

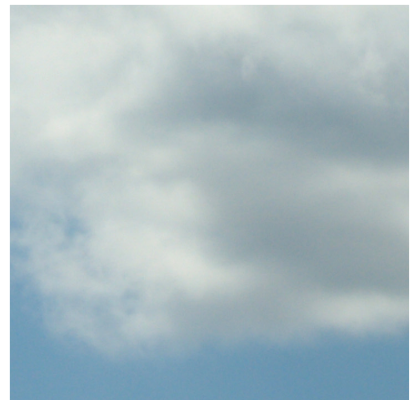
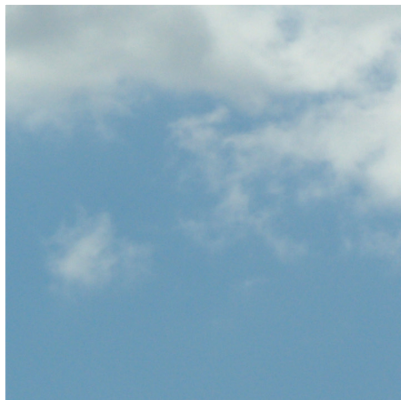
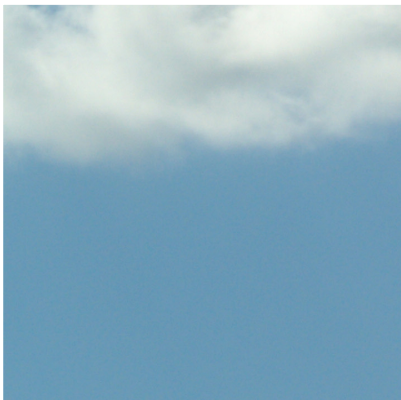
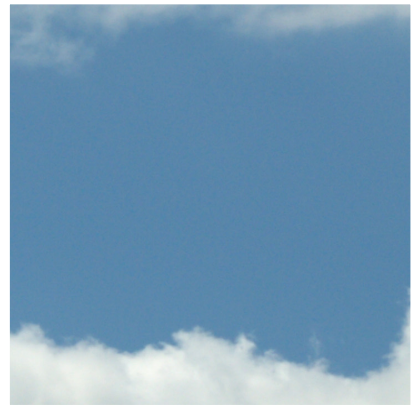
RPS

Donegal County Council

Annual Environmental Report 2017

Muckish Landfill Site

IBR1073 / April 2018



Document Control Sheet

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Project Title	Annual Environmental Report 2017					
Document Title	Muckish Landfill Site (W0126-01)					
Document No.	IBR1073					
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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	2017
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 2017 to 31st December 2017.

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 IBR1073/009.

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 agreed groundwater trigger levels for Ammoniacal Nitrogen of GW1 = 0.175 mg/l, GW2 = 2.1 mg/l and GW3 = 7mg/l²;
- EPA Interim Guideline Values³ (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 Groundwater Threshold Values (GTV).

Groundwater monitoring is carried out at three locations (GW1, GW2 and GW3) as shown on Drawing IBR1073/009. These groundwater monitoring boreholes were installed at the landfill early in 2000 as per licence requirements. Monitoring location GW1 is representative of water quality upgradient conditions and monitoring locations GW2 and GW3 are

² As per licence return approval notice of 31/05/2017 Ref LR025208.

³ EPA (2003) Towards setting guideline values for the protection of groundwater in Ireland. Interim Report

downgradient but close to the waste body in the space between the waste and the river. The results are presented in Table 5.1 below and in graph format in Appendix C.

There are no monitoring results for GW1 in October as there was insufficient sample for analysis.

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 2017

Station	Date	Ammonia N	Chloride	Conductivity @ 20°C	Dissolved Oxygen	Potassium	Temperature	pH	Phenols	Faecal Coliforms	Coliform bacteria	Total Oxidised Nitrogen	Iron	Sodium	Depth	Total Organic Carbon
		mg/l	mg/l	µS/cm	mg/l	mg/l	Deg C	pH units	µg/l	MPN/100mls	MPN/100mls	mg/l	µg/l	mg/l	m	mg/l
GW1	12-May	0.088	12.9	129.2	6.49	1.4	14.5	6.7	< 0.1	56	> 2420	0.91	43	9.4	5.3	7.29
GW2	12-May	0.36	5.9	82.5	3.36	2.6	13.3	5.74	< 0.1	43	> 2420	0.81	2300	11.2	1.7	16.57
GW3	12-May	0.269	14.8	336	0.68	2.6	12.9	6.49	< 0.1	219	> 2420	0.89	2400	11	1.6	17.75
GW2	19-Oct	0.015	9.93	83.2	3.05	1.3	14.9	5.36	< 0.1	4	> 2420	< 0.15	1200	12.2	0.67	23.25
GW3	19-Oct	1.453	21.87	403	1.26	6.6	14.4	6.57	< 0.1	3	> 2420	0.41	11000	17.6	0.66	15.87

The EPA agreed trigger levels for Ammoniacal Nitrogen are GW1 = 0.175 mg/l, GW2 = 2.1 mg/l and GW3 = 7mg/l. No exceedances of the trigger levels were recorded in 2017. GW3 recorded the highest concentration during the monitoring period when a value of 1.453 mg/l was recorded in October.

The GTV for iron is 200 µg/l. Elevated concentrations of iron relative to the GTV were recorded in GW2 and GW3 throughout the monitoring period as shown in Table 5.1. Concentrations in groundwater boreholes ranged from 43 to 11,000 ug/l. The highest concentration was recorded in GW3 in October (11,000 ug/l). 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.

A slightly elevated concentration of potassium above the IGV of 5 mg/l was recorded in GW3 in October with a value of 6.6 mg/l.

Elevated Faecal Coliforms levels above the IGV (0 counts per 100ml) were recorded in all groundwater boreholes throughout the monitoring period ranging from 3 to 219 MPN/100mls. The highest level was recorded in GW3 in May (219 MPN/100mls).

Coliform bacteria levels exceeded the IGV of 0 counts per 100ml in all groundwater boreholes throughout the monitoring period with a level of >2,420 MPN/100mls.

No elevated concentrations, relative to the appropriate guideline values of the remaining parameters measured were recorded upgradient or downgradient 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 well 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.

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

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 on the Ray (Duvowen) River as shown on Drawing IBR1073/009 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 5.3 below and presented in graphical format in Appendix C.

Ammonia N concentrations were below the EQS for good status total ammonia of 0.14 mg N/l throughout the reporting period ranging from <0.05 to 0.11 mg/l.

An elevated COD concentration above the SWQS of 40 mg/l was recorded in SW3 in May (50 mg/l).

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

The hydrogeological risk assessment in 2015 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.

The OEE requested resampling to be undertaken downstream of the site in June 2017 to investigate raised levels of ammonia detected in the second bi-annual report of 2016. The results are presented in Table 5.2 below. Ammonia concentrations were higher downstream

of the site at SW4 (0.041 mg/l) relative to SW3 (<0.007 mg/l) adjacent to the site and reduced to <0.009 mg/l at the bridge further downstream of the site. Ammonia concentrations were below the EQS for good status total ammonia (0.14 mg/l).

Table 5.2 Surface Water resampling following the second bi-annual report of 2016

PARAMETER	SW3	SW4	Bridge above SW4
Ammonia mg/l	<0.007	0.041	<0.009
pH	6.61	6.48	6.68
Conductivity	53.3	70.7	54.6
DO mg/l	9.70	9.59	9.64
Temperature	16.7	16.8	16.9
Time	12:15	12:10	12:30

Table 5.3 Surface Water Concentrations 2017

Station	Date	Ammonia N	Chloride	Conductivity @ 20°C	Dissolved Oxygen (Measurement)	pH	Temperature	BOD	Chemical Oxygen Demand	Suspended Solids
		mg/l	mg/l	µS/cm	mg/l	pH units	C	mg/l	mg/l	mg/l
SW1	12-May	< 0.05	14.8	61.2	10.41	7.22	13.3	< 1	4	6
SW2	12-May	< 0.05	14.8	70.8	9.05	6.63	14.6	< 1	18	6
SW3	12-May	0.109	15.8	63.1	10.11	7.18	14	1.12	52	6
SW4	12-May	0.11	15.8	62.2	10.1	7.16	14.1	1.24	7	6
SW1	19-Oct	< 0.05	9.926	59.6	10.73	6.58	14.6	< 1	8	< 6
SW2	19-Oct	< 0.05	14.889	59.9	10.79	6.52	14.5	< 1	13	< 6
SW3	19-Oct	< 0.05	9.926	62.2	10.74	6.45	14.2	< 1	7	< 6
SW4	19-Oct	< 0.05	11.911	62.7	10.66	6.41	14.4	< 1	9	< 6

5.5 Leachate Composition

Leachate monitoring was previously carried out at one monitoring location on the site (L1) as shown on Drawing IBR1073/009 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 5.4 below.

Table 5.4 Raw Leachate Concentrations 2017

PARAMETER	Muckish Landfill Site		From 30 samples from UK/Irish landfills accepting domestic waste Results in mg/l		
	12-May	19-Oct	Min Conc	Max Conc	Mean
Ammonia N	140	16	<0.2	1700	491
BOD	1.68	1	4.5	>4800	>834
COD	364	24	<10	33,700	3078
Chloride (mg/l)	124	27.79	27	3410	1256
TON (mg/l N)	< 0.69	< 0.69	/	/	/
Conductivity (μ S/cm)	1749	543	503	19,200	7789
pH (pH units)	6.86	6.32	6.4	8.0	7.2

Table 5.4 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 IBR1073/009 Monitoring Locations), all of which are within the site boundary in waste.

Monitoring of the landfill gas was undertaken during May and October of the monitoring period and results are shown in Table 5.5 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 5.5 Landfill Gas Results 2017

Station	Date	Pressure	Carbon Dioxide	Methane	Oxygen
		mBar	%	%	%
P1	12-May	978	25.2	50.6	0.6
P2	12-May	977	25.4	55.7	0.1
P3	12-May	979	28.4	51.3	1.1
P1	19-Oct	977	24.4	56.6	0.2
P2	19-Oct	977	26.5	50.1	0.2
P3	19-Oct	977	31.9	53.4	0.1

6 Volume of Leachate Produced and Volume of Leachate Discharged

Leachate is tankered on a weekly basis from the collection sump on site. Records show that during this period 2,422.77 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 2,362 m³.

Table 6.1 Breakdown of Leachate Volumes by Month in 2017

Month	Leachate Volume (m ³)
January	94.7
February	94.7
March	157.1
April	125.8
May	169.7
June	402.7
July	242.0
August	284.7
September	220.7
October	252.7
November	282.3
December	95.7
Total:	2,422.77

7 Capping and Restoration of Completed Cells / Phases

The site is fully restored.

8 Reported Incidents and Complaints Summaries

Revised screening levels for incident reporting based on a combination of compliance points derived from the hydrogeological review, or standards as appropriate to each location were submitted to the EPA for approval. The following were agreed by the EPA for Muckish⁴;

- Groundwater trigger levels for Ammoniacal Nitrogen of GW1 = 0.175 mg/l, GW2 = 2.1 mg/l and GW3 = 7mg/l.

Other than the reporting of on-going emissions exceedances detected in the routine monitoring programme (1 in total on 19/10/17), no other incidents occurred during the monitoring period and no complaints were received.

A site visit was undertaken by the EPA on the 07/03/17. The following corrective actions were noted;

- Ensure that there is an emergency response plan in place for the facility that addresses fire.
- Carry out the recommendations set out in the hydrogeological report.
- Investigate fully the source of the elevated ammonia and action as required. In the event that it is another source other than the landfill, this should be followed up by Donegal County Council in its capacity as an environmental regulator.
- Provide a proposal to the EPA for agreement detailing the leachate management procedure at the site, particularly in the event of elevated monitoring results and potential impact on the River Ray (Duvowen). Licence conditions 4.7 and 7.6 are relevant. Ensure that the hose is removed from the leachate collection sump after use and that the lid is put in place properly to prevent rain water ingress.

Corrective actions were carried out as directed and hydrogeological actions will be undertaken over the next few years.

⁴ As per licence return approval notice of 31/05/2017 Ref LR025208.

9 Review of Nuisance Controls

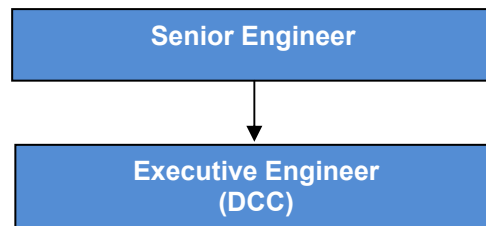
The site is inspected regularly for all types of nuisances (flies, pests, dust, litter and illegal dumping, birds and odours) and where any action is deemed necessary the appropriate steps are taken in accordance with the EMS.

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



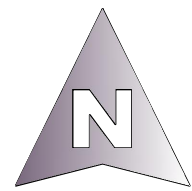
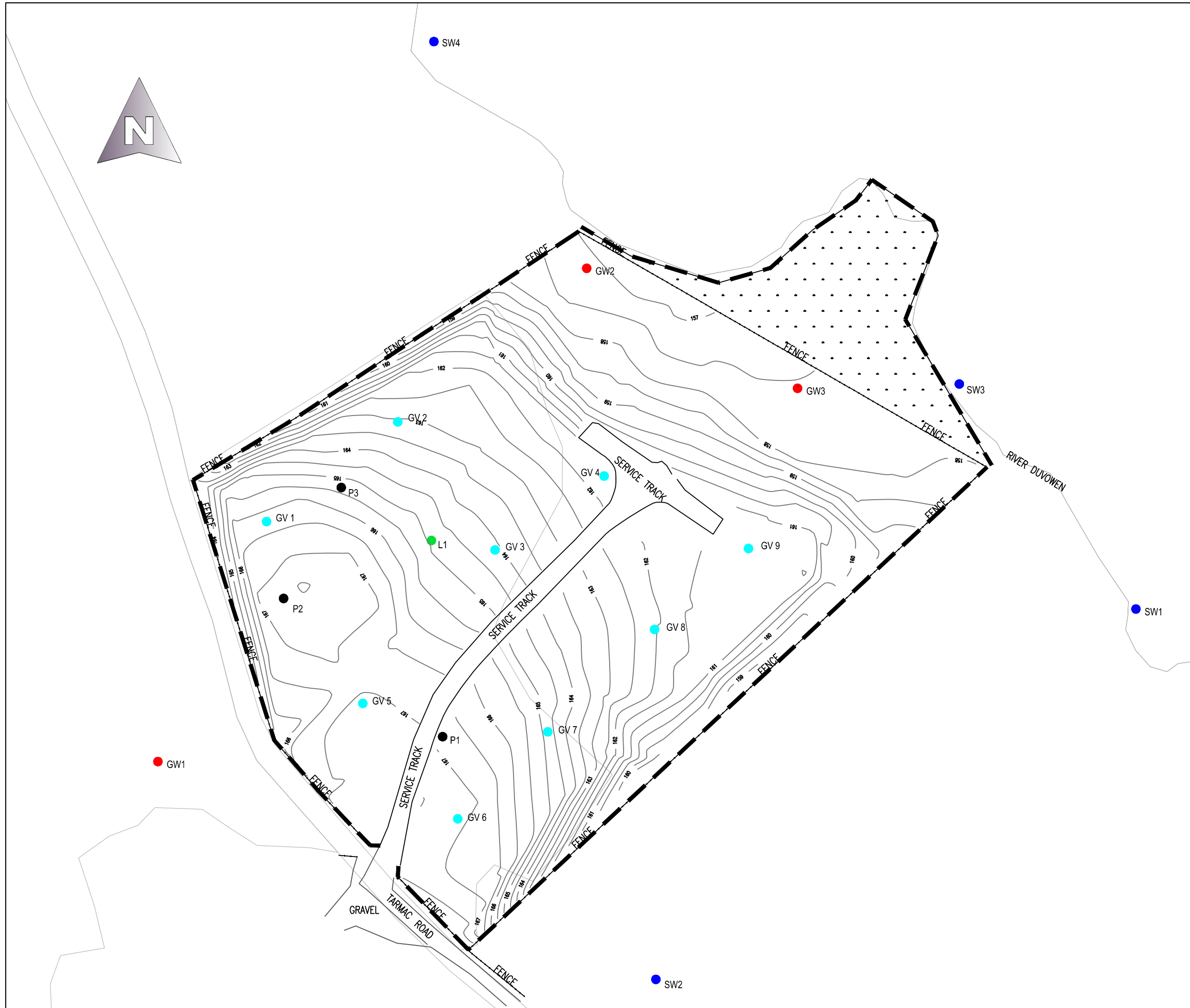
An Environmental Liability Risk Assessment has not been carried out at this facility as the landfill site is closed it is not a requirement of the licence.


10.2 Management Responsibility

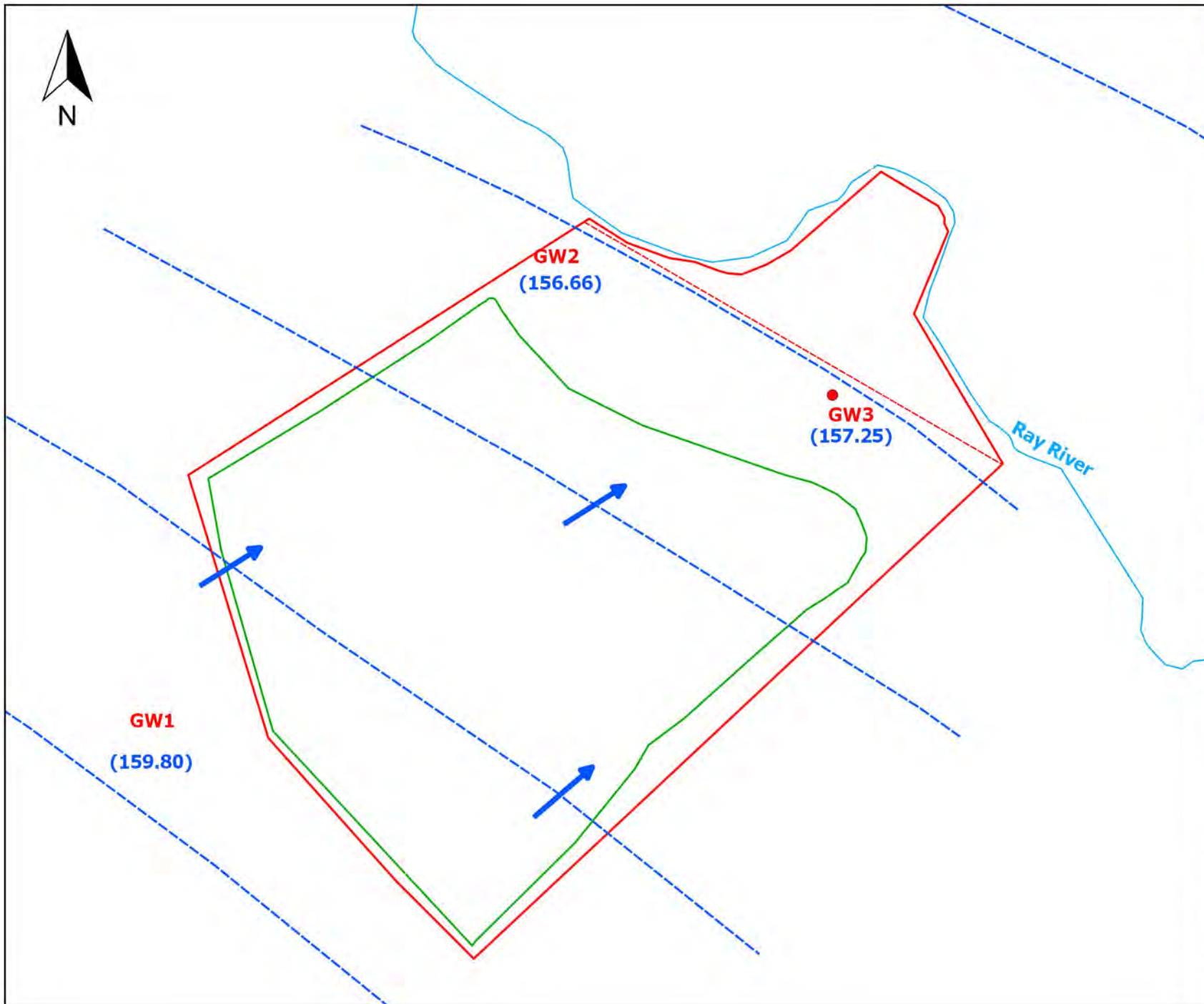
Senior Engineer: Overall responsibility for the management of the site and ensuring compliance with the Waste Licence. Delegation of authority and responsibility to ensure the effective management of the facility and licence compliance.

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
 RPS Consulting Engineers Enterprise Fund Business Centre Ballyraine Letterkenny Co. Donegal T +353 (0) 74 91 61927 F +353 (0) 74 91 61928 W www.rpsgroup.com/ireland E ireland@rpsgroup.com			
Client Donegal County Council			
Project Donegal Landfill Site Reporting 2017			
Title Muckish LFS - Monitoring Points			
Drawing Status Preliminary	Sheet Size A3	Drawing Scale 1:1000	
Drawing Number IBR1073 /009		Rev 0	
Project Leader AMcG	Drawn By AMB	Date May '15	Initial Review CG



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
 BlueRock Environmental 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 Copyright: BlueRock Env Ltd	

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,
Stranorlar Wastewater Treatment Plant,
Railway Road, Stranorlar, Co. Donegal.
074-9153900**

Sample No.: 172501251	Sample Date/Time: 12/05/2017 @ 12:40
Category: Landfill Monitoring	Sample Method: Grab
Entity: Muckish Landfill	Sampled By: Fionnuala Bonner
Station: Muckish Gw 1	Laboratory: Donegal Co Co
Template: Muckish Biannual GW	Analyst: Fionnuala Bonner
Sample Notes:	
Customer Name: Landfill Monitoring Donegal Co. Council	Sample No. Laboratory: 172501251
Contact Details: Julie McMahon Central Lab The Kube, Magheranan Letterkenny 0749122787: 0872861096 julie.mcmahon@donegalcoco.ie	Sample No. Customer: Date Received: 12/05/2017 Mode Of Delivery: Cooler box Condition On Delivery: ok Date Started: 12/05/2017 Report Date: 12/06/2017 Report Reference: 17DL233
Customer Ref: Landfill Compliance Monitoring	

Parameter/Unit	Test Method	Maximum Limit	Minimum Limit	Test Date	Test RESULT
Ammonia N mg/l	5.4P-TMC6	--	--	15/05/17	0.088 ***
Chloride mg/l	5.4P-TMC14	--	--	17/05/17	12.9
Conductivity @ 20°C µS/cm	5.4P-TMC2	--	--	12/05/17	129.2
Iron µg/l		--	--	15/05/17	43 ***
pH pH units	5.4P-TMC1	--	--	12/05/17	6.7
Potassium mg/l		--	--	15/05/17	1.4 ***
Sodium mg/l		--	--	15/05/17	9.4 ***
Total Oxidised Nitrogen N mg/l	5.4P-TMC6	--	--	15/05/17	0.91 ***
Depth m	5.4P-TMC27	--	--	12/05/17	5.3
Dissolved Oxygen mg/l	5.4P-TMC18	--	--	12/05/17	6.49
Faecal Coliforms MPN/100mls		--	--	12/05/17	56
Temperature Degrees C	5.4P-TMC1	--	--	12/05/17	14.5
Coliform Bacteria MPN/100mls	5.4P-TMM1	--	--	12/05/17	> 2420
Total Organic Carbon mg/l	5.4P-TMC10	--	--	15/05/17	7.29 ***
Visual Inspection Descriptive	5.4P-TMC26	--	--	12/05/17	Nothing Observed
Phenols mg/l		--	--	15/05/17	< 0.1 ***
Ortho-Phosphate P mg/l	5.4P-TMC6	--	--		
Nitrite N mg/l	5.4P-TMC6	--	--		
Nitrate N mg/l	5.4P-TMC6	--	--		

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Comhairle Contae Dhún na nGall
Donegal County Council
Central Laboratory,
Stranorlar Wastewater Treatment Plant,
Railway Road, Stranorlar, Co. Donegal.
074-9153900

Sample No.:	172501250	Sample Date/Time:	12/05/2017 @ 12:05
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

Customer Name:	Landfill Monitoring Donegal Co. Council	Sample No. Laboratory:	172501250
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:	12/05/2017
		Mode Of Delivery:	Cooler box
		Condition On Delivery:	ok
		Date Started:	12/05/2017
		Report Date:	12/06/2017
		Report Reference:	17DL233

Parameter/Unit	Test Method	Maximum Limit	Minimum Limit	Test Date	Test RESULT
Ammonia N mg/l	5.4P-TMC6	--	--	15/05/17	0.36 ***
Chloride mg/l	5.4P-TMC14	--	--	17/05/17	5.9
Conductivity @ 20°C µS/cm	5.4P-TMC2	--	--	12/05/17	82.5
Iron µg/l		--	--	15/05/17	2300 ***
pH pH units	5.4P-TMC1	--	--	12/05/17	5.74
Potassium mg/l		--	--	15/05/17	2.6 ***
Sodium mg/l		--	--	15/05/17	11.2 ***
Total Oxidised Nitrogen N mg/l	5.4P-TMC6	--	--	15/05/17	0.81 ***
Depth m	5.4P-TMC27	--	--	12/05/17	1.7
Dissolved Oxygen mg/l	5.4P-TMC18	--	--	12/05/17	3.36
Faecal Coliforms MPN/100mls		--	--	12/05/17	43
Temperature Degrees C	5.4P-TMC1	--	--	12/05/17	13.3
Coliform Bacteria MPN/100mls	5.4P-TMM1	--	--	12/05/17	> 2420
Total Organic Carbon mg/l	5.4P-TMC10	--	--	15/05/17	16.57 ***
Visual Inspection Descriptive	5.4P-TMC26	--	--	12/05/17	Nothing Observed
Phenols mg/l		--	--	15/05/17	< 0.1 ***
Ortho-Phosphate P mg/l	5.4P-TMC6	--	--		
Nitrite N mg/l	5.4P-TMC6	--	--		
Nitrate N mg/l	5.4P-TMC6	--	--		

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Comhairle Contae Dhún na nGall
Donegal County Council
Central Laboratory,
Stranorlar Wastewater Treatment Plant,
Railway Road, Stranorlar, Co. Donegal.
 074-9153900

Sample No.: 172501252	Sample Date/Time: 12/05/2017 @ 12:20
Category: Landfill Monitoring	Sample Method: Grab
Entity: Muckish Landfill	Sampled By: Fionnuala Bonner
Station: Muckish Gw 3	Laboratory: Donegal Co Co
Template: Muckish Biannual GW	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: 172501252
Sample No. Customer:
Date Received: 12/05/2017
Mode Of Delivery: Cooler box
Condition On Delivery: ok
Date Started: 12/05/2017
Report Date: 12/06/2017
Report Reference: 17DL233

Parameter/Unit	Test Method	Maximum Limit	Minimum Limit	Test Date	Test RESULT
Ammonia N mg/l	5.4P-TMC6	--	--	15/05/17	0.269 ***
Chloride mg/l	5.4P-TMC14	--	--	17/05/17	14.8
Conductivity @ 20°C µS/cm	5.4P-TMC2	--	--	12/05/17	336
Iron µg/l		--	--	15/05/17	2400 **
pH pH units	5.4P-TMC1	--	--	12/05/17	6.49
Potassium mg/l		--	--	15/05/17	2.6 ***
Sodium mg/l		--	--	15/05/17	11 ***
Total Oxidised Nitrogen N mg/l	5.4P-TMC6	--	--	15/05/17	0.89 ***
Depth m	5.4P-TMC27	--	--	12/05/17	1.6
Dissolved Oxygen mg/l	5.4P-TMC18	--	--	12/05/17	0.68
Faecal Coliforms MPN/100mls		--	--	12/05/17	219
Temperature Degrees C	5.4P-TMC1	--	--	12/05/17	12.9
Coliform Bacteria MPN/100mls	5.4P-TMM1	--	--	12/05/17	> 2420
Total Organic Carbon mg/l	5.4P-TMC10	--	--	15/05/17	17.75 ***
Visual Inspection Descriptive	5.4P-TMC26	--	--	12/05/17	Nothing Observed
Phenols mg/l		--	--	15/05/17	< 0.1 ***
Ortho-Phosphate P mg/l	5.4P-TMC6	--	--		
Nitrite N mg/l	5.4P-TMC6	--	--		
Nitrate N mg/l	5.4P-TMC6	--	--		

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Fionnuala Bonner

12/06/2017

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Comhairle Contae Dhún na nGall
Donegal County Council
Central Laboratory,
Stranorlar Wastewater Treatment Plant,
Railway Road, Stranorlar, Co. Donegal.
 074-9153900

Sample No.: 172501246	Sample Date/Time: 12/05/2017 @ 11:40
Category: Landfill Monitoring	Sample Method: Grab
Entity: Muckish Landfill	Sampled By: Fionnuala Bonner
Station: Muckish Sw 1	Laboratory: Donegal Co Co
Template: Muckish Biannual SW	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

Sample No. Laboratory: 172501246
Sample No. Customer:
Date Received: 12/05/2017
Mode Of Delivery: Cooler box
Condition On Delivery: ok
Date Started: 12/05/2017
Report Date: 12/06/2017
Report Reference: 17DL233

Customer Ref: Landfill Compliance Monitoring

Parameter/Unit	Test Method	Maximum Limit	Minimum Limit	Test Date	Test RESULT
Ammonia N mg/l	5.4P-TMC5	--	--	15/05/17	< 0.05 ***
Biological Oxygen Demand mg/l	5.4P-TMC9	--	--	19/05/17	< 1 ***
Chloride mg/l	5.4P-TMC14	--	--	17/05/17	14.8
Conductivity @ 20°C µS/cm	5.4P-TMC2	--	--	12/05/17	61.2
pH pH units	5.4P-TMC1	--	--	12/05/17	7.22
Suspended Solids mg/l	5.4P-TMC4	--	--	15/05/17	6
Dissolved Oxygen mg/l	5.4P-TMC18	--	--	12/05/17	10.41
Temperature Degrees C	5.4P-TMC1	--	--	12/05/17	13.3
Visual Inspection Descriptive	5.4P-TMC26	--	--	12/05/17	Nothing Observed
COD Chemical Oxygen Demand mg/l	5.4P-TMC3	--	--	12/05/17	4
Ortho-Phosphate P mg/l	5.4P-TMC5	--	--		
Nitrite N mg/l	5.4P-TMC5	--	--		
Nitrate N mg/l	5.4PTMC5	--	--		

In RESULT column, unaccredited in-house test result - no asterisk, *inhouse accred., **unaccred. & subcontracted, *** accred. & sub-cont.

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Comhairle Contae Dhún na nGall
Donegal County Council
Central Laboratory,
Stranorlar Wastewater Treatment Plant,
Railway Road, Stranorlar, Co. Donegal.
 074-9153900

Sample No.:	172501247	Sample Date/Time:	12/05/2017 @ 12:30
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

Customer Name:	Landfill Monitoring Donegal Co. Council	Sample No. Laboratory:	172501247
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:	12/05/2017
		Mode Of Delivery:	Cooler box
		Condition On Delivery:	ok
		Date Started:	12/05/2017
		Report Date:	12/06/2017
		Report Reference:	17DL233

Parameter/Unit	Test Method	Maximum Limit	Minimum Limit	Test Date	Test RESULT
Ammonia N mg/l	5.4P-TMC5	--	--	15/05/17	< 0.05 ***
Biological Oxygen Demand mg/l	5.4P-TMC9	--	--	19/05/17	< 1 ***
Chloride mg/l	5.4P-TMC14	--	--	17/05/17	14.8
Conductivity @ 20°C µS/cm	5.4P-TMC2	--	--	12/05/17	70.8
pH pH units	5.4P-TMC1	--	--	12/05/17	6.63
Suspended Solids mg/l	5.4P-TMC4	--	--	15/05/17	6
Dissolved Oxygen mg/l	5.4P-TMC18	--	--	12/05/17	9.05
Temperature Degrees C	5.4P-TMC1	--	--	12/05/17	14.6
Visual Inspection Descriptive	5.4P-TMC26	--	--	12/05/17	Nothing Observed
COD Chemical Oxygen Demand mg/l	5.4P-TMC3	--	--	12/05/17	18
Ortho-Phosphate P mg/l	5.4P-TMC5	--	--		
Nitrite N mg/l	5.4P-TMC5	--	--		
Nitrate N mg/l	5.4PTMC5	--	--		

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Fionnuala Bonner

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Donegal County Council
Central Laboratory,
Stranorlar Wastewater Treatment Plant,
Railway Road, Stranorlar, Co. Donegal.
 074-9153900

Sample No.:	172501248	Sample Date/Time:	12/05/2017 @ 11:50
Category:	Landfill Monitoring	Sample Method:	Grab
Entity:	Muckish Landfill	Sampled By:	Fionnuala Bonner
Station:	Muckish Sw 3	Laboratory:	Donegal Co Co
Template:	Muckish Biannual SW	Analyst:	Fionnuala Bonner

Customer Name:	Landfill Monitoring Donegal Co. Council	Sample No. Laboratory:	172501248
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:	12/05/2017
		Mode Of Delivery:	Cooler box
		Condition On Delivery:	ok
		Date Started:	12/05/2017
		Report Date:	12/06/2017
		Report Reference:	17DL233

Parameter/Unit	Test Method	Maximum Limit	Minimum Limit	Test Date	Test RESULT
Ammonia N mg/l	5.4P-TMC5	--	--	15/05/17	0.109 ***
Biological Oxygen Demand mg/l	5.4P-TMC9	--	--	19/05/17	1.12 ***
Chloride mg/l	5.4P-TMC14	--	--	17/05/17	15.8
Conductivity @ 20°C µS/cm	5.4P-TMC2	--	--	12/05/17	63.1
pH pH units	5.4P-TMC1	--	--	12/05/17	7.18
Suspended Solids mg/l	5.4P-TMC4	--	--	15/05/17	6
Dissolved Oxygen mg/l	5.4P-TMC18	--	--	12/05/17	10.11
Temperature Degrees C	5.4P-TMC1	--	--	12/05/17	14
Visual Inspection Descriptive	5.4P-TMC26	--	--	12/05/17	Nothing Observed
COD Chemical Oxygen Demand mg/l	5.4P-TMC3	--	--	12/05/17	52
Ortho-Phosphate P mg/l	5.4P-TMC5	--	--		
Nitrite N mg/l	5.4P-TMC5	--	--		
Nitrate N mg/l	5.4PTMC5	--	--		

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Donegal County Council
Central Laboratory,
Stranorlar Wastewater Treatment Plant,
Railway Road, Stranorlar, Co. Donegal.
 074-9153900

Sample No.:	172501249	Sample Date/Time:	12/05/2017 @ 12:00
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

Customer Name:	Landfill Monitoring Donegal Co. Council	Sample No. Laboratory:	172501249
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:	12/05/2017
		Mode Of Delivery:	cooler box
		Condition On Delivery:	ok
		Date Started:	12/05/2017
		Report Date:	12/06/2017
		Report Reference:	17DL233

Parameter/Unit	Test Method	Maximum Limit	Minimum Limit	Test Date	Test RESULT
Ammonia N mg/l	5.4P-TMC5	--	--	15/05/17	0.11 ***
Biological Oxygen Demand mg/l	5.4P-TMC9	--	--	19/05/17	1.24 ***
Chloride mg/l	5.4P-TMC14	--	--	17/05/17	15.8
Conductivity @ 20°C µS/cm	5.4P-TMC2	--	--	12/05/17	62.2
pH pH units	5.4P-TMC1	--	--	12/05/17	7.16
Suspended Solids mg/l	5.4P-TMC4	--	--	15/05/17	6
Dissolved Oxygen mg/l	5.4P-TMC18	--	--	12/05/17	10.1
Temperature Degrees C	5.4P-TMC1	--	--	12/05/17	14.1
Visual Inspection Descriptive	5.4P-TMC26	--	--	12/05/17	Nothing Observed
COD Chemical Oxygen Demand mg/l	5.4P-TMC3	--	--	12/05/17	7
Ortho-Phosphate P mg/l	5.4P-TMC5	--	--		
Nitrite N mg/l	5.4P-TMC5	--	--		
Nitrate N mg/l	5.4PTMC5	--	--		

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Fionnuala Bonner

12/06/2017

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Donegal County Council
Central Laboratory,
Stranorlar Wastewater Treatment Plant,
Railway Road, Stranorlar, Co. Donegal.
 074-9153900

Sample No.:	172501245	Sample Date/Time:	12/05/2017 @ 11:30
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: 172501245
Sample No. Customer:
Date Received: 12/05/2017
Mode Of Delivery: Cooler box
Condition On Delivery: ok
Date Started: 12/05/2017
Report Date: 12/06/2017
Report Reference: 17DL233

Parameter/Unit	Test Method	Maximum Limit	Minimum Limit	Test Date	Test RESULT
Ammonia N mg/l	5.4P-TMC6	--	--	15/05/17	140 ***
Chloride mg/l	5.4P-TMC14	--	--	17/05/17	124
Conductivity @ 20°C µS/cm	5.4P-TMC2	--	--	12/05/17	1749
pH pH units	5.4P-TMC1	--	--	12/05/17	6.86
Total Oxidised Nitrogen N mg/l	5.4P-TMC6	--	--	15/05/17	< 0.69 ***
Biological Oxygen Demand mg/l	5.4P-TMC9	--	--	19/05/17	1.68 ***
Depth m	5.4P-TMC27	--	--	12/05/17	--
Temperature Degrees C	5.4P-TMC1	--	--	12/05/17	14.4
Visual Inspection Descriptive	5.4P-TMC26	--	--	12/05/17	Nothing Observed
COD Chemical Oxygen Demand mg/l	5.4P-TMC3	--	--	12/05/17	364
Ortho-Phosphate P mg/l	5.4P-TMC6	--	--		
Nitrite N mg/l	5.4P-TMC6	--	--		
Nitrate N mg/l	5.4P-TMC6	--	--		

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**Comhairle Contae Dhún na nGall
Donegal County Council
Central Laboratory,
Stranorlar Wastewater Treatment Plant,
Railway Road, Stranorlar, Co. Donegal.
074-9153900**

Sample No.:	172501319	Sample Date/Time:	12/05/2017 @ 15:10
Category:	Landfill Monitoring	Sample Method:	Grab
Entity:	Muckish Landfill	Sampled By:	Fionnuala Bonner
Station:	Muckish P1	Laboratory:	Donegal Co Council
Template:	Landfill Monitoring - Landfill Gas	Analyst:	Fionnuala Bonner
Sample Notes:			
Customer Name:	Landfill Monitoring Donegal Co. Council	Sample No. Laboratory:	172501319
Contact Details:	Julie McMahon Central Lab The Kube, Magheranan Letterkenny 0749122787: 0872861096 julie.mcmahon@donegalcoco.ie	Sample No. Customer:	
		Date Received:	12/05/2017
		Mode Of Delivery:	Field Test
		Condition On Delivery:	N/A
		Date Started:	12/05/2017
Customer Ref:	Landfill Compliance Monitoring	Report Date:	15/05/2017
		Report Reference:	17DL233

Parameter/Unit	Test Method	Maximum Limit	Minimum Limit	Test Date	Test RESULT
Pressure mBar	5.4P-TMC23	--	--	12/05/17	978
Carbon Dioxide %	5.4P-TMC23	--	--	12/05/17	25.2
Methane %	5.4P-TMC23	--	--	12/05/17	50.6
Oxygen %	5.4P-TMC23	--	--	12/05/17	0.6

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Fionnuala Bonner

12/06/2017

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Comhairle Contae Dhún na nGall
Donegal County Council
Central Laboratory,
Stranorlar Wastewater Treatment Plant,
Railway Road, Stranorlar, Co. Donegal.
 074-9153900

Sample No.: 172501320	Sample Date/Time: 12/05/2017 @ 15:00
Category: Landfill Monitoring	Sample Method: Grab
Entity: Muckish Landfill	Sampled By: Fionnuala Bonner
Station: Muckish P2	Laboratory: Donegal Co Council
Template: Landfill Monitoring - Landfill Gas	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: 172501320
Sample No. Customer:
Date Received: 12/05/2017
Mode Of Delivery: Field Test
Condition On Delivery: N/A
Date Started: 12/05/2017
Report Date: 15/05/2017
Report Reference: 17DL233

Parameter/Unit	Test Method	Maximum Limit	Minimum Limit	Test Date	Test RESULT
Pressure mBar	5.4P-TMC23	--	--	12/05/17	977
Carbon Dioxide %	5.4P-TMC23	--	--	12/05/17	25.4
Methane %	5.4P-TMC23	--	--	12/05/17	55.7
Oxygen %	5.4P-TMC23	--	--	12/05/17	0.1

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Comhairle Contae Dhún na nGall
Donegal County Council
Central Laboratory,
Stranorlar Wastewater Treatment Plant,
Railway Road, Stranorlar, Co. Donegal.
 074-9153900

Sample No.:	172501321	Sample Date/Time:	12/05/2017 @ 15:20
Category:	Landfill Monitoring	Sample Method:	Grab
Entity:	Muckish Landfill	Sampled By:	Fionnuala Bonner
Station:	Muckish P3	Laboratory:	Donegal Co Council
Template:	Landfill Monitoring - Landfill Gas	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: 172501321
Sample No. Customer:
Date Received: 15/05/2017
Mode Of Delivery: Field Test
Condition On Delivery: N/A
Date Started: 12/05/2015
Report Date: 15/05/2017
Report Reference: 17DL233

Parameter/Unit	Test Method	Maximum Limit	Minimum Limit	Test Date	Test RESULT
Pressure mBar	5.4P-TMC23	--	--	15/05/17	979
Carbon Dioxide %	5.4P-TMC23	--	--	15/05/17	28.4
Methane %	5.4P-TMC23	--	--	15/05/17	51.3
Oxygen %	5.4P-TMC23	--	--	15/05/17	1.1

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Sample No.:	172503608	Sample Date/Time:	19/10/2017 @ 12:20
Category:	Landfill Monitoring	Sample Method:	Grab
Entity:	Muckish Landfill	Sampled By:	Fionnuala Bonner
Station:	Muckish Gw 1	Laboratory:	Donegal Co Council
Template:	Muckish Biannual GW	Analyst:	Fionnuala Bonner

Sample Notes:

Parameter/Unit	Test Method	Maximum Limit	Minimum Limit	Test Date	Test RESULT
Ammonia N mg/l	5.4P-TMC6	--	--	19/10/17	--
Chloride mg/l	5.4P-TMC14	--	--	23/10/17	--
Conductivity @ 20°C µS/cm	5.4P-TMC2	--	--	19/10/17	--
Iron µg/l		--	--	19/10/17	-- ***
pH pH units	5.4P-TMC1	--	--	19/10/17	--
Potassium mg/l		--	--	19/10/17	-- ***
Sodium mg/l		--	--	19/10/17	-- ***
Total Oxidised Nitrogen N mg/l	5.4P-TMC6	--	--	19/10/17	--
Depth m	5.4P-TMC27	--	--	19/10/17	4.44
Dissolved Oxygen mg/l	5.4P-TMC18	--	--	19/10/17	--
Faecal Coliforms MPN/100mls		--	--	19/10/17	--
Temperature Degrees C	5.4P-TMC1	--	--	19/10/17	--
Coliform Bacteria MPN/100mls	5.4P-TMM1	--	--	19/10/17	--
Total Organic Carbon mg/l	5.4P-TMC10	--	--	19/10/17	--
Visual Inspection Descriptive	5.4P-TMC26	--	--	19/10/17	Nothing Observed
Phenols mg/l		--	--		
Ortho-Phosphate P mg/l	5.4P-TMC6	--	--		
Nitrite N mg/l	5.4P-TMC6	--	--		
Nitrate N mg/l	5.4P-TMC6	--	--		

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Sample No.:	172503609	Sample Date/Time:	19/10/2017 @ 11:20
Category:	Landfill Monitoring	Sample Method:	Grab
Entity:	Muckish Landfill	Sampled By:	Fionnuala Bonner
Station:	Muckish Gw 2	Laboratory:	Donegal Co Council
Template:	Muckish Biannual GW	Analyst:	Fionnuala Bonner

Parameter/Unit	Test Method	Maximum Limit	Minimum Limit	Test Date	Test RESULT
Ammonia N mg/l	5.4P-TMC6	--	--	23/10/17	0.015 ***
Chloride mg/l	5.4P-TMC14	--	--	23/10/17	9.93
Conductivity @ 20°C µS/cm	5.4P-TMC2	--	--	19/10/17	83.2
Iron µg/l		--	--	23/10/17	1200 ***
pH pH units	5.4P-TMC1	--	--	19/10/17	5.36
Potassium mg/l		--	--	23/10/17	1.3 ***
Sodium mg/l		--	--	23/10/17	12.2 ***
Total Oxidised Nitrogen N mg/l	5.4P-TMC6	--	--	23/10/17	< 0.15 ***
Depth m	5.4P-TMC27	--	--	19/10/17	0.67
Dissolved Oxygen mg/l	5.4P-TMC18	--	--	19/10/17	3.05
Faecal Coliforms MPN/100mls		--	--	23/10/17	4
Temperature Degrees C	5.4P-TMC1	--	--	19/10/17	14.9
Coliform Bacteria MPN/100mls	5.4P-TMM1	--	--	23/10/17	> 2420
Total Organic Carbon mg/l	5.4P-TMC10	--	--	23/10/17	23.25 ***
Visual Inspection Descriptive	5.4P-TMC26	--	--	19/10/17	Nothing Observed
Phenols mg/l		--	--	23/10/17	< 0.1 ***
Ortho-Phosphate P mg/l	5.4P-TMC6	--	--		
Nitrite N mg/l	5.4P-TMC6	--	--		
Nitrate N mg/l	5.4P-TMC6	--	--		

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Sample No.:	172503610	Sample Date/Time:	19/10/2017 @ 11:55
Category:	Landfill Monitoring	Sample Method:	Grab
Entity:	Muckish Landfill	Sampled By:	Fionnuala Bonner
Station:	Muckish Gw 3	Laboratory:	Donegal Co Council
Template:	Muckish Biannual GW	Analyst:	Fionnuala Bonner

Sample Notes:

Parameter/Unit	Test Method	Maximum Limit	Minimum Limit	Test Date	Test RESULT
Ammonia N mg/l	5.4P-TMC6	--	--	23/10/17	1.453
Chloride mg/l	5.4P-TMC14	--	--	23/10/17	21.87
Conductivity @ 20°C µS/cm	5.4P-TMC2	--	--	19/10/17	403
Iron µg/l		--	--	23/10/17	11000 ***
pH pH units	5.4P-TMC1	--	--	19/10/17	6.57
Potassium mg/l		--	--	23/10/17	6.6 ***
Sodium mg/l		--	--	23/10/17	17.6 ***
Total Oxidised Nitrogen N mg/l	5.4P-TMC6	--	--	23/10/17	0.41 ***
Depth m	5.4P-TMC27	--	--	19/10/17	0.66
Dissolved Oxygen mg/l	5.4P-TMC18	--	--	19/10/17	1.26
Faecal Coliforms MPN/100mls		--	--	19/10/17	3
Temperature Degrees C	5.4P-TMC1	--	--	19/10/17	14.4
Coliform Bacteria MPN/100mls	5.4P-TMM1	--	--	19/10/17	> 2420
Total Organic Carbon mg/l	5.4P-TMC10	--	--	23/10/17	15.87 ***
Visual Inspection Descriptive	5.4P-TMC26	--	--	19/10/17	Nothing Observed
Phenols mg/l		--	--	23/10/17	< 0.1 ***
Ortho-Phosphate P mg/l	5.4P-TMC6	--	--		
Nitrite N mg/l	5.4P-TMC6	--	--		
Nitrate N mg/l	5.4P-TMC6	--	--		

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Sample No.:	172503604	Sample Date/Time:	19/10/2017 @ 11:30
Category:	Landfill Monitoring	Sample Method:	Grab
Entity:	Muckish Landfill	Sampled By:	Fionnuala Bonner
Station:	Muckish Sw 1	Laboratory:	Donegal Co Council
Template:	Muckish Biannual SW	Analyst:	Fionnuala Bonner

Sample Notes:

Parameter/Unit	Test Method	Maximum Limit	Minimum Limit	Test Date	Test RESULT
Ammonia N mg/l	5.4P-TMC5	--	--	23/10/17	< 0.05
Biological Oxygen Demand mg/l	5.4P-TMC9	--	--	25/10/17	< 1
Chloride mg/l	5.4P-TMC14	--	--	23/10/17	9.926
Conductivity @ 20°C µS/cm	5.4P-TMC2	--	--	19/10/17	59.6
pH pH units	5.4P-TMC1	--	--	19/10/17	6.58
Suspended Solids mg/l	5.4P-TMC4	--	--	23/10/17	< 6
Dissolved Oxygen mg/l	5.4P-TMC18	--	--	19/10/17	10.73
Temperature Degrees C	5.4P-TMC1	--	--	19/10/17	14.6
Visual Inspection Descriptive	5.4P-TMC26	--	--	19/10/17	Nothing Observed
COD Chemical Oxygen Demand mg/l	5.4P-TMC3	--	--	23/10/17	8
Ortho-Phosphate P mg/l	5.4P-TMC5	--	--		
Nitrite N mg/l	5.4P-TMC5	--	--		
Nitrate N mg/l	5.4PTMC5	--	--		

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Sample No.:	172503605	Sample Date/Time:	19/10/2017 @ 11:50
Category:	Landfill Monitoring	Sample Method:	Grab
Entity:	Muckish Landfill	Sampled By:	Fionnuala Bonner
Station:	Muckish Sw 2	Laboratory:	Donegal Co Council
Template:	Muckish Biannual SW	Analyst:	Fionnuala Bonner

Parameter/Unit	Test Method	Maximum Limit	Minimum Limit	Test Date	Test RESULT
Ammonia N mg/l	5.4P-TMC5	--	--	23/10/17	< 0.05
Biological Oxygen Demand mg/l	5.4P-TMC9	--	--	25/10/17	< 1
Chloride mg/l	5.4P-TMC14	--	--	23/10/17	14.889
Conductivity @ 20°C µS/cm	5.4P-TMC2	--	--	19/10/17	59.9
pH pH units	5.4P-TMC1	--	--	19/10/17	6.52
Suspended Solids mg/l	5.4P-TMC4	--	--	23/10/17	< 6
Dissolved Oxygen mg/l	5.4P-TMC18	--	--	19/10/17	10.79
Temperature Degrees C	5.4P-TMC1	--	--	19/10/17	14.5
Visual Inspection Descriptive	5.4P-TMC26	--	--	19/10/17	Nothing Observed
COD Chemical Oxygen Demand mg/l	5.4P-TMC3	--	--	23/10/17	13
Ortho-Phosphate P mg/l	5.4P-TMC5	--	--		
Nitrite N mg/l	5.4P-TMC5	--	--		
Nitrate N mg/l	5.4PTMC5	--	--		

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Sample No.:	172503606	Sample Date/Time:	19/10/2017 @ 11:10
Category:	Landfill Monitoring	Sample Method:	Grab
Entity:	Muckish Landfill	Sampled By:	Fionnuala Bonner
Station:	Muckish Sw 3	Laboratory:	Donegal Co Council
Template:	Muckish Biannual SW	Analyst:	Fionnuala Bonner

Sample Notes:

Parameter/Unit	Test Method	Maximum Limit	Minimum Limit	Test Date	Test RESULT
Ammonia N mg/l	5.4P-TMC5	--	--	23/10/17	< 0.05
Biological Oxygen Demand mg/l	5.4P-TMC9	--	--	25/10/17	< 1
Chloride mg/l	5.4P-TMC14	--	--	23/10/17	9.926
Conductivity @ 20°C µS/cm	5.4P-TMC2	--	--	19/10/17	62.2
pH pH units	5.4P-TMC1	--	--	19/10/17	6.45
Suspended Solids mg/l	5.4P-TMC4	--	--	23/10/17	< 6
Dissolved Oxygen mg/l	5.4P-TMC18	--	--	19/10/17	10.74
Temperature Degrees C	5.4P-TMC1	--	--	19/10/17	14.2
Visual Inspection Descriptive	5.4P-TMC26	--	--	19/10/17	Nothing Observed
COD Chemical Oxygen Demand mg/l	5.4P-TMC3	--	--	23/10/17	7
Ortho-Phosphate P mg/l	5.4P-TMC5	--	--		
Nitrite N mg/l	5.4P-TMC5	--	--		
Nitrate N mg/l	5.4PTMC5	--	--		

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Sample No.:	172503607	Sample Date/Time:	19/10/2017 @ 11:15
Category:	Landfill Monitoring	Sample Method:	Grab
Entity:	Muckish Landfill	Sampled By:	Fionnuala Bonner
Station:	Muckish Sw 4	Laboratory:	Donegal Co Council
Template:	Muckish Biannual SW	Analyst:	Fionnuala Bonner

Sample Notes:

Parameter/Unit	Test Method	Maximum Limit	Minimum Limit	Test Date	Test RESULT
Ammonia N mg/l	5.4P-TMC5	--	--	23/10/17	< 0.05
Biological Oxygen Demand mg/l	5.4P-TMC9	--	--	25/10/17	< 1
Chloride mg/l	5.4P-TMC14	--	--	23/10/17	11.911
Conductivity @ 20°C µS/cm	5.4P-TMC2	--	--	19/10/17	62.7
pH pH units	5.4P-TMC1	--	--	19/10/17	6.41
Suspended Solids mg/l	5.4P-TMC4	--	--	23/10/17	< 6
Dissolved Oxygen mg/l	5.4P-TMC18	--	--	19/10/17	10.66
Temperature Degrees C	5.4P-TMC1	--	--	19/10/17	14.4
Visual Inspection Descriptive	5.4P-TMC26	--	--	19/10/17	Nothing Observed
COD Chemical Oxygen Demand mg/l	5.4P-TMC3	--	--	23/10/17	9
Ortho-Phosphate P mg/l	5.4P-TMC5	--	--		
Nitrite N mg/l	5.4P-TMC5	--	--		
Nitrate N mg/l	5.4PTMC5	--	--		

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Sample No.: 172503611	Sample Date/Time: 19/10/2017 @ 12:10
Category: Landfill Monitoring	Sample Method: Grab
Entity: Muckish Landfill	Sampled By: Fionnuala Bonner
Station: Leachate Holding Lagoon	Laboratory: Donegal Co Council
Template: Muckish Biannual Leachate	Analyst: Fionnuala Bonner

Sample Notes:

Parameter/Unit	Test Method	Maximum Limit	Minimum Limit	Test Date	Test RESULT
Ammonia N mg/l	5.4P-TMC6	--	--	23/10/17	16
Chloride mg/l	5.4P-TMC14	--	--	23/10/17	27.79
Conductivity @ 20°C µS/cm	5.4P-TMC2	--	--	19/10/17	543
pH pH units	5.4P-TMC1	--	--	19/10/17	6.32
Total Oxidised Nitrogen N mg/l	5.4P-TMC6	--	--	23/10/17	< 0.69
Biological Oxygen Demand mg/l	5.4P-TMC9	--	--	25/10/17	1
Depth m	5.4P-TMC27	--	--		
Temperature Degrees C	5.4P-TMC1	--	--	19/10/17	14.9
Visual Inspection Descriptive	5.4P-TMC26	--	--	19/10/17	Nothing Observed
COD Chemical Oxygen Demand mg/l	5.4P-TMC3	--	--	23/10/17	24
Ortho-Phosphate P mg/l	5.4P-TMC6	--	--		
Nitrite N mg/l	5.4P-TMC6	--	--		
Nitrate N mg/l	5.4P-TMC6	--	--		

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Sample No.: 172503612	Sample Date/Time: 19/10/2017 @ 12:30
Category: Landfill Monitoring	Sample Method: Grab
Entity: Muckish Landfill	Sampled By: Fionnuala Bonner
Station: Muckish P1	Laboratory: Donegal Co Council
Template: Landfill Monitoring - Landfill Gas	Analyst: Fionnuala Bonner

Sample Notes:

Parameter/Unit	Test Method	Maximum Limit	Minimum Limit	Test Date	Test RESULT
Pressure mBar	5.4P-TMC23	--	--	19/10/17	977
Carbon Dioxide %	5.4P-TMC23	--	--	19/10/17	24.4
Methane %	5.4P-TMC23	--	--	19/10/17	56.6
Oxygen %	5.4P-TMC23	--	--	19/10/17	0.2

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 074-9153900

Sample No.:	172503613	Sample Date/Time:	19/10/2017 @ 12:35
Category:	Landfill Monitoring	Sample Method:	Grab
Entity:	Muckish Landfill	Sampled By:	Fionnuala Bonner
Station:	Muckish P2	Laboratory:	Donegal Co Council
Template:	Landfill Monitoring - Landfill Gas	Analyst:	Fionnuala Bonner

Sample Notes:

Parameter/Unit	Test Method	Maximum Limit	Minimum Limit	Test Date	Test RESULT
Pressure mBar	5.4P-TMC23	--	--	19/10/17	977
Carbon Dioxide %	5.4P-TMC23	--	--	19/10/17	26.5
Methane %	5.4P-TMC23	--	--	19/10/17	50.1
Oxygen %	5.4P-TMC23	--	--	19/10/17	0.2

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Central Laboratory,
Stranorlar Wastewater Treatment Plant,
Railway Road, Stranorlar, Co. Donegal.
 074-9153900

Sample No.:	172503614	Sample Date/Time:	19/10/2017 @ 12:40
Category:	Landfill Monitoring	Sample Method:	Grab
Entity:	Muckish Landfill	Sampled By:	Fionnuala Bonner
Station:	Muckish P3	Laboratory:	Donegal Co Council
Template:	Landfill Monitoring - Landfill Gas	Analyst:	Fionnuala Bonner

Sample Notes:

Parameter/Unit	Test Method	Maximum Limit	Minimum Limit	Test Date	Test RESULT
Pressure mBar	5.4P-TMC23	--	--	19/10/17	977
Carbon Dioxide %	5.4P-TMC23	--	--	19/10/17	31.9
Methane %	5.4P-TMC23	--	--	19/10/17	53.4
Oxygen %	5.4P-TMC23	--	--	19/10/17	0.1

In RESULT column, unaccredited in-house test result - no asterisk, *inhouse accred., **unaccred. & subcontracted, *** accred. & sub-cont.

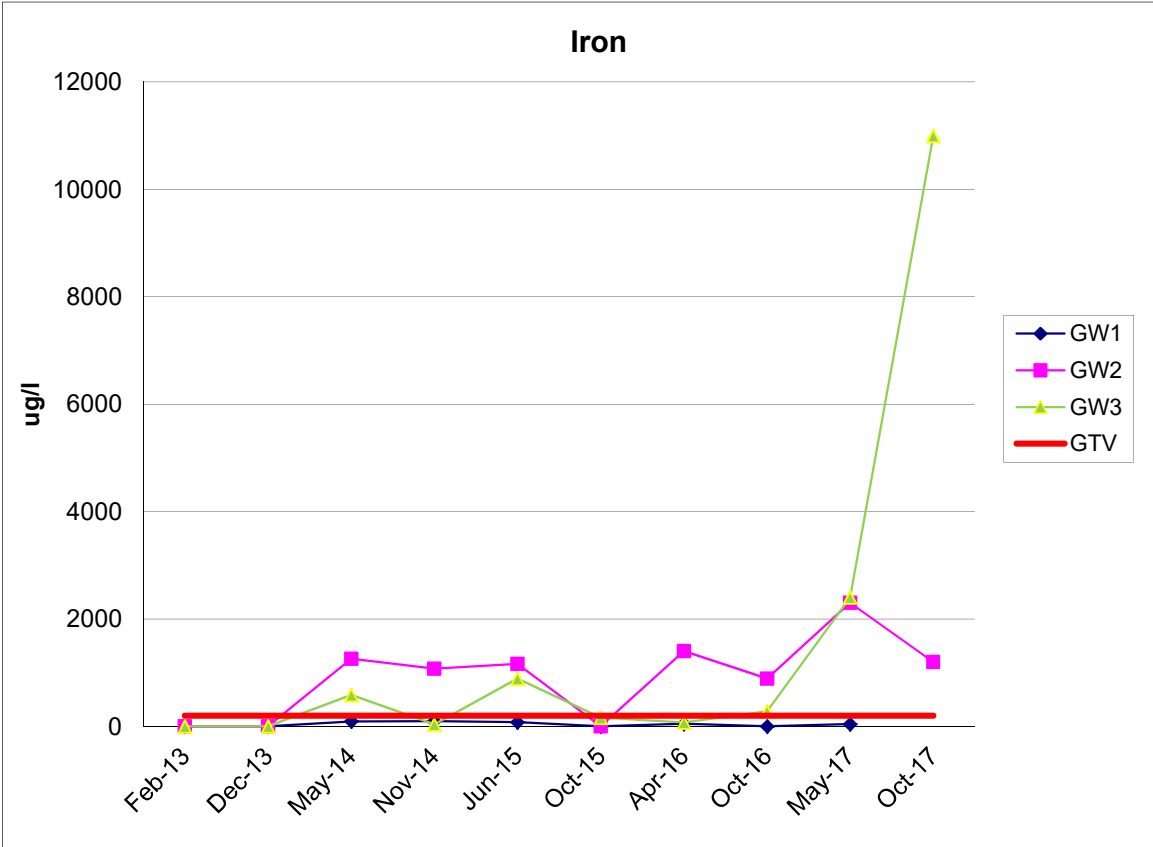
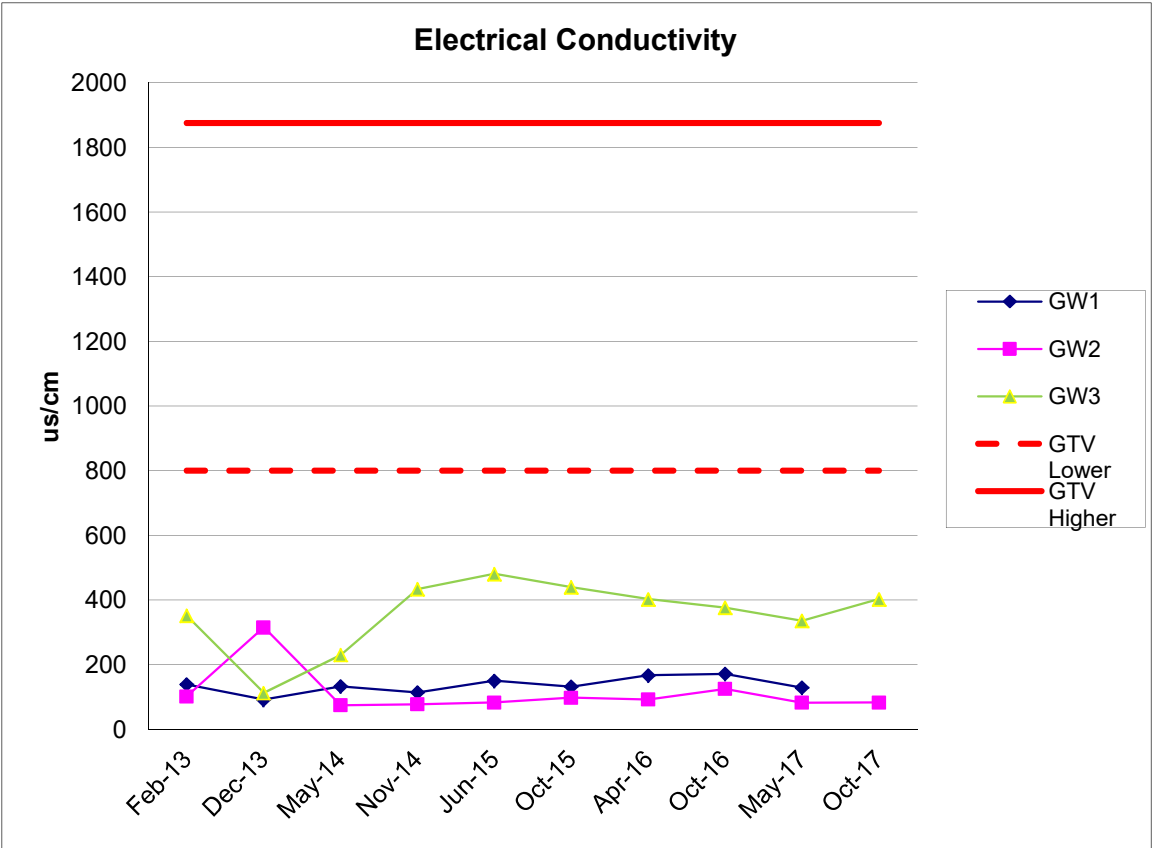
SIGNED

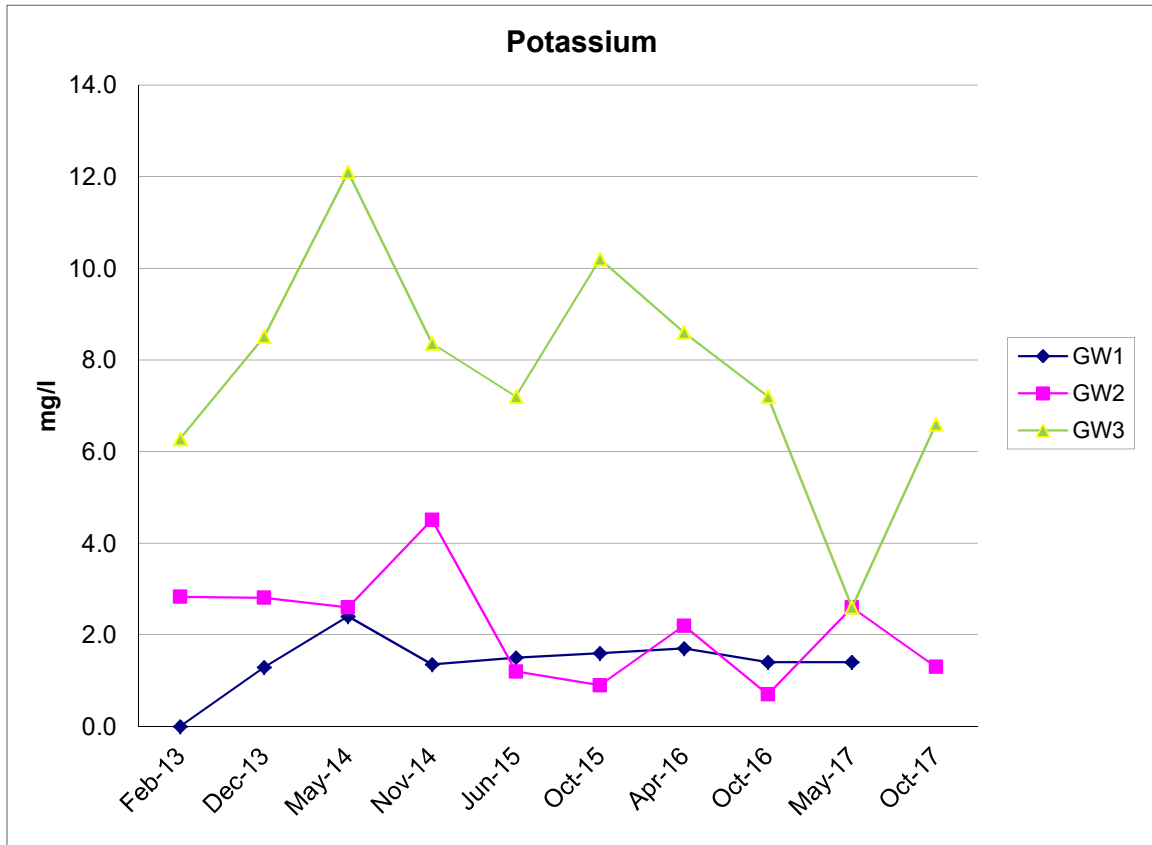
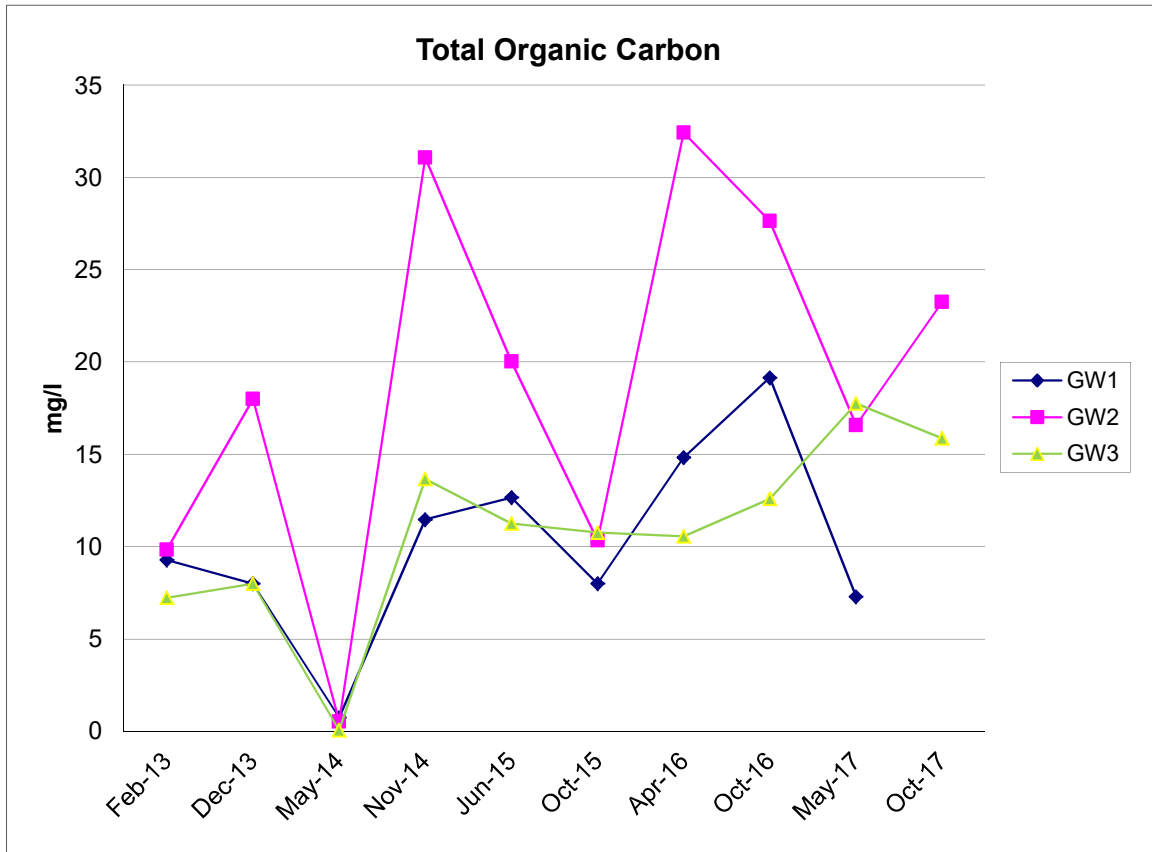
P. Bonner

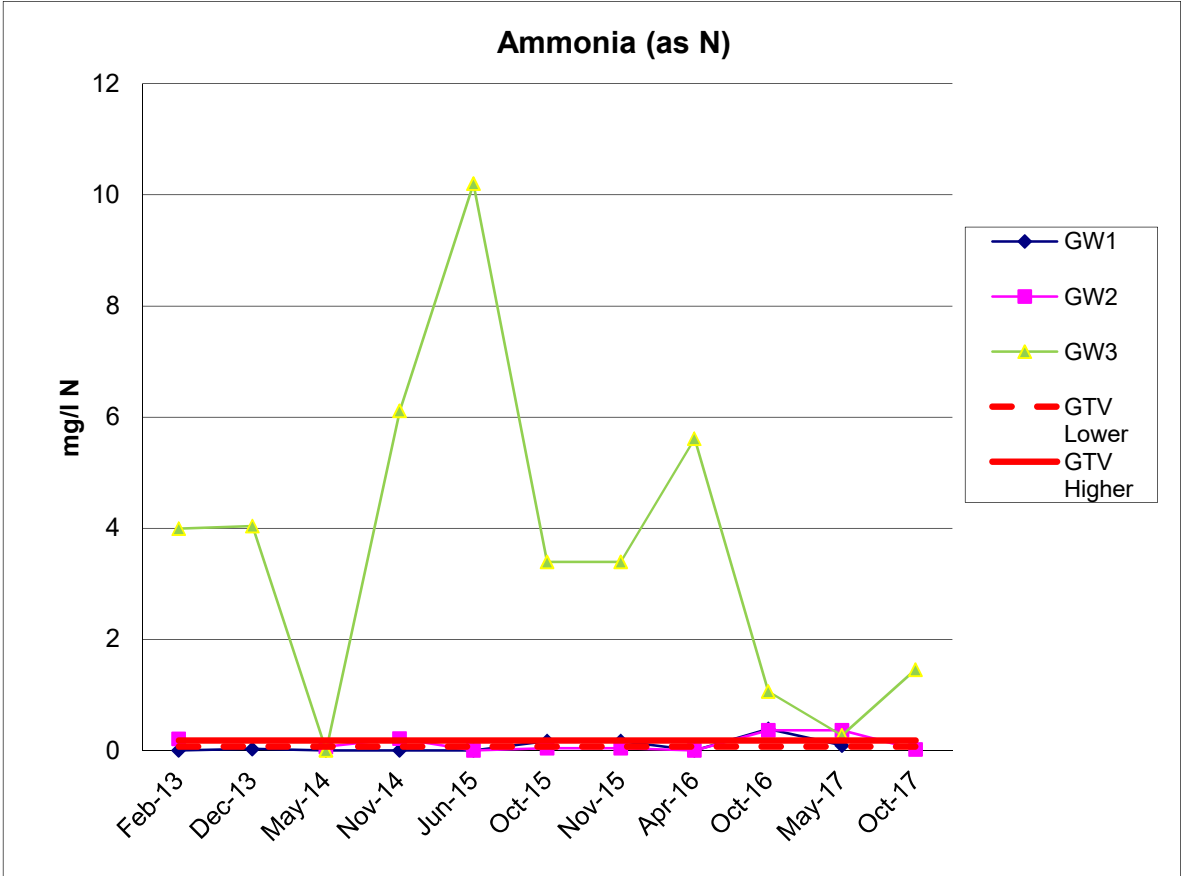
27/11/2017

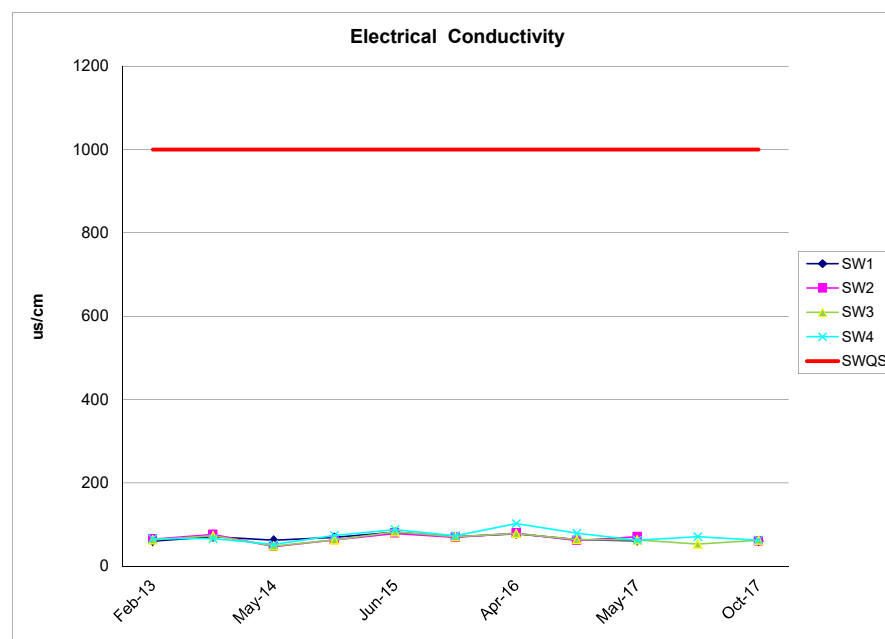
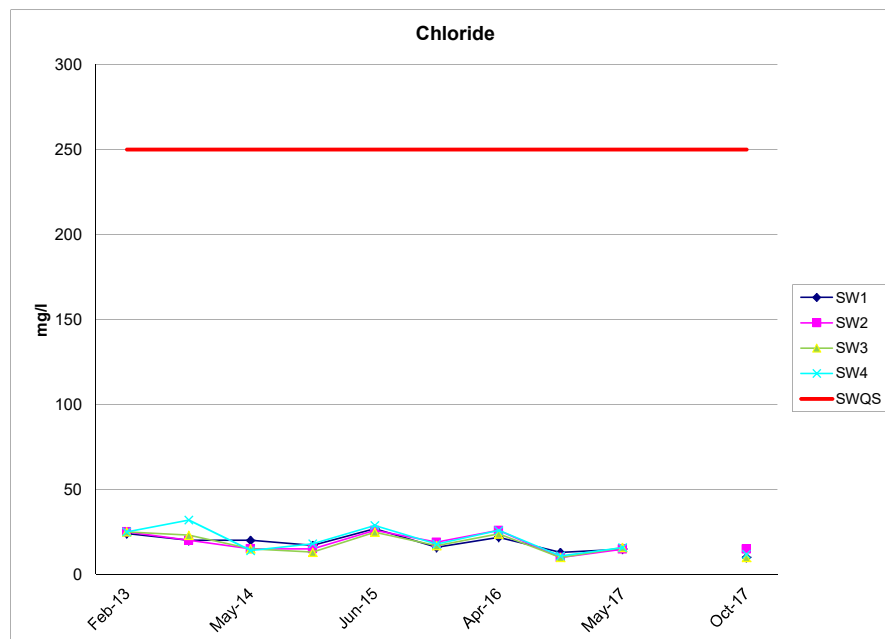
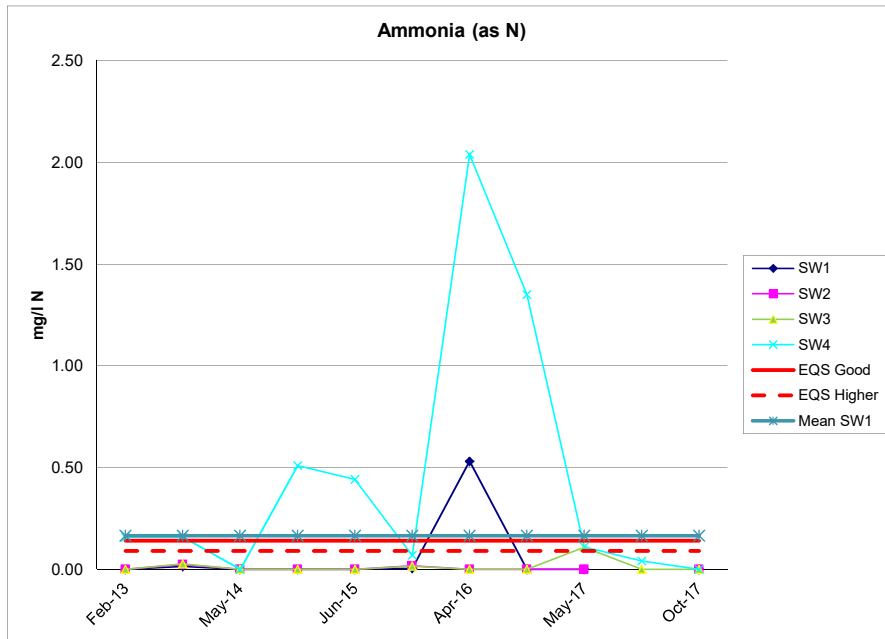
Dr. Joe Ferry, Laboratory Manager

Any opinions, remarks and/or interpretations expressed above are outside the scope of accreditation
 Original Test Report, unless otherwise indicated by the insertion of Supplementary Test Report in Report Reference section
 Micro. parameters with units MPN/100mls are reported as zero for result of <1 MPN/100ml, i.e. none detected in volume tested
 Where "0" is reported, it means "None detected in volume tested."









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)
2017	Closed	1,152			20,500	2,362	2,362	2,362	2422.77
Total		1,152						2,362	2422.77

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.	1152.1	mm

Total rainfall in millimetres for Malin_head	Year	2017	2016	2015	2014	2013	2012
Jan		56.7	166.3	176.0	162.2	140.9	134.7
Feb		85.1	130.7	85.8	189.9	74.1	68.1
Mar		96.9	72.7	123.1	71.6	61.7	29.8
Apr		41.1	52.9	64.7	33.4	61.6	46.3
May		50.9	65.6	137.0	86.8	102.5	50.7
Jun		77.7	72.4	56.1	48.6	85.5	141.1
Jul		114.6	109.9	132.7	86.0	56.5	91.4
Aug		172.5	79.9	111.0	95.3	92.6	87.3
Sep		90.2	94.7	29.7	23.0	69.7	139.2
Oct		111.9	37.6	71.9	131.4	103.8	123.5
Nov		137.5	113.9	222.9	134.4	116.0	87.4
Dec		117	76.0	272.9	150.5	178.6	149.3
Annual		1152.1	1072.6	1483.8	1213.1	1143.5	1148.8

Appendix E

E-PRTR

(AER Electronic Reporting System)



Environmental Protection Agency

| PRTR# : W0126 | Facility Name : Muckish Landfill Site | Filename : W0126_2017.xls |
Return Year : 2017 |

[Guidance to completing the PRTR workbook](#)

PRTR Returns Workbook

Version 1.1.19

REFERENCE YEAR	2017
-----------------------	------

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) ?	
--	--

4.1 RELEASES TO AIR

[Link to previous years emissions data](#)

| PRTR#: W0126 | Facility Name : Muckish Landfill Site | Filename : W0126_2017.xls | Return Year : 2017 |

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SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS

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

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

SECTION B : REMAINING PRTR POLLUTANTS

POLLUTANT		METHOD			QUANTITY			
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
01	Methane (CH4)	C	OTH	Landgem	0.0	56530.0	0.0	56530.0
03	Carbon dioxide (CO2)	C	OTH	Landgem	0.0	155100.0	0.0	155100.0
02	Carbon monoxide (CO)	C	OTH	Landgem	0.0	27.64	0.0	27.64
07	Non-methane volatile organic compounds (NMVOC)	C	OTH	Landgem	0.0	364.4	0.0	364.4
55	1,1,1-trichloroethane	C	OTH	Landgem	0.0	0.45	0.0	0.45
56	1,1,2,2-tetrachloroethane	C	OTH	Landgem	0.0	1.3	0.0	1.3
34	1,2-dichloroethane (EDC)	C	OTH	Landgem	0.0	0.29	0.0	0.29
62	Benzene	C	OTH	Landgem	0.0	1.05	0.0	1.05
58	Trichloromethane	C	OTH	Landgem	0.0	0.03	0.0	0.03
35	Dichloromethane (DCM)	C	OTH	Landgem	0.0	8.38	0.0	8.38
65	Ethyl benzene	C	OTH	Landgem	0.0	3.44	0.0	3.44
73	Toluene	C	OTH	Landgem	0.0	25.32	0.0	25.32
60	Vinyl chloride	C	OTH	Landgem	0.0	3.22	0.0	3.22
78	Xylenes	C	OTH	Landgem	0.0	8.98	0.0	8.98
57	Trichloroethylene	C	OTH	Landgem	0.0	2.59	0.0	2.59

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

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

POLLUTANT		METHOD			QUANTITY			
Pollutant No.	Name	M/C/E	Method 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	2.865	0.0	2.865

* 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:

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

5. ONSITE TREATMENT & OFFSITE TRANSFERS OF WASTE

| PRTR# : W0126 | Facility Name : Muckish Landfill Site | Filename : W0126_2017.xls | Return Year : 2017 |

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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	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	2422.77 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