Classes of Activity

No.	class_name
-	Refer to PRTR class activities below

Address 1	Muckish
Address 2	Falcarragh
Address 3	
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	Julie McMahon
AER Returns Contact Email Address	julie.mcmahon@donegalcoco.ie
AER Returns Contact Position	Executive Engineer
AER Returns Contact Telephone Number	0749122787
AER Returns Contact Mobile Phone Number	0872861096
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](#)

| PRTR# : W0126 | Facility Name : Muckish Landfill Site | Filename : IBR0125 Landgem 2016.xlsx | Return Year : 2016 |

22/03/2017 14:36

SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS

RELEASERS TO AIR		METHOD			Please enter all quantities in this section in KG:			
POLLUTANT		Method Used			QUANTITY			
No. Annex I	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

RELEASERS TO AIR		METHOD			Please enter all quantities in this section in KG:			
POLLUTANT		Method Used			QUANTITY			
No. Annex I	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	0.0	58831.97	0.0	58831.97
03	Carbon dioxide (CO2)	C	OTH	Landgem	0.0	161421.13	0.0	161421.13
02	Carbon monoxide (CO)	C	OTH	Landgem	0.0	28.77	0.0	28.77
07	Non-methane volatile organic compounds (NMVOC)	C	OTH	Landgem	0.0	0.0	0.0	379.31
55	1,1,1-trichloroethane	C	OTH	Landgem	0.0	0.47	0.0	0.47
56	1,1,2,2-tetrachloroethane	C	OTH	Landgem	0.0	1.35	0.0	1.35
34	1,2-dichloroethane (EDC)	C	OTH	Landgem	0.0	0.3	0.0	0.3
62	Benzene	C	OTH	Landgem	0.0	1.09	0.0	1.09
58	Trichloromethane	C	OTH	Landgem	0.0	0.03	0.0	0.03
35	Dichloromethane (DCM)	C	OTH	Landgem	0.0	8.72	0.0	8.72
65	Ethyl benzene	C	OTH	Landgem	0.0	3.58	0.0	3.58
73	Toluene	C	OTH	Landgem	0.0	26.36	0.0	26.36
60	Vinyl chloride	C	OTH	Landgem	0.0	3.35	0.0	3.35
78	Xylenes	C	OTH	Landgem	0.0	9.35	0.0	9.35
57	Trichloroethylene	C	OTH	Landgem	0.0	2.7	0.0	2.7

* 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)

RELEASERS TO AIR		METHOD			Please enter all quantities in this section in KG:			
POLLUTANT		Method Used			QUANTITY			
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
247	Acetone	C	OTH	Landgem	0.0	2.98	0.0	2.98

* 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			
	T (Total) kg/Year	M/C/E	Method Code	Designation or Description
Total estimated methane generation (as per site model)	0.0			Facility Total Capacity m3 per hour
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)	0.0			N/A

5. ONSITE TREATMENT & OFFSITE TRANSFERS OF WASTE

[PRTR# : W0126 | Facility Name : Muckish Landfill Site | Filename : IBR0125 Landgem 2016.xlsx | Return Year : 2016]

22/03/2017 14:36

Please enter all quantities on this sheet in Tonnes

3

Transfer Destination	European Waste Code	Hazardous	Quantity (Tonnes per Year)	Description of Waste	Waste Treatment Operation	Method Used		Location of Treatment	<small>Haz Waste</small> - Name and Licence/Permit No of Next Destination Facility <small>Haz Waste</small> : Name and Licence/Permit No of Recoverer/Disposer <small>Non-Haz Waste</small> : Name and Licence/Permit No of Recoverer/Disposer	<small>Haz Waste</small> : Address of Next Destination Facility <small>Non-Haz Waste</small> : Address of Recoverer/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	1482.67 in 19 07 02	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](#)

[Link to Waste Guidance](#)