

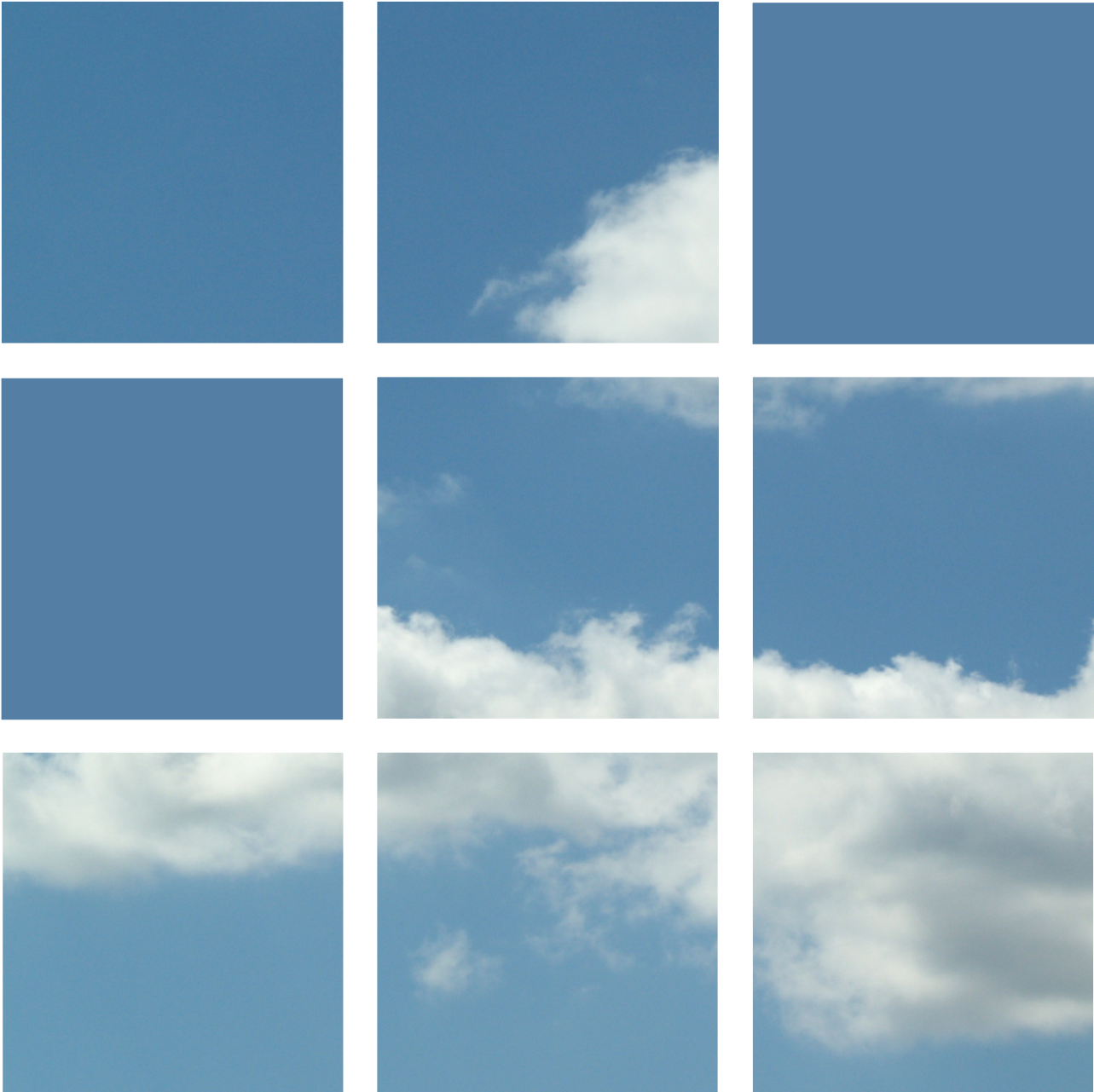


Donegal County Council

Annual Environmental Report 2015

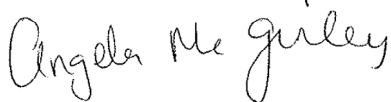

Balbane Landfill Site

IBR0859 / April 2016



Document Control Sheet

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1 Introduction

This Annual Environmental Report (AER) has been prepared to meet the requirements of Condition 11.5 of Waste Licence 90-1 for Balbane Landfill Site, and includes the information listed in Schedule F of the Licence.

Balbane Landfill Site, as shown on Drawing IBR0859/003, is located approximately 6.5 km north of Killybegs, in the townland of Balbane, County Donegal. The landfill covers an area of approximately 2.9 hectares. The landfill site was developed to operate on the dilute and disperse principle whereby leachate generated by rainfall was allowed to disperse into the surrounding environment.

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 13th of November 2001 the Environmental Protection Agency granted the Council a Waste Licence (registration number 90-1) for the facility, in accordance with the Third Schedule of the Waste Management Act, 1996. The site closed in January 2004.

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

Table 1.1 Facility Information Summary

AER Reporting Year	2015
Licence Register Number	W0090-01
Name of site	Balbane Landfill Site
Site Location	Balbane, County Donegal
NACE Code	3821
Class/Classes of Activity	Landfill

2 Report Period

The report period for this Annual Environmental Report (AER) is from January to December 2015.

3 Waste Activities Carried Out at the Facility

In accordance with Condition 1 of the waste licence only those waste types and quantities of waste listed in Schedule A shall be disposed of at the facility unless the prior agreement of the Agency has been obtained. The maximum annual tonnage of individual waste types for disposal is listed in Schedule A of the Waste Licence at 7,500 tonnes from the date of grant of licence for municipal waste and 70,000 tonnes of inert material of the purpose of restoration.

The licensed waste 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 deposition of municipal and inert waste.
- **Class 4:** Surface impoundment, including placement of liquid or sludge discards into pits, ponds or lagoons. This activity is limited to leachate collection and treatment.
- **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.

The site is closed and is now secured to prevent unauthorised entry.

4 Quantity and Composition of Waste Received and Disposed of During the Reporting Period and each Previous Year

A temporary computerised weighbridge was installed at the site in 2002 and this was used to record waste data figures until the facility closed in January 2004. No waste has been received at the site since closure. Annual figures for the period 1998-2004 are shown in Table 4.1.

Table 4.1 Waste Quantities Accepted

Waste Types	1998	1999	2000	2001	2002	2003	2004
Municipal Waste (20 03 01)	3228	3716	4721	4107	5069	2790	187
Street Cleanings (20 03 03)						57	3

5 Summary Report on Emissions, Results and Interpretation of Environmental Monitoring

5.1 Environmental Monitoring Requirements

There are no continuous air, groundwater, surface water or wastewater (sewer) monitoring at Balbane landfill site. Periodic/non-continuous monitoring of groundwater, surface water, leachate, and landfill gas are carried out at the site as per Schedule D of the licence, and as agreed with the EPA, as set out in Tables A2, A3 and A4 of Appendix B.

Details of the monitoring locations are shown on Drawing IBR0859/004 and are given in Table A1 of Appendix A.

5.2 Monitoring Results

Results of monitoring for the period for groundwater, surface water, leachate and gas are contained in tabular format in the report and in graphical format in Appendix C.

5.3 Groundwater

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

- EPA Interim guideline values¹ (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 (GWR 2010).

Groundwater locally flows in a south-easterly direction and GW1 reflects baseline conditions up-gradient of the site. GW2 & GW4 are down-gradient but in / adjacent to waste. It should be noted that BH2 is also located within waste and is considered to be a leachate well. The direction of groundwater flow is presented in Figure 5 in Appendix A.

¹EPA (2003) Towards setting guideline values for the protection of groundwater in Ireland. Interim Report

The GTV for ammonia is 0.175 mg/l. An elevated concentration of ammonia was recorded up-gradient of the site in GW1 in November (8.60 mg/l N) which reflects the baseline conditions of the groundwater up-gradient of the site. It is important to note that elevated levels of ammonia up gradient trigger an emission incident on the site; however the source of contamination remains unexplained. Ammonia concentrations ranged from >0.04 to 0.07 mg/l N for the remaining sampling dates.

Elevated concentrations of ammonia were also recorded down gradient of the site in boreholes GW2 and GW4 throughout the sampling period. Concentrations ranged from 0.61 to 20.00 mg/l N in GW2 and ranged from 0.83 to 16.20 mg/l N in GW4. Monitoring wells GW2 and GW4 are located adjacent to the waste body.

Electrical conductivity (EC) levels up-gradient in GW1 were consistently below the GTV of 1000 μ S/cm ranging between 314 and 616 μ S/cm. EC levels down-gradient within GW2 were below the guideline value ranging between 79 and 129 μ S/cm. EC levels within GW4 exceeded the guideline value in 3 of the 4 sampling dates ranging between 668 and 1,130 μ S/cm.

Chloride concentrations were consistently below the GTV guideline value of 185.7 in all boreholes. The highest chloride concentrations are recorded in GW4. However a reducing trend since is evident and the levels continue to reduce with the most recent concentration recorded at 28 mg/l in November 2015.

Potassium concentrations were below the IGV guideline value for Potassium of 5 mg/l in GW1 and GW2. Potassium concentrations within GW4 were recorded at significantly elevated levels in 3 of the 4 sampling dates ranging between 1.8 to 41.2 mg/l

The GTV guideline value for iron is 200 μ g/l. Elevated concentrations of iron were recorded in all boreholes in June and July.

All other parameters measured quarterly are below the GTV and IGV. Analysis for metals and List I / II substances were undertaken in Quarter 2 (June 2014), as agreed with the EPA (to be undertaken every three years) and therefore are not required until 2017.

The landfill site was developed to operate on the dilute and disperse principle and results show that groundwater is being impacted from leachate generated within the landfill. It should be noted that groundwater monitoring boreholes in Balbane are adjacent to /within the unlined waste body and it is expected that concentrations in groundwater have reduced

further down gradient of the site. The graphs in appendix C also show the seasonal variation in parameter concentration at the site.

A hydrogeological risk assessment was undertaken in 2015 and submitted to the EPA. The report found that the area of impact to groundwater from the landfill leachate is considered to be minor relative to the groundwater body catchment area of the Northwest Donegal GWB i.e. < 0.001%. To-date no remedial works have been completed at Balbane landfill and a remedial strategy been proposed. Donegal County Council are actively developing remedial options for the site including the option for recirculating leachate through a willow plantation constructed over the waste body. Please refer to Section 7.

Table 5.1 Groundwater Concentrations 2015

	Date	Ammonia (as N)	Chloride	Conductivity @ 20°C	Depth	DO (Meas't)	Iron	pH	Phenols	Potassium	Sodium	Temp	TOC	TON
GW 1	Mar-15	0.07	16.87	568	1	9.7	<20	7.25	<0.15	2.8	42.2	8.7	8.53	<0.11
GW 2	Mar-15	1.25	21.84	129	2.2	12	<20	6.57	<0.15	1.9	15	8.9	1.84	<0.11
GW 4	Mar-15	16.2	143.93	1089	3	12.1	<20	7.28	<0.15	32.1	90.1	8.8	9.04	<0.11
GW 1	Jun-15	<0.04	17.87	616	0.5	5.06	2.16	6.74	<0.15	2.3	40.2	15.2	10.66	<0.1
GW 2	Jun-15	20	29.78	113.6	4.3	5.21	0.48	6.14	<0.15	1.1	13	13	1.43	0.1
GW 4	Jun-15	0.83	152.86	1130	4.1	5.19	2.93	7.14	<0.15	29.9	94.8	14.4	10.09	<0.1
GW 1	Jul-15	<0.04	10.92	616	0.9	4.96	1.334	6.75	0.1	2.3	34.9	14.6	6.73	0.054
GW 2	Jul-15	0.614	12.9	113.6	3.9	5.74	0.407	6.07	<0.1	1	9.6	14.7	0.98	0.272
GW 4	Jul-15	16.1	134.99	1130	3.6	3.88	4.245	7.21	<0.1	1.8	112.8	15	6.67	0.093
GW 1	Nov-15	8.6	30.77	314	0.6	6.67	210	6.78	<0.1	1.3	17.8	9.5	3.27	<0.11
GW 2	Nov-15	1.74	26.8	128.4	4.2	5.97	<20	6.12	<0.1	0.8	6.3	9.6	1.31	0.226
GW 4	Nov-15	2.06	27.79	668	3.3	6.32	37	8.93	<0.1	41.2	88.4	9.5	5.29	1.4

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).

S1 is upstream of the site, whilst S4–S7 inclusive are downstream. S2 and S3 were relocated and relabelled at the request of the EPA.

The EQS 2009 guideline values for ammonia ranges from 0.09 (high) to 0.14 mg/l N (good). Upstream of the site, at surface water monitoring point S1, ammonia concentrations were within the guideline values of 0.14 mg/l N (good). Although results for upstream surface water are within limits, results for March show ammonia concentration of 0.1mg/l. The source of this is unknown.

Elevated concentrations, relevant to the EQS 2009 guideline values for ammonia, were recorded downstream of the site for the majority of the sampling dates ranging between 0.04 to 4.09 mg/l N. There is a generalised reduction in ammonia concentration over time at any fixed point. In addition, contamination levels appear to be reducing with distance from the site except for an elevated ammonia concentration recorded in S7 (1.52 mg/l N) in November.

The EQS 2009 guideline value for BOD is 2.6 mg/l. BOD values recorded at monitoring point S1 were below the EQS guideline value. These results reflect the baseline conditions of the surface water upstream of the site.

Elevated concentrations of BOD were recorded downstream of the site. These elevated concentrations were recorded at times in all downstream surface water monitoring points with values ranging from <1 to 14.32 mg/l.

No elevated concentrations above the appropriate EQS and/or SWQS values have been recorded for chloride or electrical conductivity throughout the monitoring period both upstream and downstream of the site.

All other parameters measured quarterly are below the EQS and SWQS were comparable.

Analysis for metals and List I / II substances were undertaken in Quarter 2 (June 2014), as agreed with the EPA (to be undertaken every three years) and therefore are not required until 2017.

The restoration of this landfill has not been undertaken to date. A hydrogeological risk assessment was undertaken in 2015. The report found that the site in its present condition appears to be impacting significantly on surface waters immediately downstream from the landfill predominantly via surface water discharges from leachate breakout from the waste body and subsequent overland flow and shallow groundwater flow. Donegal County Council are actively developing remedial options for the site including the option for recirculating leachate through a willow plantation constructed over the waste body. Please refer to Section 7.

Graphs of the concentrations for key parameter are provided in Appendix C.

Table 5.2 Surface Water Concentrations 2015

Location	Date	Ammonia (as N)	BOD	COD	Chloride	Conductivity @ 20 °C	DO (Meas't)	pH	Temp	SS
S 1	Mar-15	0.05	0.21	8	24.82	91.2	12.1	6	8.7	<6
S 4	Mar-15	4.07	1.33	11	41.69	346	12	8	8.6	<6
S 5	Mar-15	4.09	1.36	10	43.67	342	12.1	8	8.6	<6
S 6	Mar-15	3	1.32	10	43.67	317	12.1	8	8.8	<6
S 7	Mar-15	0.47	0.35	6	28.79	151	12.2	7	8.8	<6
S 1	Jun-15	0.1	<1	12	14.89	54.6	9.89	6.04	13.9	<6
S 4	Jun-15	1.82	<1	11	32.76	281	9.7	7.58	14.9	<6
S 5	Jun-15	2.21	9.54	11	44.67	290	9.84	7.8	15.1	<6
S 6	Jun-15	1.29	<1	14	31.76	235	9.81	7.67	15	<6
S 7	Jun-15	0.35	8.67	11	39.7	110.5	10.05	7.29	15	6.67
S 1	Jul-15	<0.04	1.7	37	7.94	29.2	8.65	5.94	15.2	<6
S 4	Jul-15	0.364	14.32	30	9.93	73.3	9.06	7.18	15.1	<6
S 5	Jul-15	0.56	1.34	27	9.93	82.3	9.15	7.3	15.3	<6
S 6	Jul-15	0.322	13.84	30	8.93	70.5	9.09	7.21	15.5	<6
S 7	Jul-15	0.088	13.88	32	8.93	53.5	9.2	7.03	15.3	<6
S 1	Nov-15	<0.04	1.19	12	14.89	62.7	10.8	5.83	10.1	<6
S 4	Nov-15	1.07	1.21	10	17.87	120.4	11	7.37	10.2	<6
S 5	Nov-15	<0.04	8.89	12	99.26	416	11.05	7.7	10.2	<6
S 6	Nov-15	1	1.32	15	21.84	109	11.01	7.29	10.3	<6
S 7	Nov-15	1.52	9.58	9	49.63	175.8	11.07	7.16	10.1	<6

5.5 Leachate

Leachate quality varies during the lifetime of a landfill depending on the stage of decomposition of waste. No samples were obtained from BH2 in 2015 as the well was inaccessible.

5.6 Gas Monitoring

The gas monitoring piezometers on the site at Balbane are located within waste, and are not perimeter wells. The results (Table 5.3) are similar to previous reporting period with landfill gas concentration being relatively low.

Table 5.3 Landfill Gas Results 2015

Location	Date	Atmospheric Pressure	Carbon Dioxide %v/v	Methane %v/v	Oxygen %v/v
BH1 (Gas)	Mar-15	989	3.3	0.1	17
BH2 (Gas)	Mar-15	989	0.9	0.3	20.6
BH3 (Gas)	Mar-15	989	13.6	9.3	11.3
BH1 (Gas)	Jun-15	1018	5.5	0	12.9
BH2 (Gas)	Jun-15	1018	0.9	0.4	19.9
BH3 (Gas)	Jun-15	1018	0.7	13.6	17.8
BH1 (Gas)	Jul-15	992	5.1	0	13.3
BH2 (Gas)	Jul-15	992	0.5	0.6	20.1
BH3 (Gas)	Jul-15	992	16.1	14.2	0.9
BH1 (Gas)	Dec-15	989	8.5	19.1	1.7
BH2 (Gas) ²	Dec-15	NT	NT	NT	NT
BH3 (Gas) ²	Dec-15	NT	NT	NT	NT

5.7 Dust Monitoring

As previously agreed with the Agency, monitoring of dust ceased when the site closed. When any activity commences, such as restoration works for example, a dust-monitoring programme will be resumed as necessary.

² BH2 and BH3 were inaccessible in December 2015 due to flooding.

6 Volume of Leachate Produced and Volume of Leachate Transported / Discharged Off Site

A water balance calculation has been undertaken and is presented in Appendix D. It estimates that 10,943 m³ of leachate will have been generated from this waste body during the period. Due to a lack of collection infrastructure there is no leachate transported off site. Correspondingly it is assumed that all leachate generated disperses into the surrounding environment.

7 Report on Development Work Undertaken during the Reporting Period and a Timescale for those Proposed during the Coming Year

The restoration of this landfill has been delayed due to lack of funds available to Donegal County Council as a result of the removal of grant funding for such projects. The Council met with the Agency in November 2009 and discussed this issue. The Agency requested that the Council investigate the viability of carrying out some focused works to address leachate emissions, this being the significant environmental risk from the site. This was carried out and a proposal for leachate treatment submitted to the Agency for consideration in 1st June 2010. The Council received a response from the Agency in May 2011 citing Condition 6.4.1 of the Licence and requesting a demonstration that leachate discharges will have no significant impact on receiving waters. This remained under consideration for a period thereafter due to the complexities of fulfilling the request. In the intervening years the Council has been investigating the viability of bio-technologies as engineering techniques to remediate landfills.

The Agency requested that a Specified Engineering Work (SEW) be prepared and submitted for the proposed remediation, however, initial scoping work confirmed that Churchtown landfill site was a better candidate for a pilot willow project. The Council has since developed a Willow Crop in combination with an Integrated Constructed Wetland (ICW) at Churchtown landfill site. This project is currently being commissioned. It is the intention of the Council to scope out a remediation project for Balbane landfill site which incorporates an ICW for leachate treatment. Efforts to secure financial support from the DEHLG continue, and it is hoped that a SEW can be produced for the Agency and the project advanced during 2016.

8 Report on Restoration of Completed Cells / Phases

The Restoration and Aftercare Plan was submitted to the Agency in October 2004 and approved in November 2004.

Of Donegal County Council's six closed landfill sites Balbane was scheduled to the last to be restored and will be undertaken next now that the Churchtown restoration has been completed. See also comments in Section 7 above.

9 Site Survey showing Existing Levels of the Facility at the End of the Reporting Period

A topographical survey of the site was last carried out in December 2002. This was included in the 2002 AER.

10 Annual Water Balance Calculation and Interpretation

A water balance calculation has been undertaken and is presented in Appendix D. The calculation for monthly water balance is as follows:

$$L_o = [ER (A) + LW + IRCA + ER (I)] - [aW]$$

Where

L_o = leachate produced (m^3)

ER = effective rainfall

A = area of cell (m^2)

LW = liquid waste

IRCA = infiltration through restored areas and capped areas (m)

a = absorptive capacity of waste (m^3/t)

W = weight of waste deposited

I = surface area of lagoons (m^2)

11 Reported Incidents and Complaints Summaries

Other than the reporting of on-going emissions exceedances detected in the routine surface water and groundwater monitoring programme (8 in total), no other incidents occurred during the monitoring period and no complaints were received.

Four non compliances were noted on 17/11/15 during a site inspection. These were in relation to failure to provide leachate management infrastructure and non submission of groundwater risk screening report. The groundwater risk screening report was submitted on 16/12/15. See comments in Section 7 with regards to the restoration of the facility.

12 Review of Nuisance Controls

As the facility is no longer operational, all areas formerly used for the placement of municipal waste have been covered by clay and topsoil. There has been a resultant reduction in nuisance on foot of this and, by agreement with the Agency, monitoring programmes and control systems employed whilst operational are now in abeyance.'

However, precautionary measures are employed to ensure the detection and appropriate management of any nuisances that may arise. As part of the Environmental Management System for the site a procedure has been developed to provide for regular inspections of the site as part of the quarterly monitoring programme. Should this inspection reveal the incidence of any type of nuisance (vermin, litter, dust, birds or odours) then appropriate action is initiated.

13 Report on Financial Provisions made under this License, Management and Staffing Structure of the Facility and a Programme for Public Information

Donegal County Council being a local authority is able to provide the necessary finances to ensure the proper management, development and restoration of Balbane Landfill Site.

Overall responsibility for the ongoing operations and development of the landfill site is held by the Senior Engineer. The Senior Engineer is assisted by an Executive Engineer assigned to the Environment Section of Donegal County Council.

As part of the Environmental Management System (EMS) for the site, a communication programme (in accordance with Condition 2.8 of waste licence) is provided in Section 2 of the EMS to ensure that members of the public can obtain information concerning the environmental performance of the facility at all reasonable times.

The Management Structure at Balbane Landfill site is set out in Figure 13.1 below.

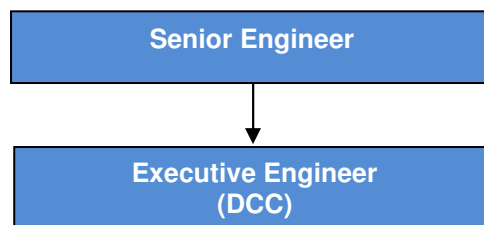


Figure 13.1 Management Structure

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.

14 Report on Staff Training

No training has been undertaken as the facility is now closed and there are no operational personnel on the site.

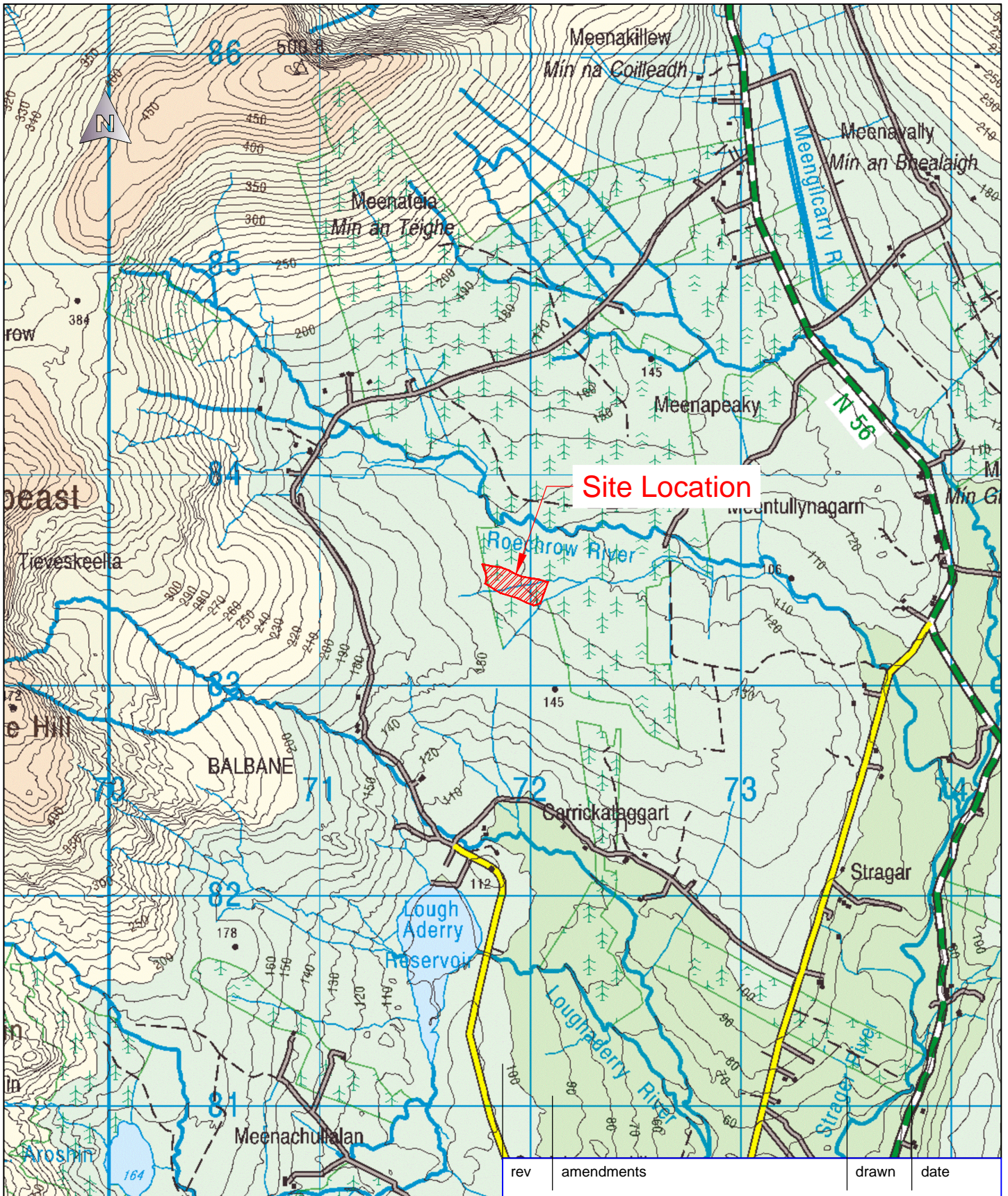
15 Resources and Energy Consumption Summary


An energy efficiency audit has not been carried out at this facility as the landfill site is closed it is not a requirement of the licence. No energy was consumed on the site during the reporting period.

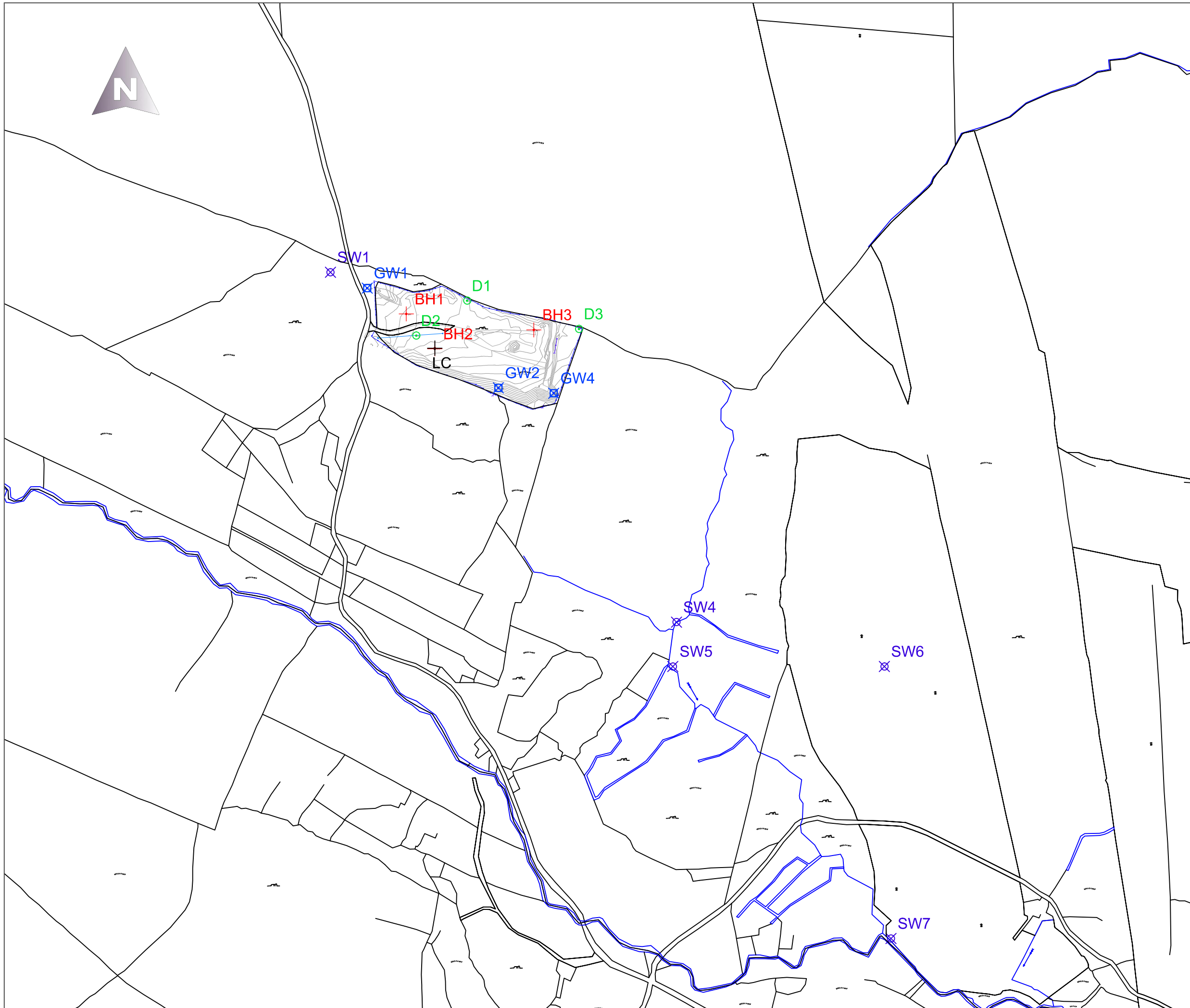
16 Report on Environmental Management Programme

An Environmental Management Programme (EMP) was revised in 2004 to take into consideration the closure of the site and was submitted in to the Agency in December 2004 for its agreement. A public communication programme has been initiated in accordance with Condition 2 of the Waste Licence to ensure that information concerning the environmental performance is available at reasonable times. The public may view environmental records at the Donegal County Council headquarters. Details regarding this are contained in Section 2 of the Environmental Management System Manual.

Appendix A Drawings



 Enterprise Fund Business Centre Ballyraine Letterkenny Co. Donegal	T +353 74 9161927 F +353 74 9161928 W www.rpsgroup.com/ireland E ireland@rpsgroup.com	Drawing Number	Rev
		IBR0859/003	0
Project	Donegal Landfill Site Reporting 2015		
Client	Donegal County Council		
Drawing Status	Sheet Size	Drawing Scale	Project Leader
Preliminary	A4	1:25,000	DD
			Drawn By
			AMB
			Date
			Apr '15
			Initial Review
			AMcG



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 recipient's 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 recipient's drawing production, or setting out on site.

4. Keys:
- BH Landfill Gas Monitoring Boreholes
 - D1 Dust Monitoring Point
 - GW Groundwater monitoring Locations
 - LC Leachate Monitoring Locations
 - SW Surface Water Monitoring Locations

rev	amendments	drawn	date

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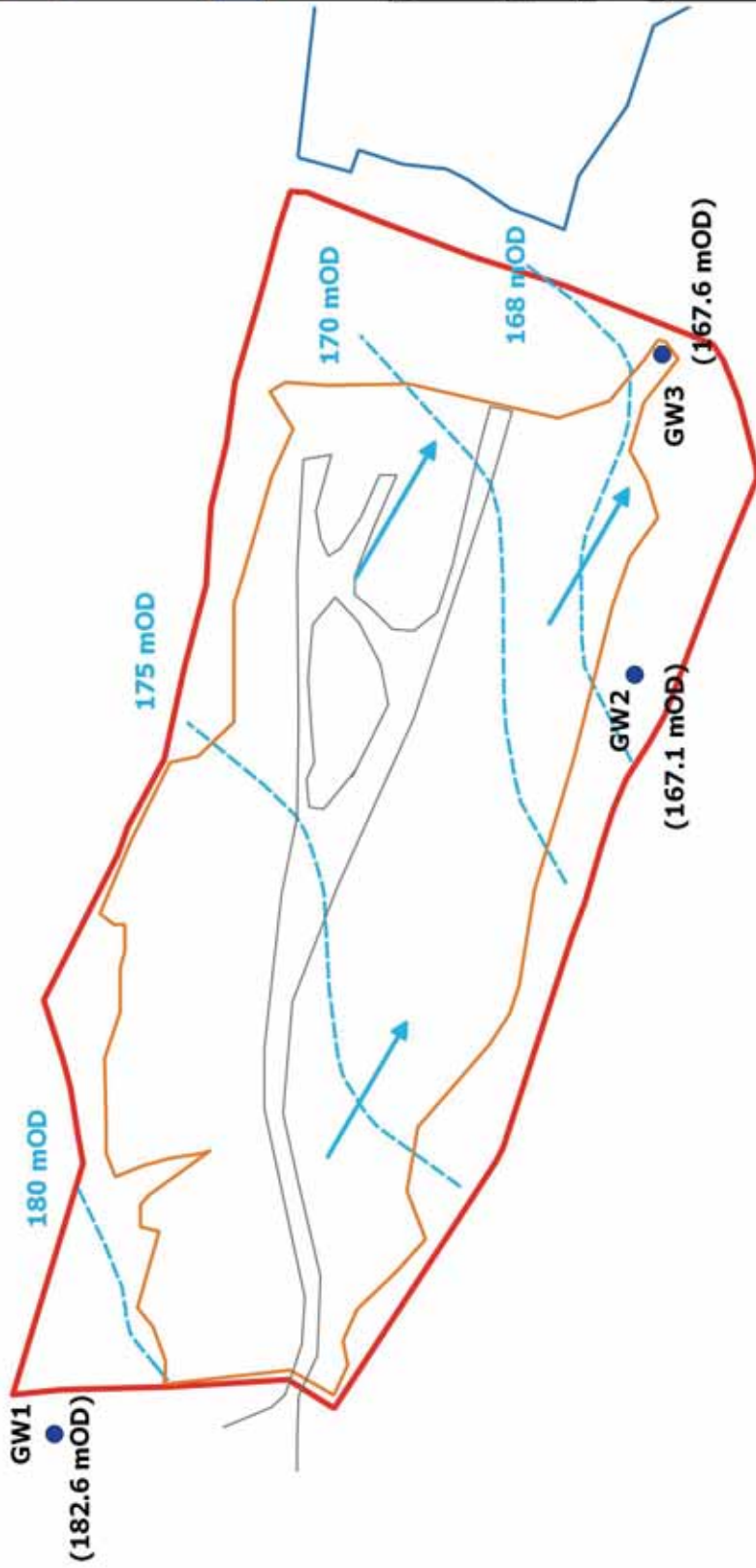
Project
Donegal Landfill Site Reporting 2015

Title
Balbane LFS - Monitoring Points

Drawing Status Preliminary	Sheet Size A3	Drawing Scale 1:5000
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Drawing Number IBR0859 /004	Rev 0
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Project Leader DD	Drawn By AMB	Date Apr '15	Initial Review AMCG
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Legend

- Road
- Waste Boundary
- - - Groundwater Contours
- Stream
- Wells
- Site Boundary
- Groundwater Flow Direction

Project

**Balbane Landfill
Hydrogeological Risk
Assessment**

Client

**Donegal County
Council**

Drawing

Figure 5

Title

**Groundwater Contours
September 2014**



**The Hydrogeological and
Contaminated Land Consultancy**

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Date : 06/09/2015
Drawn by : SB
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Appendix B

Monitoring Information

Appendix A - Monitoring Information

Table A1 Grid References of Monitoring Points

Monitoring Points	Easting	Northing
Boreholes		
GW1	171246.5649	383193.1516
GW2	171427.2239	383055.9240
GW4 Note 1	171503.0898	383048.6637
Surface Water Monitoring		
S1	171187	363215
S4	171657	382720
S5	171658	382673
S6 Note 2	171949	382314
S7 Note 2	171965	382297
Gas Piezometers		
BH1	171300.3033	383157.7656
BH2	171339.4609	383110.6149
BH3	171475.8577	383135.7863
Dust		
D1	171384.5481	383176.7779
D2	171314.6629	383128.5125
D3	171538.3837	383137.6433
Leachate		
BH2	171339.4609	383110.6149

Note 1 – GW3 was replaced by GW4 when the landfill mass extended past the location of GW3

Note 2 – SW2 and SW3 were replaced by SW6 and SW7

Table A2 Groundwater Parameters and Monitoring Frequencies

Quarterly		Every Three Year (Due 2017)	
Temperature	Chloride	Boron	Magnesium
Groundwater Level	Dissolved Oxygen	Cadmium	Manganese
	Sodium	Calcium	Mercury
	TON	Chromium	Orthophosphate
	TOC	Copper	Zinc
	Phenols	Cyanide	
	Ammoniacal Nitrogen	Fluoride	
	Electrical Conductivity	Lead	
	pH	List I/II substances	
	Iron	Sulphate	
	Potassium		

Table A3 Surface Water Parameters and Monitoring Frequencies

Quarterly		Once Every Three Year (Due 2017)	
Temperature	Chloride	Iron	Magnesium
pH	Dissolved Oxygen	Cadmium	Manganese
Ammoniacal Nitrogen	COD	Calcium	Mercury
BOD		Chromium	Orthophosphate
Electrical Conductivity		Copper	Zinc
TSS		Sodium	Potassium
		Fluoride	TON
		Lead	Sulphate
		List I/II substances	

Table A4 Landfill Gas Parameters and Monitoring Frequencies

Quarterly
Atmospheric Pressure
Carbon Dioxide
Methane
Oxygen

Appendix C

Results of Monitoring

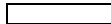
Location	Date	Ammonia (as N)	Chloride	Conductivity @ 20 °C	Depth	DO (Meas't)	Iron	pH	Phenols	Potassium	Sodium	Temp	TOC	TON
GW 1	Mar-15	0.07	16.87	568	1	9.7	<20	7.25	<0.15	2.8	42.2	8.7	8.53	<0.11
GW 2	Mar-15	1.25	21.84	129	2.2	12	<20	6.57	<0.15	1.9	15	8.9	1.84	<0.11
GW 4	Mar-15	16.2	143.93	1089	3	12.1	<20	7.28	<0.15	32.1	90.1	8.8	9.04	<0.11
GW 1	Jun-15	<0.04	17.87	616	0.5	5.06	2.16	6.74	<0.15	2.3	40.2	15.2	10.66	<0.1
GW 2	Jun-15	20	29.78	113.6	4.3	5.21	0.48	6.14	<0.15	1.1	13	13	1.43	0.1
GW 4	Jun-15	0.83	152.86	1130	4.1	5.19	2.93	7.14	<0.15	29.9	94.8	14.4	10.09	<0.1
GW 1	Jul-15	<0.04	10.92	616	0.9	4.96	1.334	6.75	0.1	2.3	34.9	14.6	6.73	0.054
GW 2	Jul-15	0.614	12.9	113.6	3.9	5.74	0.407	6.07	<0.1	1	9.6	14.7	0.98	0.272
GW 4	Jul-15	16.1	134.99	1130	3.6	3.88	4.245	7.21	<0.1	1.8	112.8	15	6.67	0.093
GW 1	Nov-15	8.6	30.77	314	0.6	6.67	210	6.78	<0.1	1.3	17.8	9.5	3.27	<0.11
GW 2	Nov-15	1.74	26.8	128.4	4.2	5.97	<20	6.12	<0.1	0.8	6.3	9.6	1.31	0.226
GW 4	Nov-15	2.06	27.79	668	3.3	6.32	37	8.93	<0.1	41.2	88.4	9.5	5.29	1.4

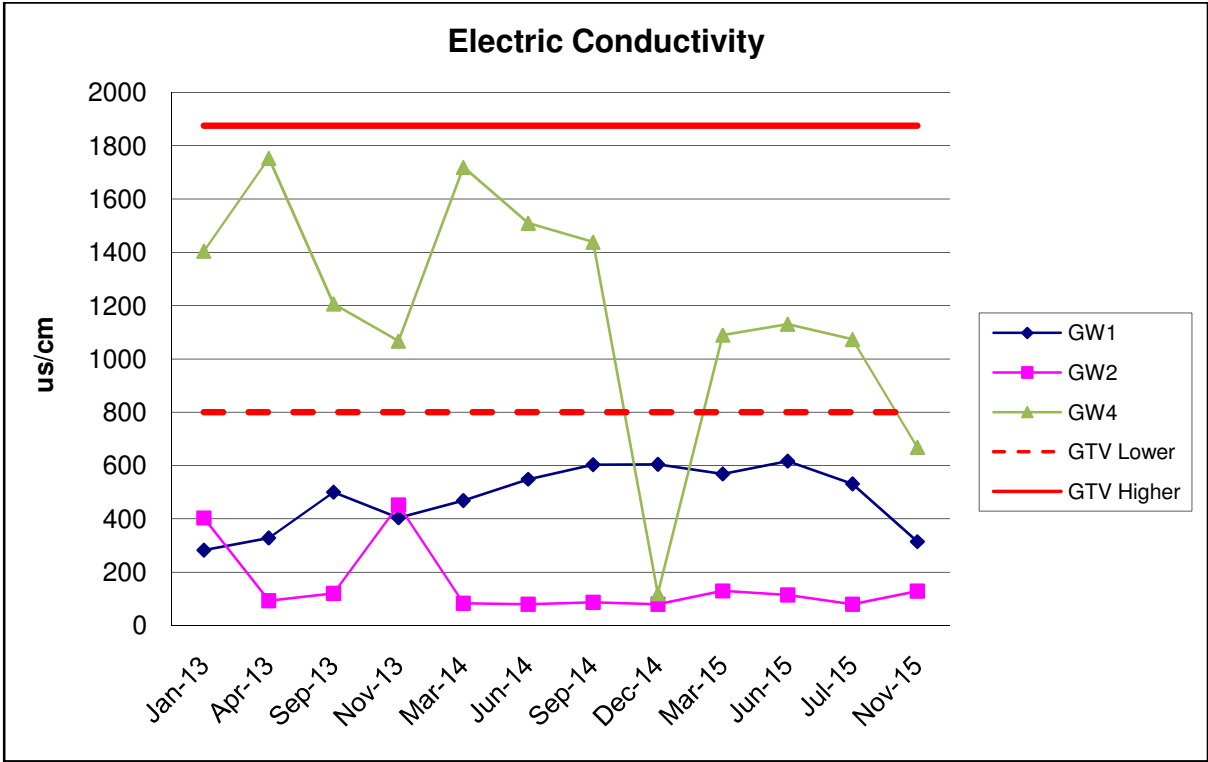
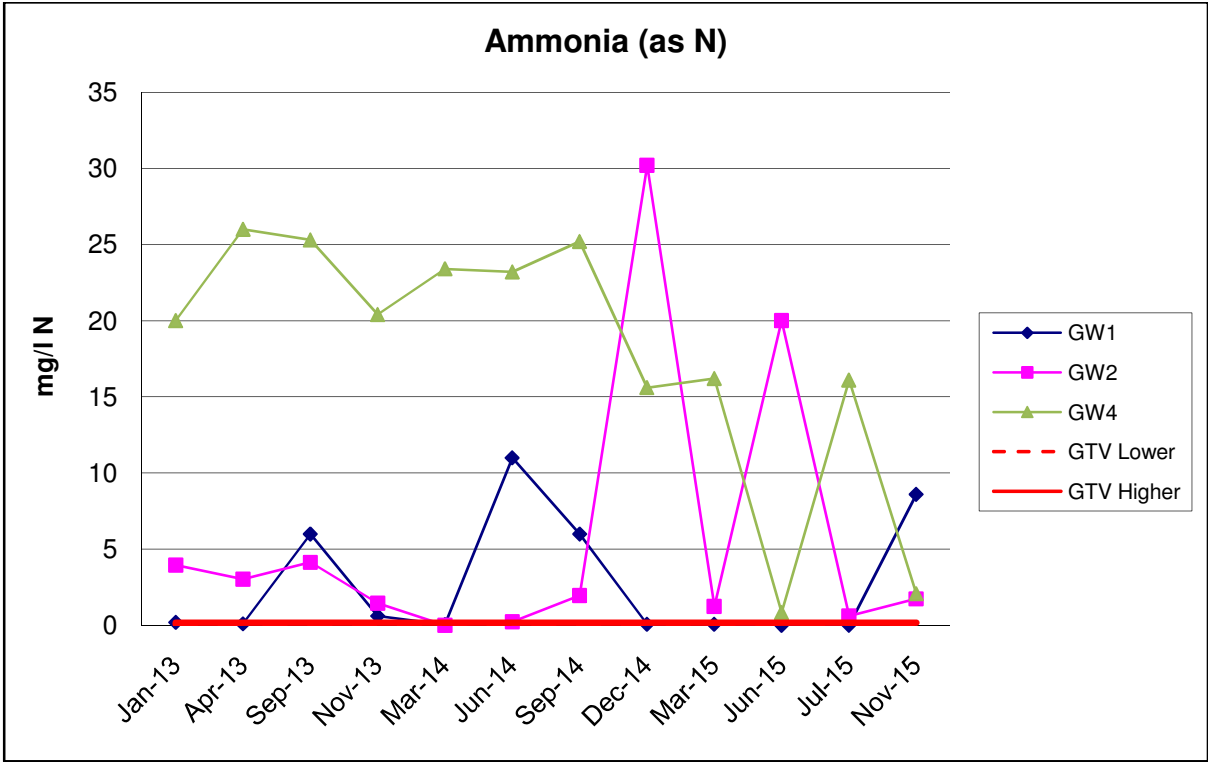
Location	Date	Ammonia (as N)	BOD	COD	Chloride	Conductivity @ 20 °C	DO (Meas't)	pH	Temp	SS
S 1	Mar-15	0.05	0.21	8	24.82	91.2	12.1	6	8.7	<6
S 4	Mar-15	4.07	1.33	11	41.69	346	12	8	8.6	<6
S 5	Mar-15	4.09	1.36	10	43.67	342	12.1	8	8.6	<6
S 6	Mar-15	3	1.32	10	43.67	317	12.1	8	8.8	<6
S 7	Mar-15	0.47	0.35	6	28.79	151	12.2	7	8.8	<6
S 1	Jun-15	0.1	<1	12	14.89	54.6	9.89	6.04	13.9	<6
S 4	Jun-15	1.82	<1	11	32.76	281	9.7	7.58	14.9	<6
S 5	Jun-15	2.21	9.54	11	44.67	290	9.84	7.8	15.1	<6
S 6	Jun-15	1.29	<1	14	31.76	235	9.81	7.67	15	<6
S 7	Jun-15	0.35	8.67	11	39.7	110.5	10.05	7.29	15	6.67
S 1	Jul-15	<0.04	1.7	37	7.94	29.2	8.65	5.94	15.2	<6
S 4	Jul-15	0.364	14.32	30	9.93	73.3	9.06	7.18	15.1	<6
S 5	Jul-15	0.56	1.34	27	9.93	82.3	9.15	7.3	15.3	<6
S 6	Jul-15	0.322	13.84	30	8.93	70.5	9.09	7.21	15.5	<6
S 7	Jul-15	0.088	13.88	32	8.93	53.5	9.2	7.03	15.3	<6
S 1	Nov-15	<0.04	1.19	12	14.89	62.7	10.8	5.83	10.1	<6
S 4	Nov-15	1.07	1.21	10	17.87	120.4	11	7.37	10.2	<6
S 5	Nov-15	<0.04	8.89	12	99.26	416	11.05	7.7	10.2	<6
S 6	Nov-15	1	1.32	15	21.84	109	11.01	7.29	10.3	<6
S 7	Nov-15	1.52	9.58	9	49.63	175.8	11.07	7.16	10.1	<6

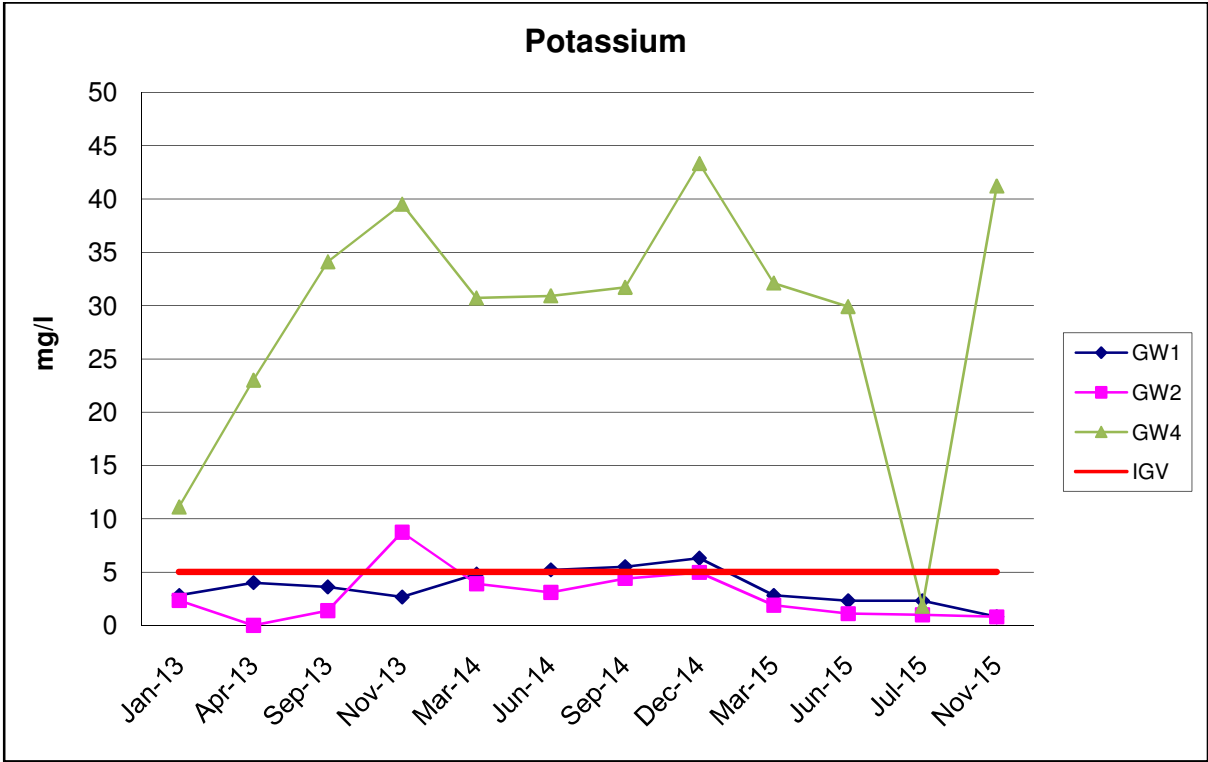
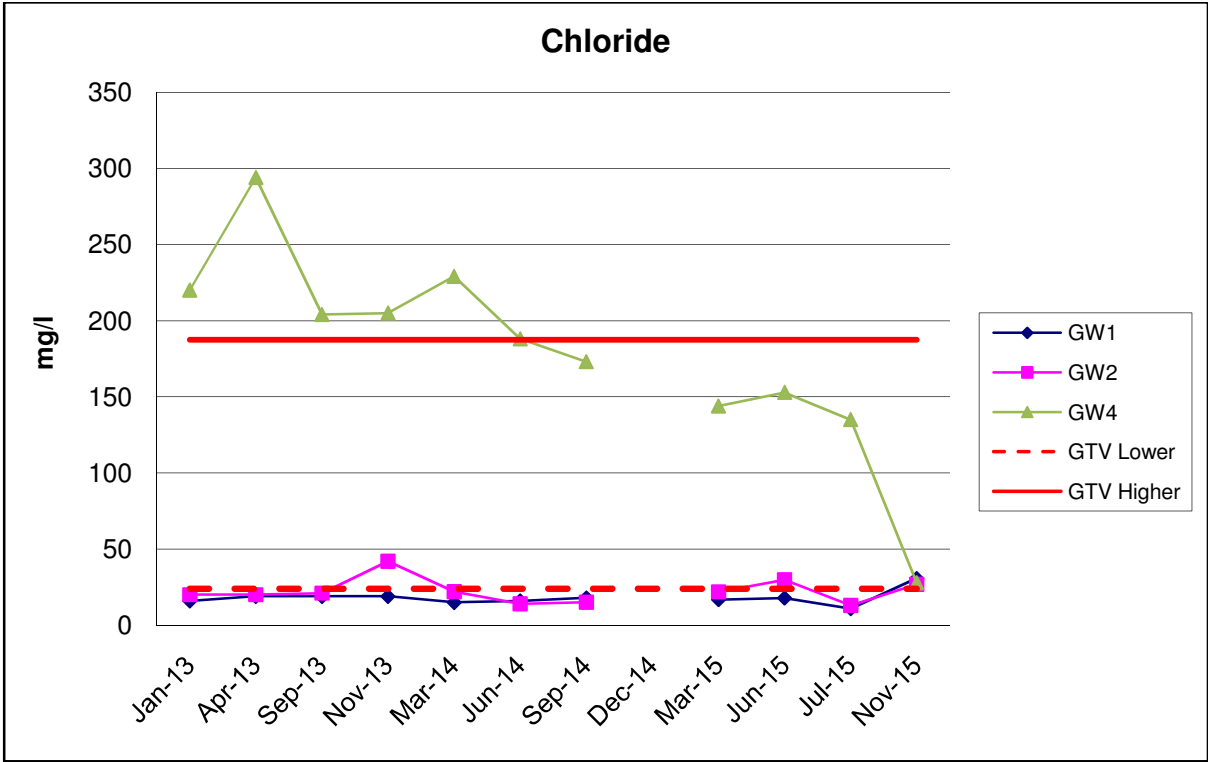
Location	Date	Atmospheric Pressure	Carbon Dioxide	Methane	Oxygen
BH1 (Gas)	Mar-15	989	3.3	0.1	17
BH2 (Gas)	Mar-15	989	0.9	0.3	20.6
BH3 (Gas)	Mar-15	989	13.6	9.3	11.3
BH1 (Gas)	Jun-15	1018	5.5	0	12.9
BH2 (Gas)	Jun-15	1018	0.9	0.4	19.9
BH3 (Gas)	Jun-15	1018	0.7	13.6	17.8
BH1 (Gas)	Jul-15	992	5.1	0	13.3
BH2 (Gas)	Jul-15	992	0.5	0.6	20.1
BH3 (Gas)	Jul-15	992	16.1	14.2	0.9
BH1 (Gas)	Dec-15	989	8.5	19.1	1.7
BH2 (Gas)	Dec-15	NT	NT	NT	NT
BH3 (Gas)	Dec-15	NT	NT	NT	NT

Location	Date	Ammonia (as N)	BOD	COD	Chloride	Conduct'y @ 20 °C	Depth	pH	Temp	TON	Visual Inspection
BH 2 (Leachate)*	Mar-15	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
BH 2 (Leachate)*	Jun-15	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
BH 2 (Leachate)*	Jul-15	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
BH 2 (Leachate)*	Dec-15	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT

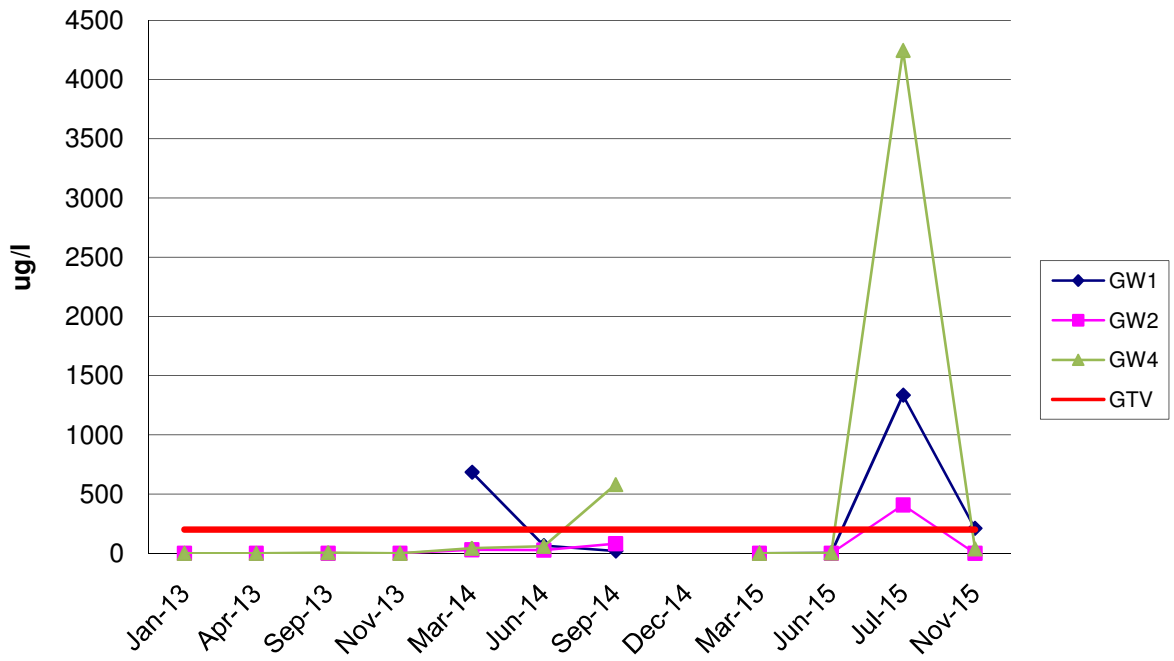
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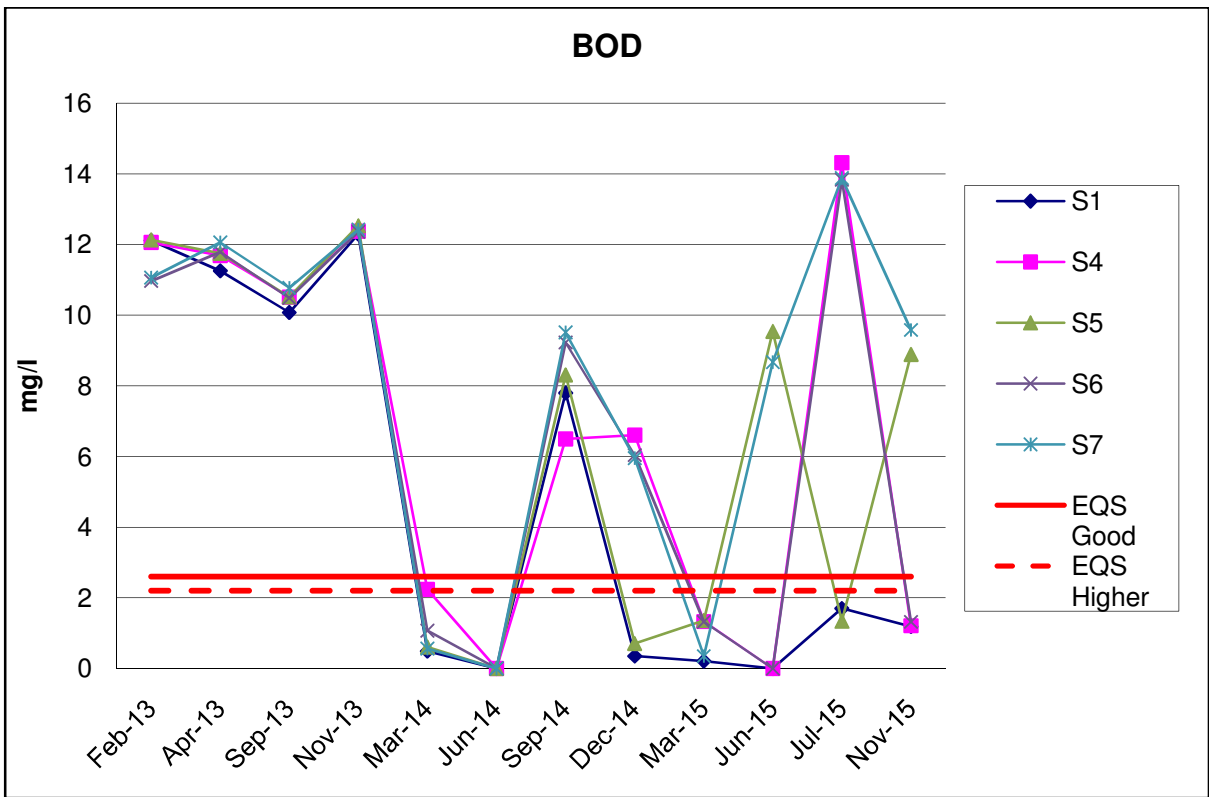
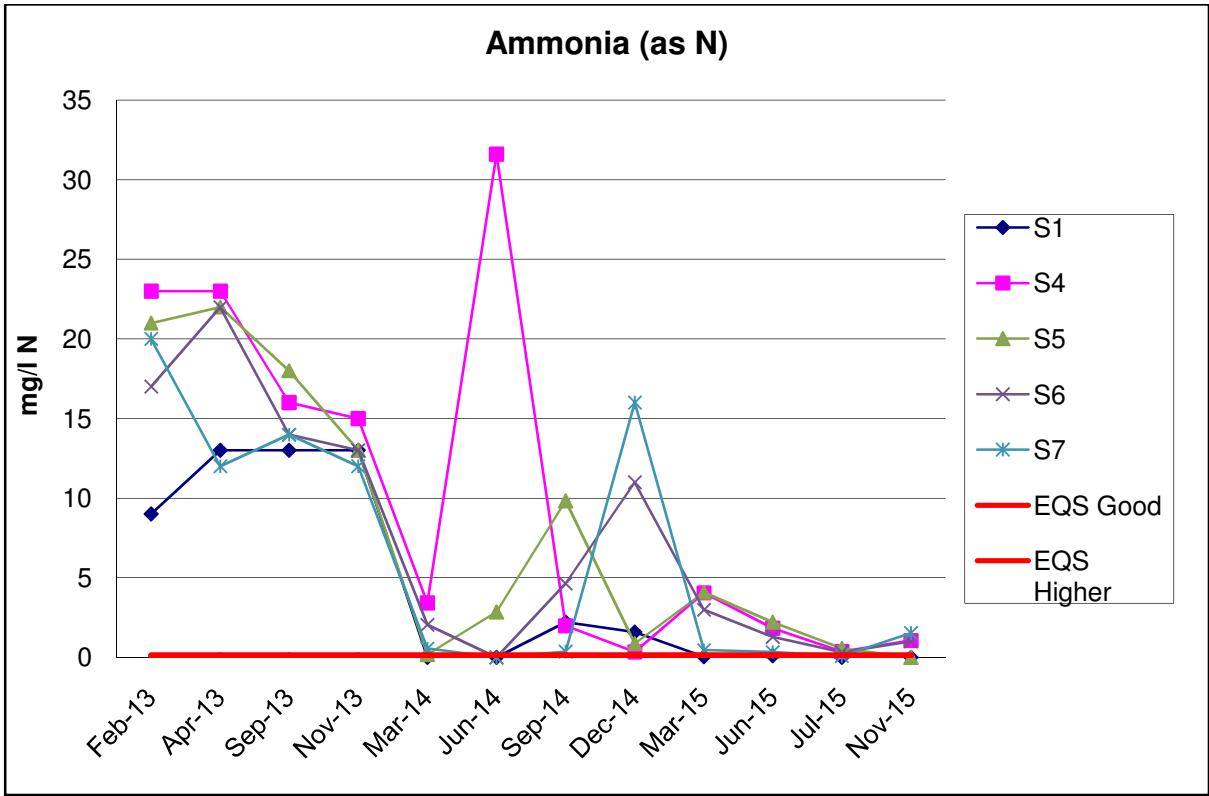


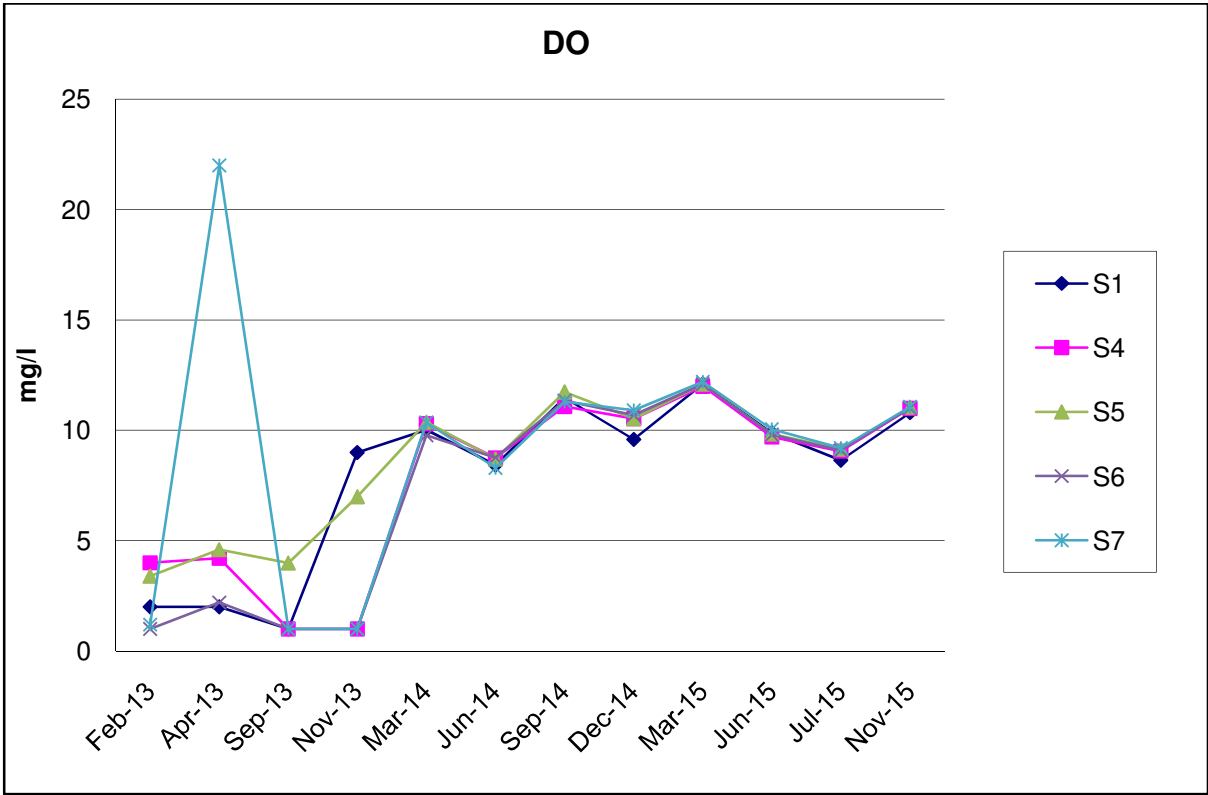
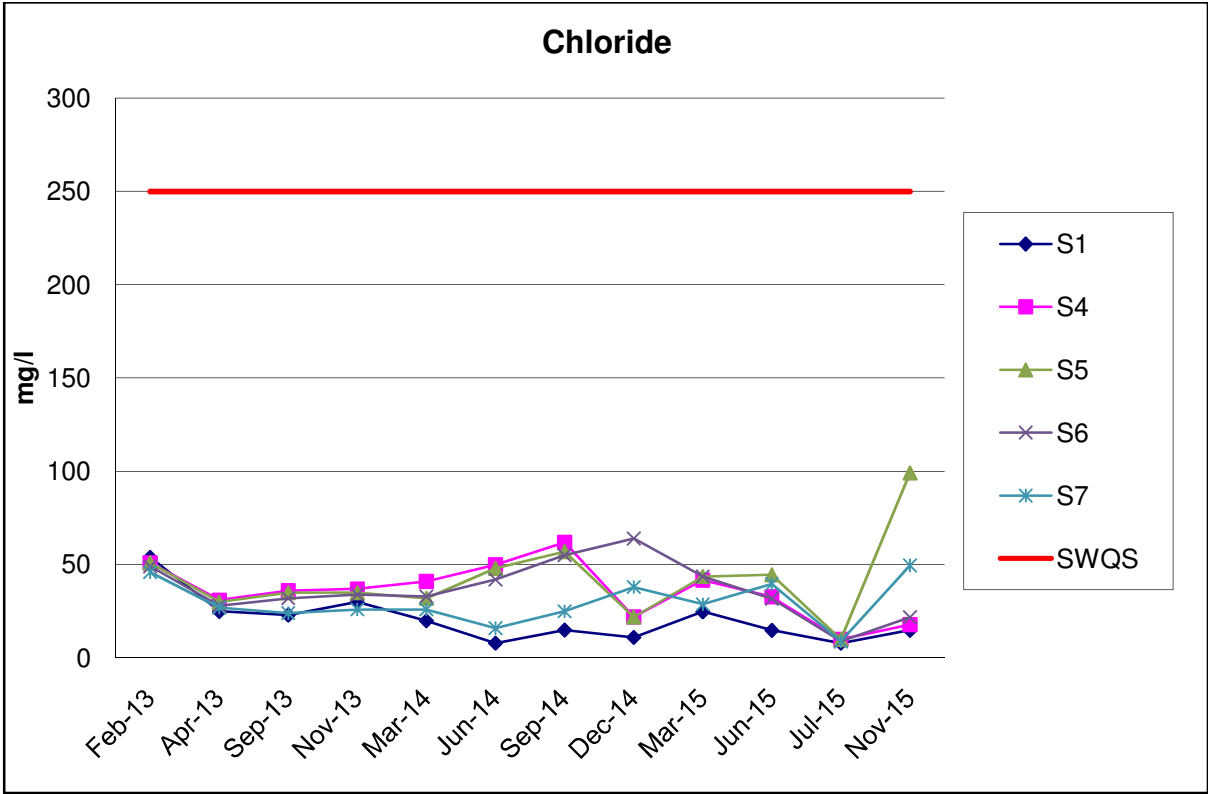




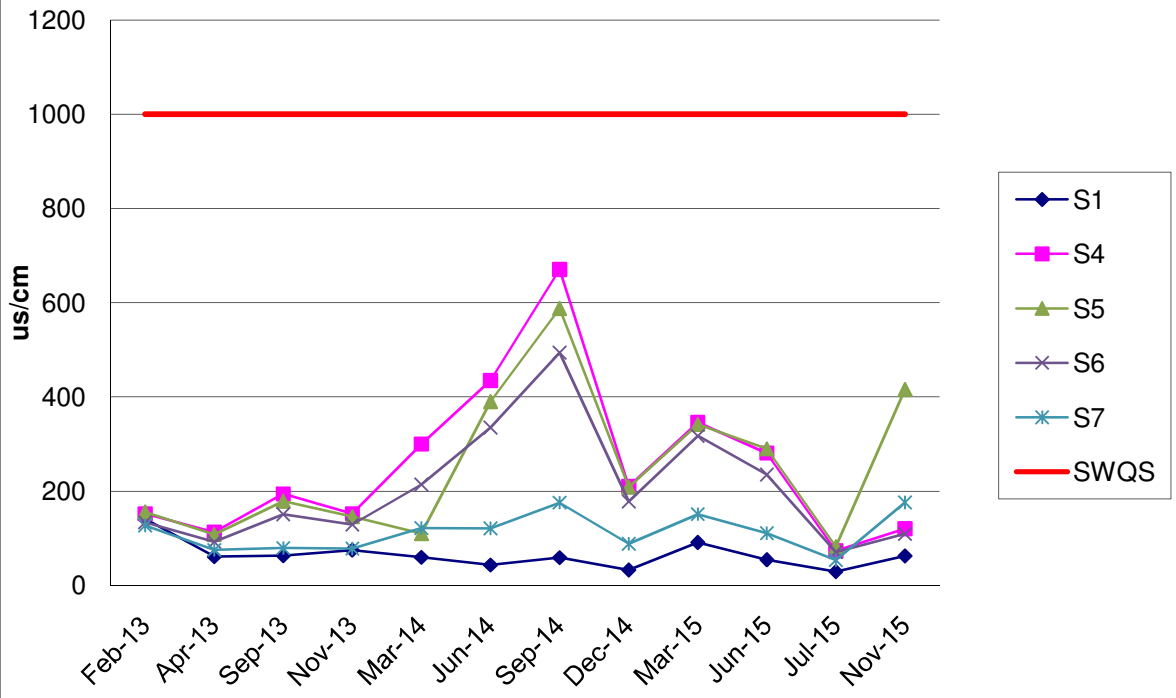
Iron







Electrical Conductivity



Appendix D

Water Balance Calculation and Meteorological Data

BALBANE WATER BALANCE CALCULATION

Year	Status	Rainfall (mm)	Restored area	Temp Restored area RCA(m ²)	Temp Restored area infiltration IRCA(m ³)	Total Water	Leachate produced Lo(m ³)
2015	Closed	1,484	0	29,500	10,943	10,943	10,943
Total							10,943

Assumptions

IRCA=	Temp restored area infiltration of rainfall estimated % (25-30% of annual rainfall, EPA Manual)	30%	%
Temporary restored area	Area of landfill site temporary restored, site closed in Jan 2004	29,500	m ²
Rainfall Data	Data taken from Malin Head. Evaporation losses have not been i	1,484	mm

Total rainfall in millimetres for Malin_head	Year	2015	2014	2013	2012
	Jan	176	162.2	140.9	134.7
	Feb	85.8	189.9	74.1	68.1
	Mar	123.1	71.6	61.7	29.8
	Apr	64.7	33.4	61.6	46.3
	May	137	86.8	102.5	50.7
	Jun	56.1	48.6	85.5	141.1
	Jul	132.7	86	56.5	91.4
	Aug	111	95.3	92.6	87.3
	Sep	29.7	23	69.7	139.2
	Oct	71.9	131.4	103.8	123.5
	Nov	222.9	134.4	116	87.4
	Dec	272.9	150.5	178.6	149.3
	Annual	1483.8	1213.1	1143.5	1148.8

Appendix E

E-PRTR

(AER Electronic Reporting System)



| PRTR# : W0090 | Facility Name : Balbane Landfill Site | Filename : W0090_2015 2.xls |
Return Year : 2015 |

[Guidance to completing the PRTR workbook](#)

PRTR Returns Workbook

Version 1.1.19

REFERENCE YEAR	2015
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1. FACILITY IDENTIFICATION

Parent Company Name	Donegal County Council
Facility Name	Balbane Landfill Site
PRTR Identification Number	W0090
Licence Number	W0090-01

Classes of Activity

No.	class_name
-	Refer to PRTR class activities below

Address 1	Balbane
Address 2	Killybegs
Address 3	
Address 4	
Country	Donegal Ireland
Coordinates of Location	-8.44483 54.6955
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
5(d)	Landfills
5(c)	Installations for the disposal of non-hazardous waste

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# : W0090 | Facility Name : Balbane Landfill Site | Filename : W0090_2015 2.xls | Return Year : 2015 |

07/04/2016 09:38

SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS

POLLUTANT		METHOD			Please enter all quantities in this section in KGs			
No. Annex II	Name	M/C/E	Method Used		Emission Point 1	QUANTITY		
			Method Code	Designation or Description		T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
01	Methane (CH4)	C	OTH	Landgem	0.0	152300.0	0.0	152300.0
03	Carbon dioxide (CO2)	C	OTH	Landgem	0.0	417900.0	0.0	417900.0
02	Carbon monoxide (CO)	C	OTH	Landgem	0.0	74.48	0.0	74.48
07	Non-methane volatile organic compounds (NMVOC)	C	OTH	Landgem	0.0	982.1	0.0	982.1
55	1,1,1-trichloroethane	C	OTH	Landgem	0.0	1.22	0.0	1.22

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

SECTION B : REMAINING PRTR POLLUTANTS

POLLUTANT		METHOD			Please enter all quantities in this section in KGs			
No. Annex II	Name	M/C/E	Method Used		Emission Point 1	QUANTITY		
			Method Code	Designation or Description		T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
56	1,1,2,2-tetrachloroethane	C	OTH	Landgem	0.0	3.51	0.0	3.51
34	1,2-dichloroethane (EDC)	C	OTH	Landgem	0.0	0.77	0.0	0.77
62	Benzene	C	OTH	Landgem	0.0	2.82	0.0	2.82
58	Trichloromethane	C	OTH	Landgem	0.0	0.07	0.0	0.07
35	Dichloromethane (DCM)	C	OTH	Landgem	0.0	22.59	0.0	22.59
65	Ethyl benzene	C	OTH	Landgem	0.0	9.28	0.0	9.28
73	Toluene	C	OTH	Landgem	0.0	68.24	0.0	68.24
60	Vinyl chloride	C	OTH	Landgem	0.0	8.67	0.0	8.67
78	Xylenes	C	OTH	Landgem	0.0	24.2	0.0	24.2
57	Trichloroethylene	C	OTH	Landgem	0.0	6.99	0.0	6.99

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

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

Additional Data Requested from Landfill operators

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

Landfill:	Balbane Landfill Site				
Please enter summary data on the quantities of methane flared and / or utilised	T (Total) kg/Year	M/C/E	Method Used		Facility Total Capacity m3 per hour
	Total estimated methane generation (as per site model)	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