



**ANNUAL ENVIRONMENTAL REPORT**

**By**

**Louth County Council**

**To**

**Environmental Protection Agency**

**For**

**Waste licence Reference (W0033-01)**

**Reporting Period January – December 2017**

**DROGHEDA LANDFILL SITE COUNTY LOUTH**



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# 1 Introduction

This Annual Environmental Report (AER) has been prepared to meet the requirements of Condition 2.8 of Waste Licence W0033-01 for Drogheda Landfill and includes the information listed in Schedule C of the Waste Licence. Drogheda Landfill Site has been in operation since 1983 and has ceased accepting waste for disposal since the waste licence was granted on 30<sup>th</sup> December 1999 as required by the Waste Management (Licensing) Regulations, 1997.

The site is located 600 metres north of the River Boyne on the north-west edge of Drogheda town. The site is adjacent to Leonards Cross at the junction of the R168 road to Collon (and there on to the newly constructed M1) and Cement Road, a minor road linking the Slane Road and the N1 primary road northwards from Drogheda to Dundalk. The site is approximately 32 hectares in extent and was formally a limestone quarry. The site was developed on the benches of the redundant limestone quarry. The site has historically operated on a dilute and disperses principle.

Facility information summary is provided in Table 1.1

**Table 1.1 Facility Information Summary**

<b>AER Reporting Year</b>	2017
<b>Licence Register Number</b>	W0033-01
<b>Name of site</b>	Drogheda Landfill Site
<b>Site Location</b>	Collon Road
<b>NACE Code</b>	3821
<b>Class/Classes of Activity</b>	Landfill HRC

## 1.1 Site Geology

A hydrogeology review was undertaken for the site in 2014. The site geology description below is taken from this report (Drogheda Landfill Hydrogeological Review, BlueRock Environmental Limited, 2014).

### 1.1.1 Regional Bedrock Geology

According to the GSI Bedrock Geology Map of Ireland the site is underlain by limestone bedrock of Lower Carboniferous age and classified as Dinantian Pure Bedded Limestones of the Tullyallen Formation (TF). Geological mapping records these rocks dipping less than 20 degrees to the south-southwest with an approximate east-west strike. The Tullyallen Formation is bounded to the north by Silurian metasediments and volcanics belonging to the Glaspistol Formation (GF) and to the west by Dinantian pure bedded limestones of the Platin Formation (PT). The limestones have been deformed into a syncline that dips towards the River Boyne. The bedrock in the region is tectonically juxtaposed by the Slane Fault which trends in an ENE-WSW direction approximately 650 metres to the north of the northern site boundary. Two cross faults are recorded intersecting the Slane Fault, trending in a NNW – SSE direction – one approximately 700 metres west of the site and the second approximately 1200 metres east of the site. The cross fault to the west throws the Tullyallen Formation against the stratigraphically younger Glaspistol Formation.

### 1.1.2 Site Geology

Depths to bedrock recorded within existing monitoring boreholes at the site range between 0 and 44 bgl. Exposed limestone is evident at the landfill cliff edges surrounding the flooded former quarry void. The bedrock walls show strong vertical jointing and incorporate clay-infilled collapse structures and solution cavities. Logs from two boreholes drilled into the Tullyallen Formation to depths of 54 and 72 m in the same area also report cavities accounting for approximately 10% of the total rock penetration (NERDO, 1981). A previous borehole, drilled in 1998 along the southern boundary of the site (i.e. borehole BH10), recorded a 6m water filled void 27m below the surface. The width and extent of this karst feature is unknown.

Borehole logs from the surrounding area also record well developed karstification. Two trial boreholes drilled in Mell townland through the Tullyallen and Yellowbatter limestone formations (penetrating to 72 and 54.7 metres deep) showed cavities accounting for approximately 10% of the total rock penetration (NERDO, 1981). Both the geological log and the caliper log of the 1979 drilling work at borehole PWSBH01 at Drybridge (to the west of the landfill site) show substantial karstification, including fissure zones at 15 m, 25 m and at 40 mbgl (NERDO, 1981). The three fissures intersected were filled with unconsolidated material. Borehole records from the site investigation for the M1 Northern Motorway recorded cavities/fissures with vertical depths of up to 3 metres (BMA, 1996).

Depths to bedrock were recorded by both boreholes and a Geophysical Survey undertaken by BMA Geoservices in June 2005. Levels recorded ranged between 10 and 30 mOD.

### 1.1.3 Site Overburden

Most of the overburden was removed during the quarrying activities at the site. However, subsoils surrounding the quarried area of the site (*i.e.* along the northern and western site boundaries) comprise till derived from Lower Palaeozoic shale and sandstones (TLPSsS). Closer to Drogheda and along the Boyne Valley, subsoils consist of Irish Sea Till, derived from Irish Sea basin deposits. Depths of overburden at the site range between 0m (in the southern region of the site) and 44 mbgl (borehole BH5A) to the north of the site. The waste material, as mentioned previously was placed on the exposed limestone benches of the former quarry. Thickness of this waste material across the site is currently unclear. The depth of waste at the site is currently unclear. However, the geophysical survey undertaken by BMA Geoservices in June 2005 suggests thickness of waste ranging between 5 and 35 mbgl.

### 1.1.4 Groundwater Vulnerability

Groundwater vulnerability is dictated by the nature and thickness of the material overlying the uppermost groundwater. This means that vulnerability relates to the permeability and thickness of the subsoils. A detailed description of the groundwater vulnerability categories can be found in the Groundwater Protection Schemes document (DELG/EPA/GSI, 1999) and in the draft GSI Guidelines for Assessment and Mapping of Groundwater Vulnerability to Contamination (Fitzsimons et al, 2003).

A draft groundwater vulnerability map for Co. Louth has been developed by the GSI. The vulnerability rating for the site, given the exposed bedrock, is classified as extreme vulnerability.

### 1.1.5 Hydrology

Surface water in this area generally drains from the high ground southwards towards the River Boyne which is located approximately 450 metres south of the site and flows in a west-east direction towards the Irish Sea. A stream, named as Drybridge stream for this report, flows in a north-south direction approximately 450 metres to the west of the site.

### 1.1.6 Regional Hydrogeology

The GSI has classified the underlying bedrock aquifer as a regionally important karstified aquifer (Rkd) dominated by diffuse flow. The site is located within the Drogheda Urban Groundwater Body (GWB), which has been classified as being of “Good” status. The groundwater body descriptions are available from the GSI website: [www.gsi.ie](http://www.gsi.ie) and the



'status' is obtained from the Water Framework Directive website:  
[www.wfdireland.ie/maps.html](http://www.wfdireland.ie/maps.html).

## 1.2 Restoration Works Undertaken

The following restoration works were undertaken at the site during 2005-2007;

- Installation of 55 No. gas extraction wells;
- Installation and commissioning of an active gas extraction flare and methane stripper;
- Installation of capping layers consisting of Gas Drainage Layer, LLDPE capping and Surface Water Drainage Layer (A total area of approximately 101,650m<sup>2</sup>);
- Reinforcement of the capping system using geogric on slopes greater than 1 in 2.5;
- Surface Water Drainage System;
- Construction of a 1.0m high safety bund along cliff edges on the site to improve safety;
- Subsoil and topsoil have been placed above the capping layer to a depth of 850mm and 150mm respectively across the site.

## 1.3 Report Period

The report period for this Annual Environmental Report (AER) is from January to December 2017.

## 2 Waste Activities Carried Out at the Facility

The licensed disposal activities, in accordance with the Third Schedule of the Waste Management Act, 1996, are restricted to those listed as follows;

- 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

Licensed waste recovery activities, in accordance with the Fourth Schedule of the Waste Management Act, 1996, are restricted to those listed as follows;

- Class 2 Recycling or reclamation of organic substances, which are not used as solvents (including composting and other biological transformation processes).
- Class 3 Recycling or reclamation of metals and metal compounds.
- Class 4 Recycling or reclamation of other inorganic materials.
- Class 10 The treatment of waste on land with a consequential benefit for an agricultural activity or ecological system.
- Class 11 Use of waste obtained from any activity referred to in a preceding paragraph of this Schedule.
- Class 13 Storage of waste intended for submission to any activity referred to in a preceding paragraph of this Schedule, other than temporary storage, pending collecting, on the premises where such waste is produced.

### 3 Quantity and Composition of Waste Received and Disposed of During the Reporting Period and Each Previous Year

Table 3.1 shows waste quantities accepted at Drogheda landfill site from 1997-2006. The landfill site is now closed. The site ceased accepting waste for disposal since the waste licence was granted on 30<sup>th</sup> December 1999; however waste were brought on site for restoration and capping following this date.

Table 3.2 provide the quantities of waste accepted for recycling at Drogheda Civic Waste Facility in 2017. 65 tonnes was sent for disposal as results of contamination of the recyclables, waste accepted for disposal and bulky waste.

**Table 3.1 Waste Quantities Accepted (Tonnes) at Landfill Site**

Waste Types	1997	1998	1999	2000	2001
Total	75,350 <sup>1</sup>	86,000 <sup>1</sup>	40,000 <sup>1</sup>	58,506 <sup>1</sup>	27,085 <sup>1</sup>
Waste Types	2002	2003	2004	2005	2006
Total	21,288 <sup>1</sup>	-	8,744	-	58,584 <sup>2</sup>

**Table 3.2 Waste Quantities (Tonnes) at Civic Waste Facility**

Waste Types	2006	2007	2008	2009	2010	2011
Accepted for Recycling	1,405		3,170	3,521	4,020	3,447
To landfill/incinerator					52	
Waste Types	2012	2013	2014	2015	2016	2017
Accepted for Recycling	3,086	2,578	2,622	2,726	2,530	2,521
To landfill/incinerator	390	387	317	166	61	65

<sup>1</sup> 1997 to 2002 figures based on estimates.

<sup>2</sup> Capping material under the Capping and Restoration Contract.

**Table 3.3 Waste Quantities Accepted for Recycling at Drogheda Civic Waste Facility in 2017**

Material Type	EWC Codes	Tonnage	Name of Destination Facility(ies), or Collector(s) if Directly Exported
Mixed residual waste	20 03 01	65.00	Indaver Incinerator W0167-03
Garden (green) waste	20 02 01	906.00	Dundalk Council W0034-02
Cardboard & paper (segregated packaging waste only) e.g. cardboard boxes	15 01 01	298.00	Peute Europe NI6000076
Cardboard & paper (non-packaging waste only) e.g. news & pams	20 01 01	130.00	Peute Europe NI6000076
Glass (segregated packaging waste only) e.g. glass bottles	15 01 07	191.00	Glasson NI LN06/08
Aluminium and steel cans (mixed) (segregated packaging waste)	15 01 04	60.00	Tinnelly N.I LN09/10
Other municipal metals (non-packaging)	20 01 40	281.00	Tinnelly N.I LN09/10
Plastic (segregated packaging waste only) e.g. PET bottles	15 01 02	175.00	Shabra Plastics MN 080022-01
Clothes/textiles for recovery or disposal	20 01 10 & 20 01 011	51.00	Secondhand Clothing
Wood (segregated packaging waste) e.g. pallets, wooden crates	15 01 03	166.00	Dundalk Council W0034-02
Wood (non-packaging waste, municipal)	20 01 38	249.00	Dundalk Council W0034-02
Batteries and accumulators	(enter appropriate LoW code)	14.00	Rilta WO192/03
<b>Total</b>		<b>2586.00</b>	

## 4 Methods Of Deposition Of Waste

### 4.1 Landfill

The site ceased to accept waste for disposal when the waste licence was granted in December 1999. The only materials accepted at the site were inert wastes, which was utilised for capping at the site. Phase 1 capping works were completed in September 2007.

### 4.2 Civic Waste Facility

The Civic Waste Facility is open;

- Monday - Friday 9.30am - 6.00pm
- Saturday 9.00am – 3.00pm

The following are accepted at the Civic Waste Facility;

- cardboard,
- magazines/paper,
- glass (green, brown, clear),
- aluminium cans,
- steel food tins,
- domestic plastics,
- textiles (e.g. clothes) and footwear,
- batteries,
- scrap metal,
- wood,

- electrical and domestic appliances,
- green garden waste,
- miscellaneous.

All waste deposited at the Civic Waste Facility are placed;

- Into a receptacle for recovery, or
- into a designated inspection area.

The storage containers and storage areas are clearly labelled with yellow backgrounds and black/green writing to indicate their content.

There are samples or signage describing the type of waste which can be deposited into each container.

## 5 Summary Report on Emissions

### 5.1 Emissions to Air

There is no continuous air emission monitoring at Drogheda landfill site. Periodic/non-continuous monitoring is carried out on the flare. This is further discussed in Section 6.7.

In accordance with The PRTR Regulations releases of pollutants and off site transfers of waste by facilities operating in relevant industrial sectors are to be reported by the EPA to the European E-PRTR website where the facility exceeds specified thresholds. The PRTR reporting and landfill gas survey have been completed for Drogheda landfill site and submitted to the EPA. The PRTR is including in Appendix A.

There is a 750m<sup>3</sup>/hr landfill gas flare in operation at Drogheda landfill site. Based on model predications and information from the landfill gas flares the estimated net emission of methane from the flare combustion process and both surface and lateral emissions from the landfill body is 147,974 kg/year.

**Table 5.1 Net Methane Emission**

Quantities of Methane Flared and / or Utilised	T (Total) kg/Year
Total estimated methane generation (as per site model)	220,622
Methane flared	72,648
Methane utilised in engine/s	0.0
<b>Net Methane Emission</b>	<b>147,974</b>

### 5.2 Emissions to Groundwater and Surface Water

There are no direct emissions to groundwater. A water balance calculation has been completed for Drogheda landfill site and is presented in Appendix B. The site is unlined and an area of approximately 116,650 m<sup>2</sup> has been capped. An area of approximately 15,000 m<sup>2</sup> remains to be capped. There is no active leachate extraction system on the site. Infiltration in restored areas has been calculated using range of 2-10% of total rainfall. This equates to 4,019 to 10,185 m<sup>3</sup> of leachate produced.

Water discharges from the capped areas of the site via two concrete silt interceptors which discharge the surface water into the quarry lake (SW4 and SW5). This is further discussed in Section 6.4.

### 5.3 Emissions to Waste Water Treatment Works

There is no continuous wastewater (sewer) emissions monitoring at Drogheda landfill site. Periodic/non-continuous monitoring is carried out at discharge point to sewer from Civic Waste Facility (S2). This is further discussed in Section 6.5.

Condensate from the landfill gas extraction system is currently transported off site to Drogheda wastewater treatment plant via tanker. 12 m<sup>3</sup> was sent for disposal.

The estimated volume discharged from Civic Waste Facility (area 13,500 m<sup>2</sup>) is approximately 8,919 m<sup>3</sup> for 2017. This is within the volume limit of the licence.



## 6 Summary of results and interpretations of environmental monitoring

### 6.1 Monitoring Locations

Monitoring is carried out at locations and at frequencies as specified in Schedule F of the waste licence. Permanent access to all monitoring points is maintained.

The results contained in this report were assessed as follows;

- EPA Interim guideline values<sup>3</sup> (IGV);
- SI No 278 of 2007 EC (Drinking water) Regulations (DWR);
- SI No 9 of 2010 European Communities Environmental Objectives (Groundwater) Regulations 2010 as amended Groundwater Threshold Values (GTV);
- 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).

Boreholes BH4A and BH10A were installed in March 2000. Boreholes BH1A, BH2A, BH3A, BH5A, BH6A, BH7, BH8A, BH9A and BH11A were installed in August 2001.

These points were surveyed in October 2001 and grid reference points are given in Table 6.1 below. LG1 to LG7 were installed in October 1998. LG8 to LG10 were installed in February 2012.

Leachate monitoring points L1A to L5A were installed in February 2000. No samples of leachate were collected as these monitoring locations are dry.

All monitoring points are shown in Drawing No. IBR1074/100 Monitoring Locations in Appendix C.

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

**Table 6.1 Grid References of Monitoring Points**

Monitoring Points	Easting	Northing
<b>Groundwater Boreholes</b>		
BH1A	306775	276408
BH2A	306865	276466
BH3A	307057	276060
BH4A	306955	276519
BH5A	307044	276559
BH6A	307183	275915
BH7	307208	276602
BH8A	307248	275888
BH9A	307396	275852
BH10A	307501	275928
BH11A	307368	276157
<b>Surface Water</b>		
SW1	307164	276270
SW2	307414	276470
SW3	307388	275910
SW4	307076	276233
SW5	307244	276187
<b>Gas Piezometers Boreholes</b>		
LG1A <sup>4</sup>	306783	276395
LG2	306831	276333
LG3	306878	276285
LG4	306923	276221
LG5	306961	276174
LG6	307564	276281
LG7	307580	276241
LG8	307029	276152
LG9	306963	276270
LG10	306925	276277
<b>Leachate Boreholes</b>		
L1A	307016	276244
L2A	307027	276332
L3A	307214	276375

<sup>4</sup> LG1 was redrilled in 2016 due to a change in boundary and renamed LG1A

Monitoring Points	Easting	Northing
L4A	307290	276332
L5A	307359	276279
<b>Noise</b>		
N1	306786	276384
N2	306850	276238
N3	307311	275840
<b>Dust</b>		
DG1	306854	276352
DG2	307024	276073
DG3	307539	275993
DG4	307131	275903

## 6.2 Groundwater

As required under the Waste Licence, groundwater monitoring has been undertaken at the borehole locations as set out in Table 3 of the waste licence. Schedule F of the waste licence requires the monitoring of certain parameters on either a quarterly or annual basis as shown in Table 6.2.

**Table 6.2 Groundwater Parameters Monitoring Frequencies**

Monitoring Frequency	BH1A, BH4A, BH6A, BH9A, BH10A, BH11A	BH2A, BH3A, BH5A, BH7A, BH8A
Quarterly	Visual Inspection and Odour, Groundwater Level, Ammoniacal Nitrogen, Chloride, Cadmium, Chromium, Electrical Conductivity, pH, Temperature, Iron, Lead, Manganese, Potassium, Sodium, Barium, Nickel, Nitrate, Nitrite, Phenol, Zinc, Dissolved Oxygen, Total Suspended Solids, TON, TOC, Zinc	Visual Inspection and Odour, Groundwater Level, Ammoniacal Nitrogen, Electrical Conductivity, pH, Temperature, Chloride, Dissolved Oxygen, Cadmium, Chromium, Iron, Lead, Manganese, Potassium, Sodium, TON, TOC, Barium, Nickel, Nitrate, Nitrite, Phenol
Annually	Boron, Calcium, Copper, Cyanide, Fluoride, Magnesium, Mercury, Sulphate, Total Alkalinity, Total Phosphorous, Residues on Evaporation, Faecal Coliforms, Total Coliforms, List I & II substances	Boron, Calcium, Copper, Cyanide, Fluoride, Magnesium, Mercury, Sulphate, Total Alkalinity, Total Phosphorous, Residues on Evaporation, Zinc, Faecal Coliforms, Total Coliforms

These results are presented graphically and in table format in Appendix D.

Parameters that are indicative of possible leachate contamination include Ammoniacal-N, Conductivity, Iron, Chloride and heavy metals.

Boreholes BH1A BH2A, BH4A and BH7A provide an indication of the upgradient baseline groundwater characteristics whilst BH3A, BH6A, BH8A, BH9A, BH10A and BH11A considered as intermediate and downgradient locations.

BH6A, BH8A and BH9A typify the downgradient location for flow from the site. In addition, BH11A provides information on the nature of the groundwater deep beneath the landfill site and BH10A provides downgradient information in a borehole, which was penetrated through a karst and hence is potentially an area of relatively high groundwater flows emanating from the site. BH5A is no longer considered an upgradient borehole as it appears to be influenced by leachate emission from the adjacent waste.

Table 6.3 provides a summary of results in 2017 from groundwater monitoring boreholes throughout the monitoring period.

**Table 6.3 Summary of 2017 Results from Groundwater Monitoring Boreholes**

Parameter	Units	No. of Samples	Minimum	Maximum	Minimum <sup>5</sup>	Maximum <sup>5</sup>
Alkalinity	mg/l CaCO <sub>3</sub>	11	128	404		
Aluminium	ug/l	11	7	<b>1193</b>		
Ammonia	mg/l N	44	<0.02	<b>0.27</b>		
Barium	ug/l	44	9.72	<b>154</b>	0.014	0.081
Boron	µg/l	11	37	137		
Cadmium	µg/l	44	<1	<1	<0.0006	0.0007
Calcium	mg/l Ca	11	27.6	127.5		
Chloride	mg/l Cl	44	12.8	<b>51.8</b>		
Chromium	µg/l	44	<3	<b>60.04</b>	<0.002	0.006
Conductivity	µS/cm @ 25	44	284	910		
Copper	µg/l	11	<1	17		
Cyanide	µg/l	11	<5	<5		
D.O.	% Saturation	44	46	91		
Fluoride	mg/l	11	0.03	0.6		
Iron	µg/l	44	7.358	<b>1623</b>	<0.23	<b>3.63</b>
Lead	µg/l	44	<1	4	<0.006	<0.006

<sup>5</sup> Barium, cadmium, chromium, iron, lead, manganese, nickel and zinc were measured in mg/l instead of ug/l in March 2017. Phenol was measured in ug/l instead of mg/l in December 2017.

Parameter	Units	No. of Samples	Minimum	Maximum	Minimum <sup>5</sup>	Maximum <sup>5</sup>
Magnesium	mg/l Mg	11	1.7	20.5		
Manganese	µg/l	44	<1	<b>1856</b>	<0.007	<b>0.545</b>
Mercury	µg/l	11	<0.04	<0.04		
Nickel	µg/l	44	<1	<b>37</b>	<0.003	0.009
Nitrate	mg/l N	44	<0.11	8.13		
Nitrite	mg/l N	44	<0.007	0.039		
o-Phosphate	mg/l P	11	<0.01	<b>0.1</b>		
pH	0	44	6.93	8.5		
Phenol	µg/l	22	<0.1	1.12	<0.10	<0.10
Potassium	mg/l	44	0.69	<b>84.1</b>		
Sodium	mg/l	44	7.89	30.86		
Strontium	µg/l	11	72	234		
Sulphate	mg/l SO4	11	7	85		
Suspended Solids	mg/l	11	228	536		
Temp	°C	44	11	13.2		
T.O.C.	mg/l	22	<1	5.61		
T.O.N	mg/l N	22	<0.29	6.4		
Uranium	µg/l	11	<1	4		
Vanadium	µg/l	11	<1	8		
Zinc	µg/l	44	3	44.85	<0.018	<0.018

### 6.2.1 Upgradient

The pH levels for all upgradient boreholes were within the IGV range of  $\geq 6.5$  and  $\leq 9.5$ .

Upgradient ammonia as N concentrations were below the GTV (0.175 mg/l N), IGV (0.15 mg/l) and DWR (0.30 mg/l) throughout the year. Concentrations upgradient ranged from <0.002 to 0.08 mg/l.

Electrical Conductivity levels in all upgradient boreholes were below the IGV (1,000 µS/cm) and DWR (2,500 µS/cm) ranging from 485 to 910 µS/cm.

Chloride levels exceeded the IGV of 30 mg/l in BH4A and BH7 at times during the monitoring period. Concentrations in all upgradient boreholes were below the GTV (187.5 mg/l Cl) and DWR (250 mg/l). The highest chloride level was recorded in BH4A in December (38.3 mg/l).

Potassium concentrations were below the IGV (5 mg/l) in all upgradient boreholes except BH1 in December (5.3 mg/l) and BH7A throughout the monitoring period. The highest concentration of 84.1 mg/l was detected in BH7A in December.

Ortho-Phosphate exceeded the IGV (0.03 mg/l) at BH2A in December (0.034 mg/l). An ortho-phosphate concentration equal to the IGV was recorded in BH7A in December.

The following parameters exceeded the relative GTV, IGV and DWR in upgradient boreholes:

- Aluminium concentration equal to the GTV (150 ug/l) in BH4A in December;
- Chromium concentrations exceeded the GTV (0.03 mg/l) in BH2A in June and September;
- Iron concentrations exceeded the GTV (0.2 mg/l) in BH2A in March, June and September and in BH4A throughout the monitoring period;
- Manganese concentrations exceeded the GTV (0.05 mg/l) in BH2A in June and September and in BH4A throughout the monitoring period;
- Nickel concentrations exceeds the GTV (15 ug/l) in BH2A in June and September; and
- Phenol index concentration exceeded the IGV (0.5 ug/l) in BH4A in March.

All upgradient boreholes showed no abnormal change in TOC and TON concentrations. The highest TOC concentration was in BH2A (5.4 mg/l) and TON in BH4A (3.91 mg/l).

Barium, Boron, Cadmium, Calcium, Copper, Cyanide, Fluoride, Lead, Magnesium, Mercury, Nitrate, Nitrite, Sodium, Sulphate, Total Suspended Solids and Zinc concentrations were below the relative GTV, DWR and IGV.

Concentrations above the limit of detection were measured for the following parameters;

- Alkalinity concentrations ranged from 128 to 404 mg/l;
- Strontium concentrations ranged from 72 to 234 ug/l;
- Uranium<sup>6</sup> concentrations ranged from <1 to 4 ug/l; and
- Vanadium concentrations ranged from <1 to 8 ug/l.

<sup>6</sup> World Health Organisation (2011) Guidelines for Drinking-water Quality, Fourth Edition. Table A3.3 Guideline values for chemicals that are of health significance in drinking-water. Uranium 30 µg/l.

All other parameters were below the limit of detection.

### 6.2.2 Downgradient

The pH levels for all boreholes remain between the IGV and DWR of 6.5 to 9.5 pH units throughout the monitoring period.

Ammonia as N concentrations downgradient were below the GTV (0.175 mg/l N), IGV (0.15 mg/l) and the DWR (0.3 mg/l) except BH10 which exceeded the IGV in June (0.156 mg/l). Concentrations ranged from <0.02 to 0.156 mg/l.

All downgradient boreholes recorded Electrical Conductivity levels were below the IGV of 1,000  $\mu\text{S}/\text{cm}$  and DWR of 2,500  $\mu\text{S}/\text{cm}$ .

Chloride concentrations exceeded the IGV of 30 mg/l at times in all downgradient boreholes except BH3 and BH11. Concentrations were below the GTV (187.5 mg/l Cl) and DWR (250 mg/l). The highest chloride level was recorded in BH10A in June (51.8 mg/l).

Elevated concentrations of potassium above the IGV (5 mg/l) were consistently recorded mid gradient in BH3A and BH11A. BH10A concentrations of potassium slightly exceeded the IGV throughout the monitoring period except in September. Potassium concentrations were highest in BH11A in June (11.29 mg/l).

The following parameters exceeded the relative GTV, IGV and DWR in downgradient boreholes:

- Aluminium exceeded the GTV (150  $\mu\text{g}/\text{l}$ ) in BH11A and the IGV (0.2 mg/l) in BH10A in December;
- Barium concentration exceeded the IGV (0.1 mg/l) in BH10A in December;
- Chromium concentrations exceeded the IGV (0.03 mg/l) and GTV (37.5  $\mu\text{g}/\text{l}$ ) in BH11A in December;
- Iron concentrations exceeded the IGV (0.2 mg/l) and DWR (200  $\mu\text{g}/\text{l}$ ) in BH3A in March, BH10A in March and December and BH11A in December;

- Manganese concentrations exceeded the IGTV (0.05 mg/l) and DWR (50 ug/l) in BH3A and BH9A in March, BH11A in December and BH10A throughout the monitoring period. The highest concentration was recorded in BH10A in September (1,856 ug/l);
- Nickel concentrations exceeded the GTV (15 ug/l), IGTV (0.02 mg/l) and DWR (20 ug/l) in BH10A and BH11A in December. The highest concentration was recorded in BH11A (37 ug/l);
- Orthophosphate concentration exceeded the IGTV (0.03 mg/l) in BH3A (0.1 mg/l) in December; and
- Phenol index exceeded the IGTV (0.5 ug/l) in BH9A (0.18 mg/l) and BH10A (0.18 mg/l) in March.

Downgradient boreholes showed no abnormal change in TOC and TON concentrations. The highest TOC concentration was in BH10A (5.61 mg/l) and TON in BH3A (3.39 mg/l).

Boron, Calcium, Cadmium, Copper, Cyanide, Dissolved Oxygen, Fluoride, Lead, Magnesium, Mercury, Nitrate, Nitrite, Sodium Sulphate, Temperature, Total Suspended Solids and Zinc concentrations were below the relative GTV, DWR and IGTV.

Concentrations above the limit of detection were measured for the following parameters;

- Alkalinity ranged from 158 to 286 mg/l;
- Strontium 72 to 139 ug/l;
- Vanadium <1 to 4 ug/l.

All other parameters were below the limit of detection.

### **6.2.3 Borehole BH5A**

BH5A is no longer considered an upgradient borehole as it appears to be influenced by leachate emission from the adjacent waste.

The pH levels remain between the IGTV and DWR of 6.5 and 9.5.



Ammonia as N concentrations were below the GTV for ammonium (0.175 mg/l N) and IGTV (0.15 mg/l N) in BH5A except in December (0.27 mg/l). Concentrations ranged from <0.1 to 0.27 mg/l.

Electrical conductivity levels were below the IGTV of 1,000 µS/cm and DWR of 2,500 µS/cm.

Chloride concentrations were above the IGTV (30 mg/l) in 3 of the 4 monitoring dates but were within the GTV range (24-187.5 mg/l). Concentrations ranged from 24.7 to 36.4 mg/l.

Iron concentrations were below the IGTV (0.2 mg/l) and DWR (200 µg/l) in BH5A ranging from <0.23 mg/l to 27 µg/l.

BH5A recorded the highest TON concentration (6.4 mg/l) during the monitoring period.

A slightly elevated ortho-phosphate concentration above the IGTV (0.03 mg/l) was recorded in BH5A in December (0.04 mg/l).

Aluminium, Barium, Boron, Calcium, Cadmium, Chromium, Copper, Cyanide, Dissolved Oxygen, Fluoride, Lead, Magnesium, Manganese, Mercury, Nickel, Nitrate, Nitrite, Phenol, Potassium, Sulphate, Sodium Temperature, TOC and Zinc concentrations were below the relative GTV, DWR and IGTV.

Concentrations above the limit of detection were measured for the following parameters;

- Alkalinity concentration of 256 mg/l;
- Strontium concentration of 107 µg/l;
- Uranium<sup>7</sup> concentration of 1 µg/l; and
- Vanadium concentration of 1 µg/l.

All other parameters were below the limit of detection.

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<sup>7</sup> World Health Organisation (2011) Guidelines for Drinking-water Quality, Fourth Edition. Table A3.3 Guideline values for chemicals that are of health significance in drinking-water. Uranium 30 µg/l.

### 6.3 Hydrogeological Review

A hydrogeological review was undertaken for the site in 2014 and a conceptual site model has been developed for the site. The report found that water quality results from all monitoring boreholes suggest that monitoring boreholes BH4A and BH5A have been impacted from leachate generated from the waste body. The elevated concentrations of ammonia within BH5A and manganese and iron within BH4A have regularly been recorded above typical background concentrations for the general region in addition to the IGV and GTV. The remaining monitoring boreholes and flooded former quarry void do not indicate significant impact from the waste body and the risks posed to groundwater wells to the south or downgradient of the site is considered to be low.

### 6.4 Surface Water

SW1 and SW3 are samples from the lake on site. Water within the former quarry void is considered to be groundwater and will be assessed against the DWR, IGV and GWR 2010. Monitoring point SW2 is located in the cement works pond, which is adjacent and upstream of the site. SW4 and SW5 monitor the surface water arising from the capped area.

Schedule F of the waste licence requires the monitoring of certain parameters on either a quarterly or annual basis; the frequency of the monitoring of surface water parameters are shown in Table 6.4. Surface water results are presented in Appendix E.

**Table 6.4 Surface Water Monitoring Frequency**

Monitoring Frequency	Parameter
Quarterly	Ammoniacal Nitrogen, BOD, COD, Chloride, Dissolved Oxygen, Electrical Conductivity, pH, Total Suspended Solids, Temperature, Cadmium, Chromium, Iron, Lead, Potassium, Total Phosphorous, Barium, Nickel, Nitrate, Nitrite, and Phenol
Annually	Calcium, Copper, Magnesium, Manganese, Mercury, Sulphate, Sodium, Total Alkalinity, TON and Zinc

#### 6.4.1 Quarry Lake

Table 6.5 provides a summary of results in 2017 from quarry lake surface water locations throughout the monitoring period.

**Table 6.5 Summary of 2017 Surface Water Results from the Quarry Lake**

Parameter	Units	No. of Samples	Minimum	Maximum	Minimum <sup>8</sup>	Maximum <sup>8</sup>
Alkalinity	mg/l	3	121	147		
Aluminium	ug/l	3	<3	37		
Ammonia	mg/l N	12	<0.1	0.07		
Barium	ug/l	12	21.56	49	0.039	0.049
B.O.D.	mg/l O2	12	<2	3		
Boron	µg/l	3	135	210		
Cadmium	µg/l	12	<1	<1	< 0.0006	< 0.0006
Calcium	mg/l Ca	3	2	33		
C.O.D.	mg/l O2	12	5	19		
Chloride	mg/l Cl	6	<b>46</b>	<b>52.6</b>		
Chromium	µg/l	12	<1	<1	< 0.002	< 0.002
Conductivity	µS/cm @	12	289	520		
Copper	µg/l	3	<1	1		
D.O.	%	12	90	95		
Iron	µg/l	12	10.59	47	< 0.23	< 0.23
Lead	µg/l	12	<1	1	<0.006	<0.006
Magnesium	mg/l Mg	3	<1	8		
Manganese	µg/l	3	12	21		
Nickel	µg/l	12	<1	3.467	0.004	0.005
Nitrate	mg/l N	12	<0.11	0.66		
Nitrite	mg/l N	12	<0.006	<0.05		
o-Phosphate	mg/l P	12	<0.01	<b>0.09</b>		
pH		12	6.8	<b>9.6</b>		
Phenol	mg/l	6	<0.10	<b>0.1</b>	<0.10	<0.10
Potassium	mg/l	12	<1	<b>18.9</b>		
Sodium	mg/l	3	1.5	31.6		
Strontium	µg/l	3	75	180		
Suspended Solids	mg/l	12	3	28		
Temperature	°C	12	10.5	11.2		
T.O.N.	mg/l	3	<0.08	<0.08		
Uranium	µg/l	3	<1	<1		
Vanadium	µg/l	3	<1	1		
Zinc	µg/l	3	15	<b>127</b>		

Ammonia, Barium, BOD, COD, Cadmium, Calcium, Chromium, Chloride, Copper, Dissolved Oxygen, Electrical Conductivity, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Nitrate, Nitrite, Orthophosphate, Potassium, Phenol, pH, Sulphate, Total Suspended Solids,

<sup>8</sup> Barium, cadmium, chromium, iron, lead and nickel were measured in mg/l instead of ug/l in March 2017. Phenol was measured in ug/l instead of mg/l in December 2017.

Sodium, TON, Total Alkalinity and Zinc concentrations at SW1, SW2 and SW3 were below the GTV, IGV and DWR.

Chloride concentrations exceeded the IGV of 30 mg/l at all locations but were within the GTV range of 24-187.5 mg/l Cl. Concentrations in the quarry lake ranged from 46 to 52.6 mg/l.

Potassium exceeded the IGV of 5 mg/l at all locations ranging from <1 to 18.9 mg/l. Ortho-phosphate exceeded the IGV of 0.03 mg/l at SW1 in March (0.09 mg/l).

pH levels were within the IGV range of  $\geq 6.5$  to  $\leq 9.5$  throughout the monitoring period except SW3 in June which exceeded the upper limit with a concentration of 9.6.

Phenol exceeded the IGV (0.5 ug/l) at SW3 in March when a value of 0.1 mg/l was recorded.

An elevated Zinc concentration above the IGV of 0.1 mg/l was recorded at SW2 in December (127 ug/l).

Dissolved Oxygen levels recorded onsite during sampling ranged from 90 to 95% throughout the monitoring period.

Concentrations above the limit of detection were measured for the following parameters:

- Alkalinity concentrations ranged from 121 to 147 mg/l;
- Strontium concentrations ranged from 75 to 180 ug/l;
- Vanadium concentrations ranged from <1 to 1 ug/l.

The concentrations of hydrocarbons analysed in SW1 in December were lower than the limit of detection for the methodology used.

All other parameters were below the GTV, IGV and DWR for those comparable or below the limit of detection.

#### **6.4.2 Capped Area**

SW4 and SW5 monitor the surface water arising from the capped area. Table 6.6 provides a summary of results in 2017 from surface water locations SW4 and SW5 throughout the monitoring period.

**Table 6.6 Summary of 2017 Surface Water Results from Capped Area**

Parameter	Units	No. of Samples	Minimum	Maximum	Minimum <sup>9</sup>	Maximum <sup>9</sup>
Alkalinity	mg/l	2	416	515		
Aluminium	ug/l	2	8	21		
Ammonia	mg/l N	8	<0.1	0.04		
Barium	ug/l	8	31.25	78.64	0.043	0.047
B.O.D.	mg/l O2	8	<2	1.5		
Boron	µg/l	2	<6	9		
Cadmium	µg/l	8	<1	<1	<0.0006	<0.0006
Calcium	mg/l Ca	2	13	22		
C.O.D.	mg/l O2	8	7	15		
Chloride	mg/l Cl	4	8.8	24		
Chromium	µg/l	8	<1	<1	<0.002	<0.002
Conductivity	µS/cm @	8	324	923		
Copper	µg/l	2	<1	5		
D.O.	%	8	90	93		
Iron	µg/l	8	7.56	63	<0.23	<0.23
Lead	µg/l	8	<	<1	<0.006	<0.006
Magnesium	mg/l Mg	2	1	1		
Manganese	µg/l	2	7	<b>629</b>		
Nickel	µg/l	8	<1	4	0.005	0.005
Nitrate	mg/l N	8	0.22	5.17		
Nitrite	mg/l N	8	<0.006	<0.05		
o-Phosphate	mg/l P	8	<0.07	0.03		
pH		8	7.3	8.2		
Phenol	mg/l	4	<0.1	<0.1	<0.1	<0.1
Potassium	mg/l	8	<1	4.76		
Sodium	mg/l	2	0.7	1		
Strontium	µg/l	2	312	334		
Suspended Solids	mg/l	8	<2	6		
Temperature	°C	8	10.7	11.2		
T.O.N.	mg/l	2	0.79	1.28		
Uranium	µg/l	2	2	2		
Vanadium	µg/l	2	1	1		
Zinc	µg/l	2	10	57		

The majority of the parameters were below the lower level of detection for the methodology used for analysis or were below the SI No 294 of 1989 European Communities (Quality of Surface Water Intended for the Abstraction of Drinking Water) Regulations 1989 Surface Water Quality Standards (SWQS), SI No 272 of 2009 European Communities Environmental Objectives (Surface Water) Regulations 2009 Environmental quality standard (EQS) and the

<sup>9</sup> Barium, cadmium, chromium, iron, lead and nickel were measured in mg/l instead of ug/l in March 2017. Phenol was measured in ug/l instead of mg/l in December 2017.

SI No 278 of 2007 European communities (Drinking Water) (No. 2) Regulations 2007 parametric value (DWR) where comparable.

Ammonia, Barium, BOD, COD, Cadmium, Calcium, Chromium, Chloride, Copper, Dissolved Oxygen, Electrical Conductivity, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Nitrate, Nitrite, Orthophosphate, Potassium, Phenol, pH, Sulphate, Total Suspended Solids, Sodium, TON, Total Alkalinity and Zinc were below the EQS, SWQS and DWR.

An elevated manganese concentration exceeded the A1 SWQS of 0.05 mg/l in SW4 in December (629 ug/l). Concentrations in the capped area ranged from 7 to 629 ug/l.

Dissolved Oxygen levels recorded onsite during sampling ranged from 90 to 93 % throughout the monitoring period.

Concentrations above the limit of detection were measured for the following parameters:

- Alkalinity concentrations ranged from 416 to 515 mg/l;
- Strontium concentrations ranged from 312 to 334 ug/l;
- Uranium<sup>10</sup> concentrations were 2 ug/l at all locations; and
- Vanadium concentrations were 1 ug/l at all locations.

All other parameters were below the SWQS, EQS and DWR for those comparable or below the limit of detection.

## 6.5 Discharge to Sewer

There are two discharge points to sewer, treated condensate from the methane stripper (S1) and the discharge point to sewer from Civic Waste Facility (S2).

Monitoring at S2 during the year showed no exceedances in the emission limits to sewer as shown in Table 6.7. The estimated volume discharged from Civic Waste Facility (area 13,500 m<sup>2</sup>) was approximately 8,919 m<sup>3</sup> for 2017. This is within the limit of the licence.

S1 was not sampled during the monitoring period as the tank was empty on sampling dates.

<sup>10</sup> World Health Organisation (2011) Guidelines for Drinking-water Quality, Fourth Edition. Table A3.3 Guideline values for chemicals that are of health significance in drinking-water. Uranium 30 µg/l.

Condensate from the methane stripper is tankered from site following agreement with EPA and Waste Water Treatment Plant Operator. There were no emissions to sewer from S1.

**Table 6.7 Emission Limit Values for Emissions to Sewer Civic Waste Facility (S2)**

Parameter Emission Limit Value	Grab Sample mg/l ELV	Mar	June	Sept	Dec
BOD	335	2.3	<2	<2	<2
COD	450	< 25	49	41	52
Ammoniacal Nitrogen NH4-N	35	18	0.423	0.459	0.1
Suspended Solids	294	32	76	7.2	91
Sulphates (as SO <sub>4</sub> )	240	23	-	-	82.02
pH	6 – 9	7.23	7.3	7.1	7.1
Temperature	32°C	-	-	-	-

## 6.6 Perimeter Gas Monitoring

The licence trigger levels for the following landfill gases are greater than or equal to 1.0% v/v Methane (CH<sub>4</sub>) and greater than or equal to 1.5% v/v Carbon Dioxide (CO<sub>2</sub>). Landfill gas monitoring results have been provided for the period and are shown in Appendix F.

From the results it can be seen that CH<sub>4</sub> was not detected around the perimeter of the site (LG1 – LG9) except in LG3 in January, June, September and October. Readings ranged from 0.0 to 0.2% v/v which is below the trigger level of 1.0% v/v.

CO<sub>2</sub> ranged from 0.0 to 1.4% v/v around the perimeter of the site (LG1 - LG9) which is below the trigger level of 1.5% v/v.

CH<sub>4</sub> was not detected in the groundwater boreholes (BH1A to BH11A). CO<sub>2</sub> ranged from 0.0 to 1.3 % v/v which is below the trigger level of 1.5% v/v.

## 6.7 Flue Gas Monitoring

Flue gas monitoring was also undertaken on the 24/10/2017 on the permanent landfill gas flare. All monitoring was carried out in accordance with Environmental Protection Agency

Office of Environmental Enforcement (OEE) Air Emission Monitoring Guidance Note 2 (AG2). This report has been submitted to the EPA.

CO and NO<sub>x</sub> as NO<sub>2</sub> results were compliant with the typical emission limit values used for such installations in Ireland (CO 50 mg/m<sup>3</sup>, 150 NO<sub>x</sub> mg/m<sup>3</sup>).

## 6.8 Dust Monitoring

Dust monitoring was carried out on three occasions during this monitoring period. Table 6.8 details the results of the dust monitors installed on site. The waste licence requires dust deposition limits to be no more than 350 mg/m<sup>2</sup>/day. From Table 6.8 can be seen that all dust deposition levels in all periods are below the limit.

**Table 6.8 Results from Dust Monitoring Analysis, Drogheda Landfill Site (mg/m<sup>2</sup>/day)**

Sampling Location	Dust Monitor 1	Dust Monitor 2	Dust Monitor 3	Dust Monitor 4
July	188.72	315.06	283.09	157.79
August	189.77	150.45	58.71	35.12
November	79.68	28.83	34.08	44.56

## 6.9 Noise

Noise monitoring was not undertaken during this monitoring period.

## 6.10 Ecology

An assessment of the ecology of the Quarry Lake and adjoining habitats was undertaken on 19<sup>th</sup> September 2017. This has been submitted to the EPA. The macroinvertebrate data indicate moderately productive conditions at all three sites assessed, with no significant change in the trophic status of the two quarry lakes since 2016.



## 7 Development Works

### 7.1 Report on Development Works Undertaken During the Reporting Period, and Those Proposed During the Coming Year

Approximately 15,000m<sup>2</sup> of capping (Phase 2) in the former CRH lands to the north of the site was completed in December 2016. The slope slippage was also repaired in 2016.

Objectives for 2018 are:

- To complete the capping of the site. An area of approximately 15,000 m<sup>2</sup> remains to be capped. Consultation with a landowner is ongoing. An area remains to be purchased outside the existing boundary;
- To remove the areas of the site from the Waste Licence which do not contain waste i.e southern area and lake and small parcel to the north.

### 7.2 Report on Restoration

Phase 1 of the Restoration Capping Works for Drogheda Landfill Site has been completed satisfactorily in accordance with the contract specification, the licence conditions and EPA correspondence Ref. W0033-01/AK17EM. The CQA report has been completed and is available on site for inspection. Approximately 15,000m<sup>2</sup> of capping (Phase 2) was completed in December 2016.

## 8 Volume of Leachate Produced and Volume of Leachate Transported / Discharged Off-Site

The site was permanently capped during 2007 except for an area along the boundary of the site. Approximately 15,000m<sup>2</sup> of capping in the former CRH lands to the north of the site was completed in December 2016. No leachate is collected from the facility.

Condensate from the landfill gas extraction system is currently transported off site to Drogheda wastewater treatment plant. An estimated 12 m<sup>3</sup> was sent for disposal.

### 8.1 Monthly Water Balance Calculation and Interpretation

A water balance calculation for 2017 is presented in Appendix B using rainfall data from metrological station at Dublin Airport. Infiltration in restored areas would be in the range of 2-10% in the worst case scenario for a geosynthetic clay liner cap. This estimates the leachate production for 2017 will be in the range of 4,019 to 10,185 m<sup>3</sup>.

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

A topographical survey was undertaken at the site in 2007 following the completion of Phase 1 restoration. This survey was submitted to the EPA in December 2007. Topographical surveys undertaken since restoration works are:

- A complete topographical survey was undertaken in 2015 as part of the slope remediation work;
- A partial topographical survey was undertaken in January 2017 by Gibson Bros Ltd as part of capping of CRH Lands; and
- A partial topographical survey was undertaken in January 2018 for the slope stability report.

## 10 Estimated Annual Quantity of Landfill Gas Emitted from the Site

A 750m<sup>3</sup>/hr flare has been installed at the facility. Field balancing is undertaken at the facility as required. The average flow rate from the flare in 2017 was 180 m<sup>3</sup>/hr. The average methane concentration was 36% v/v. The total hours run was 1,704.

The landfill gas extraction system shut down periodically during 2017 due to low methane levels. Once landfill gas flow and concentration are sufficient the flare was restarted.

## 11 Estimated Annual Quantity of Indirect Emissions to Groundwater

The site was formally a limestone quarry and the landfill was developed on the benches of the redundant limestone quarry. The site has historically operated on a dilute and disperse principle.

The GSI has classified the underlying bedrock aquifer as a regionally important karstified aquifer (Rkd) dominated by diffuse flow. The site is located within the Drogheda Urban Groundwater Body (GWB) which has been classified as being of "Good" status. The vulnerability rating for the site, given the exposed bedrock, is classified as extreme vulnerability.

The site was permanently capped during 2007 except for an area along the boundary of the site (approximately 30,000m<sup>2</sup>). No leachate is collected from the facility. Condensate from the landfill gas extraction system is currently transported off site to Drogheda wastewater treatment plant. An estimated 12 m<sup>3</sup> was sent for disposal

There are no direct discharges to groundwater. A water balance calculation has been undertaken and is included in Appendix B using rainfall data from meteorological station at Dublin Airport. This estimates the leachate production for 2017 will be in the range of 4,019 to 10,185 m<sup>3</sup>.

## 12 Environmental Objectives and Targets

### 12.1 Schedule of Environmental Objectives and Targets for the Forthcoming Year

Objectives and targets to be undertaken in 2018 for Drogheda Landfill Site are as follows:

- To complete the capping of the site. An area of approximately 15,000 m<sup>2</sup> remains to be capped. Consultation with a landowner is ongoing. An area remains to be purchased outside the existing boundary;

To remove the areas of the site from the Waste Licence which do not contain waste i.e. southern area and lake and small parcel to the north.

## 13 Full Title and a Written Summary of Any Procedures Developed by the Licensee in the Year which Relates to the Facility Operation

The Environmental Management System (EMS) for the facility was updated in 2007 to take into consideration works undertaken at the site. This has been forwarded to the OEE under a separate cover.

A Fire Prevention Plan for the facility was reviewed and updated on 15<sup>th</sup> November 2017. An Emergency Response Procedure/Fire Response Plan for the facility was reviewed and updated on 10<sup>th</sup> January 2018.

## 14 Tank, Pipeline and Bund Testing and Inspection Report

There are no tanks or bunds on site. The landfill gas extraction system including condensate tank is serviced annually.

## 15 Reported Incidents and Complaints Summaries

No complaints or incidents were reported to the EPA during the monitoring period.

A compliance investigation is currently ongoing with the EPA due to the historic waste placed outside the site boundary.

A site visit was undertaken by the EPA on the 11/01/2017 (SV11087). The following comment / corrective actions were noted:

- The licensee shall put in place a Fire Prevention Plan for the facility, without delay.
- The licensee shall ensure that the ERP document is dated and a document review number/version number provided. The licensee shall review the document to address an underground fire scenario occurring at the facility, without delay.
- The licensee shall prioritise the investigation into the use of alternative flare systems. The licensee shall provide the Agency with an update on its investigations into alternative arrangements, within 2 months of issue of this report. The licensee shall ensure that any proposals are submitted to the Agency for approval prior to any trial runs or installation of new systems.
- The licensee shall complete the capping works and implement the technical assessment recommendations as outlined in the Drogheda Landfill Hydrogeological Risk Assessment (27/01/15) report, without delay.
- The licensee shall ensure a weight unit of measurement is recorded for all wastes leaving the facility.
- The licensee shall ensure works to secure the facility boundaries are progressed, without delay.

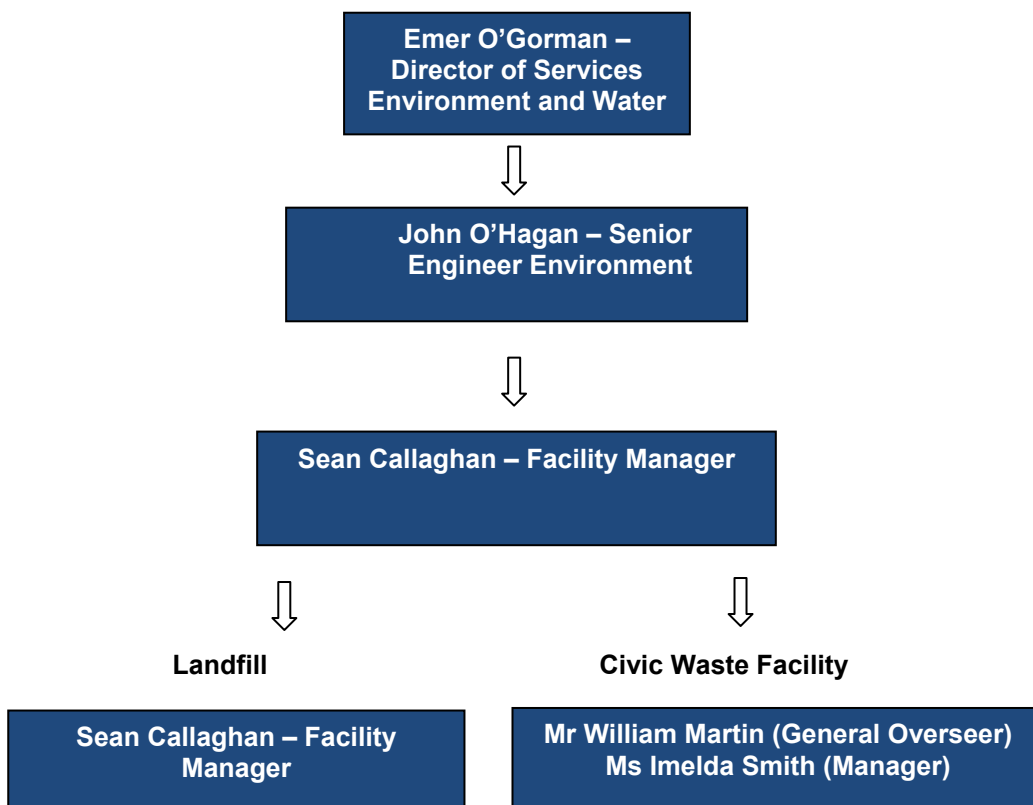
- The licensee shall ensure that surface water interceptor trenches at the facility are actively maintained in accordance with the sites preventative maintenance schedule, and that any maintenance or remedial work arising shall be recorded by the licensee.
  
- The licensee shall ensure the landfill is appropriately profiled following completion of the capping works in accordance with Condition 8.2.
  
- The licensee shall investigate the reason for an indicated negative flow value and implement any corrective actions as necessary, without delay.

A monitoring site visit was undertaken by the EPA on the 20/04/2017 (SV11823). Samples were taken from BH6A, BH11A, BH5A and SW1. No sample was taken at SW2 as the sampling location was too dangerous to access. The results were similar to quarterly monitoring results at these locations.

## 16 Reports on Financial Provision Made Under this Licence, Management and Staffing Structure of the Facility, and a Programme for Public

### 16.1 Management and Staffing Structure

The management and staffing structure for the facility is as follows;



**Figure 17.1 Management Structure at Drogheda Landfill Site**

The public information programme is provided in the Environmental Management System for the site.

### 16.2 Annual Budget and Site Running Costs

The civic amenity facility is operated by third party (V & W Recycling) on behalf of Drogheda Borough Council. A €4.00 entrance charge is applicable to all users of the site except for the disposal of electrical goods.



Funding is provided by Louth County Council for all monitoring requirements.

### **16.3 Environmental Liabilities**

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.

## Appendix A

### PRTR Reporting



Environmental Protection Agency

| PRTR# : W0033 | Facility Name : Drogheda Landfill - Drogheda Borough Council |  
 Filename : Copy of W0033\_2017.xls | Return Year : 2017 |

[Guidance to completing the PRTR workbook](#)

# PRTR Returns Workbook

Version 1.1.19

<b>REFERENCE YEAR</b>	2017
-----------------------	------

## 1. FACILITY IDENTIFICATION

Parent Company Name	Louth County Council
Facility Name	Drogheda Landfill - Drogheda Borough Council
PRTR Identification Number	W0033
Licence Number	W0033-01

### Classes of Activity

No.	class_name
-	Refer to PRTR class activities below

Address 1	Collon Road
Address 2	Mell
Address 3	Drogheda
Address 4	
	Louth
Country	Ireland
Coordinates of Location	-6.37152 53.7277
River Basin District	IEEA
NACE Code	3821
Main Economic Activity	Treatment and disposal of non-hazardous waste
<b>AER Returns Contact Name</b>	Sean Callaghan
<b>AER Returns Contact Email Address</b>	sean.callaghan@louthcoco.ie
<b>AER Returns Contact Position</b>	Executive Scientist
<b>AER Returns Contact Telephone Number</b>	042 9392977
<b>AER Returns Contact Mobile Phone Number</b>	086 3837216
<b>AER Returns Contact Fax Number</b>	042 9336761
<b>Production Volume</b>	0.0
<b>Production Volume Units</b>	
<b>Number of Installations</b>	0
<b>Number of Operating Hours in Year</b>	0
<b>Number of Employees</b>	2
<b>User Feedback/Comments</b>	
<b>Web Address</b>	

## 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# : W0033 | Facility Name : Drogheda Landfill - Drogheda Borough Council | Filename : Copy of W0033\_2017.xls | Return Year : 2017 |

05/04/2018 16:49

SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS

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

SECTION B : REMAINING PRTR POLLUTANTS

POLLUTANT		RELEASERS TO AIR			Please enter all quantities in this section in KGs			
No. Annex II	Name	M/C/E	METHOD		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	gassim minus flared	0.0	147974.0	0.0	147974.0

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

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

POLLUTANT		RELEASERS TO AIR			Please enter all quantities in this section in KGs			
Pollutant No.	Name	M/C/E	METHOD		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:

Drogheda Landfill - Drogheda Borough Council

Please enter summary data on the quantities of methane flared and / or utilised

T (Total) kg/Year	M/C/E	Method Used		Facility Total Capacity m3 per hour	
		Method Code	Designation or Description		
Total estimated methane generation (as per site model)	220622.0	c	Gassim model	Gassim Lite	N/A
Methane flared	72648.0	c	flare records	from records	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)	147974.0	c	Gassim model minus flare	net figure	N/A

5. ONSITE TREATMENT & OFFSITE TRANSFERS OF WASTE

| PRTR# : W0033 | Facility Name : Drogheda Landfill - Drogheda Borough Council | Filename : Copy of W0033\_2017.xls | Return Year : 2017 |

05/04/2018 16:49

Please enter all quantities on this sheet in Tonnes

0

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		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		Haz Waste: Name and Licence/Permit No of Recover/Disposer	Non-Haz Waste: Address of Recover/Disposer		
To Other Countries	15 01 01	No	298.0	paper and cardboard packaging	R3	M	Weighed	Abroad	Peute Europe,Ni6000076	Baahoekweg 4,LA Dordrecht,,Netherlands		
Within the Country	15 01 02	No	175.0	plastic packaging	R3	M	Weighed	Offsite in Ireland	Shrabra,MN 080022-01 Dundalk Town Council,W0034-02	Monaghan ,Ireland Newry Road,,Dundalk,,Ireland Newtowncloughogue,Newry, Co Down,BT38 8LZ,United Kingdom		
To Other Countries	15 01 04	No	60.0	metallic packaging	R4	M	Weighed	Abroad	John Tinnelly & Sons,LN09/10	Road,Toomebridge,Co Antrim,BT41 3SE,United Kingdom		
To Other Countries	15 01 07	No	191.0	glass packaging	R5	M	Weighed	Abroad	Glassdon ,Ni licenceLN/06/08		Rilta Environmental Ltd,Licence No W0192-02,Block 402,Grants Drive,Greenogue Business Park,Rathcoole Co Dublin,Ireland	Block 402,Grants Drive,Greenogue Business Park,Rathcoole Co Dublin,Ireland
Within the Country	16 06 01	Yes	14.0	lead batteries	R4	M	Weighed	Offsite in Ireland	Rilta Environmental Ltd,Licence No W0192-03	Dublin,Ireland Baahoekweg 4,LA Dordrecht,,Netherlands		
To Other Countries	20 01 01	No	130.0	newspaper and magazines	R3	M	Weighed	Abroad	Peute Europe,Ni6000076	36 Magheralane Road,Randalstown,County Antrim,BT41 2NT,United Kingdom		
To Other Countries	20 01 11	No	51.0	textiles	R3	M	Weighed	Abroad	Cookstown NI,WMEX 01/11 Dundalk Town Council,W0034-02	Newry Road,,Dundalk,,Ireland Newtowncloughogue,Newry, Co Down,BT38 8LZ,United Kingdom		
Within the Country	20 01 38	No	249.0	wood other than that mentioned in 20 01 37	R3	M	Weighed	Offsite in Ireland	John Tinnelly & Sons,LN09/10 Dundalk Town Council,W0034-02	Newry Road,,Dundalk,,Ireland Newtowncloughogue,Newry, Co Down,BT38 8LZ,United Kingdom		
To Other Countries	20 01 40	No	281.0	metals	R4	M	Weighed	Abroad	John Tinnelly & Sons,LN09/10 Dundalk Town Council,W0034-02	Newry Road,,Dundalk,,Ireland Carranstown,Duleek,,Ireland		
Within the Country	20 02 01	No	906.0	biodegradable waste	R3	M	Weighed	Offsite in Ireland	Indaver Ireland,W0167-02			
Within the Country	20 03 01	No	65.0	mixed municipal waste	D5	M	Weighed	Offsite in Ireland				

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

## Appendix B

# Water Balance Calculation

WATER BALANCE CALCULATION - Drogheda															
Year 2017	Active Phase	Active Area A(m <sup>2</sup> )	Waste Input t/year	Active Area Infiltration R(A)(m <sup>3</sup> )	Liquid Waste LW(m <sup>3</sup> )	Temporary Restored Area	Temporary Restored area infiltration IRCA(m <sup>3</sup> )	Permanently Restored Area	Restored area infiltration IRCA(m <sup>3</sup> )	Total Water	Cumulative Water	Absorptive Capacity aW(m <sup>3</sup> )	Cumulative Absorptive Capacity	Cumulative leachate	Leachate produced Lo(m <sup>3</sup> )
2017	Closed	0	0	660.70	0	15,000	2478	116650	1541	4019	4019	0	0	4019	4019
<b>Total</b>				<b>661</b>											<b>4019</b>

<u>Assumptions</u>			
1. IRCA =	Temporary	25%	% of annual rainfall
	Permanently (2-10%)	2%	% of annual rainfall
2. Absorptive Capacity = Waste density of 0.8 tonnes/m <sup>3</sup> . Estimated absorptive capacity		0.06	t/m <sup>3</sup>
3. Rainfall data (R) taken from Dublin Airport		660.7	mm
4. Capping Area		101,650	m <sup>2</sup>
Capped area 2017		15,000	m <sup>2</sup>
Future permanent cap area		15,000	m <sup>2</sup>

WATER BALANCE CALCULATION - Drogheda															
Year 2017	Active Phase	Active Area A(m <sup>2</sup> )	Waste Input t/year	Active Area Infiltration R(A)(m <sup>3</sup> )	Liquid Waste LW(m <sup>3</sup> )	Temporary Restored Area	Temporary Restored area infiltration IRCA(m <sup>3</sup> )	Permanently Restored Area	Restored area infiltration IRCA(m <sup>3</sup> )	Total Water	Cumulative Water	Absorptive Capacity aW(m <sup>3</sup> )	Cumulative Absorptive Capacity	Cumulative leachate	Leachate produced Lo(m <sup>3</sup> )
2017	Closed	0	0	660.70	0	15,000	2478	116650	7707	10185	10185	0	0	10185	10185
<b>Total</b>				<b>661</b>											<b>10185</b>

<u>Assumptions</u>			
1. IRCA =	Temporary	25%	% of annual rainfall
	Permanently (2-10%)	10%	% of annual rainfall
2. Absorptive Capacity = Waste density of 0.8 tonnes/m <sup>3</sup> . Estimated absorptive capacity		0.06	t/m <sup>3</sup>
3. Rainfall data (R) taken from Dublin Airport		660.7	mm
4. Capping Area		101,650	m <sup>2</sup>
Capped area 2017		15,000	m <sup>2</sup>
Future permanent cap area		15,000	m <sup>2</sup>



## Appendix C

### Drawings



**NOTES**

- Verifying Dimensions.  
The contractor shall verify dimensions against such other drawings or site conditions as pertain to this part of the work.
- 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.
- 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.
- Keys:

	Site Boundary
	Capped Area
	Approx Extent of Waste Licensed Boundary
	L2A Leachate Boreholes
	LG3 Landfill Gas Monitoring Point
	DG1 Dust Monitoring Points
	BH1A Groundwater Boreholes
	N1 Noise Monitoring Points
	SW2 Surfacewater Monitoring Points
	S1 Sewer

rev	amendments	drawn	date
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Co. Donegal			

Client

Project  
**Drogheda Landfill Site**

Title  
**Monitoring Locations**

Drawing Status Preliminary	Sheet Size A3	Drawing Scale 1:4000
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Drawing Number <b>IBR1074/100</b>	Rev -
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Project Leader DD	Drawn By AMB	Date Apr - 2017	Initial Review AMCG
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## Appendix D

### Groundwater Results







Drogheda Landfill Site Groundwater Quality

Table with columns for Monitoring Point, Date Collected, and various chemical parameters (Alkalinity, Ammonia, Arsenic, Barium, Beryllium, B.O.D., Boron, Cadmium, Calcium, C.O.D., Chloride, Chromium, Cobalt, Coliform Bacteria, Conductivity, Copper, Cyanide, D.O., E. Coli, Fluoride, Iron, Lead, Magnesium, Manganese, Mercury, Molybdenum, Nickel, Nitrate, Nitrite, ortho-Phosphate, pH, Phenol, Potassium, Sampling Depth, Selenium, Silver, Sodium, Strontium, Sulphate, Suspended Solids, Temp, Thallium, Time sampled, Tin (ppb), T.O.C., T.O.N., Total S Solids, Uranium, Vanadium, Zinc, Water Level m OD). Rows list specific chemical and physical parameters.

D.O. is measured in % instead of mg/l instead of % in March and June of 2016 due to a change in laboratory for laboratory analysis.

Barium, Cadmium, Chromium, Iron, Lead, Manganese, Nickel and Zinc were measured in mg/l instead of µg/l due to a change in laboratory for laboratory analysis.

Phenol and Cyanide is measured in µg/l instead of mg/l due to a change in laboratory for laboratory analysis.









Drogheda Landfill Site Groundwater Quality

Table with columns for Monitoring Point, Date Collected, and various chemical parameters (Alkalinity, Ammonia, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, C.O.D., Chloride, Chromium, Cobalt, Coliform Bacteria, Conductivity, Copper, Cyanide, D.O., E. Coli, Fluoride, Iron, Lead, Magnesium, Manganese, Mercury, Molybdenum, Nickel, Nitrate, Nitrite, o-Phosphate, pH, Phenol, Potassium, Sampling Depth, Selenium, Silver, Sodium, Strontium, Sulphate, Suspended Solids, Temp, Thallium, Time sampled, Tin, T.O.C., T.O.N., Total S Solids, Uranium, Vanadium, Zinc) across multiple monitoring dates from 2010 to 2017. Includes monitoring points DWK and IGV, and BHB8A.

D.O. is measured in mg/l instead of % in March and June of 2016 due to a change in laboratory for laboratory analysis.

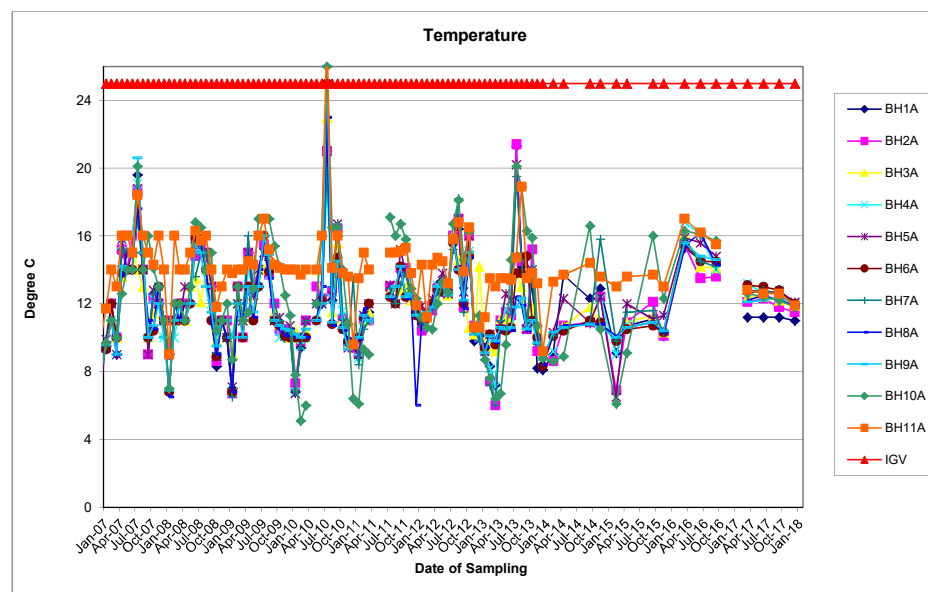
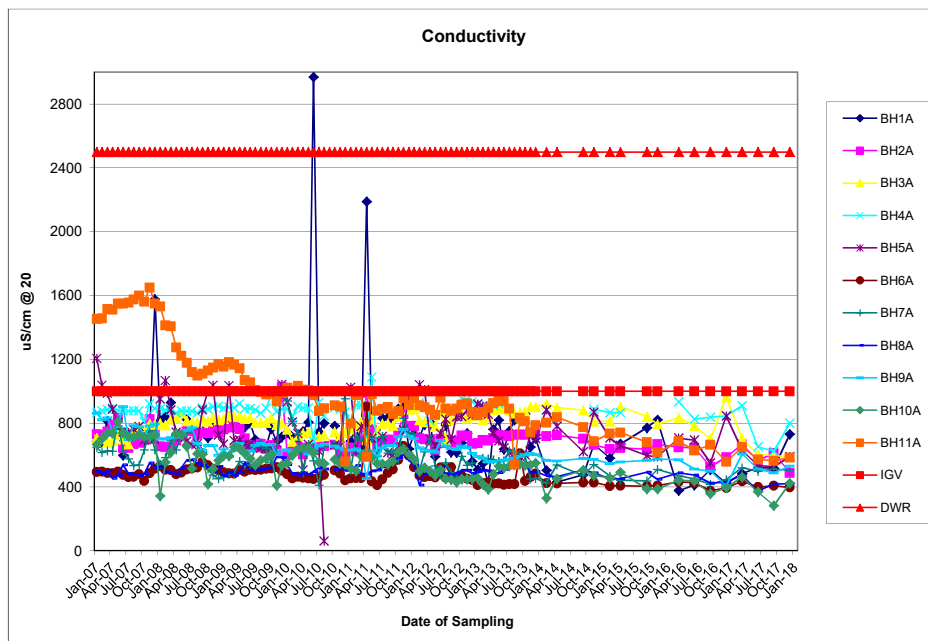
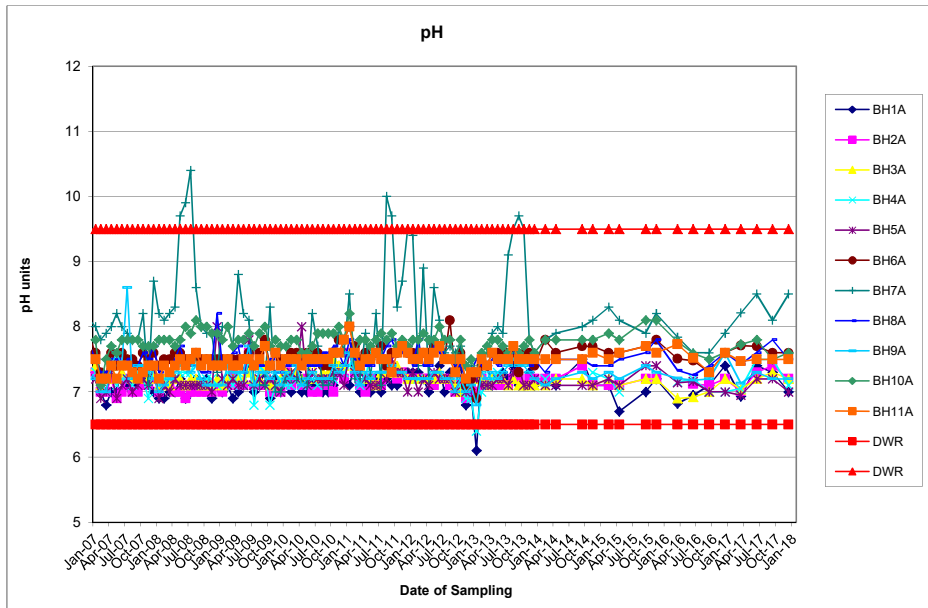
Barium, Cadmium, Chromium, Iron, Lead, Manganese, Nickel and Zinc were measured in mg/l instead of ug/l due to a change in laboratory for laboratory analysis.

Phenol and Cyanide is measured in ug/l instead of mg/l due to a change in laboratory for laboratory analysis.



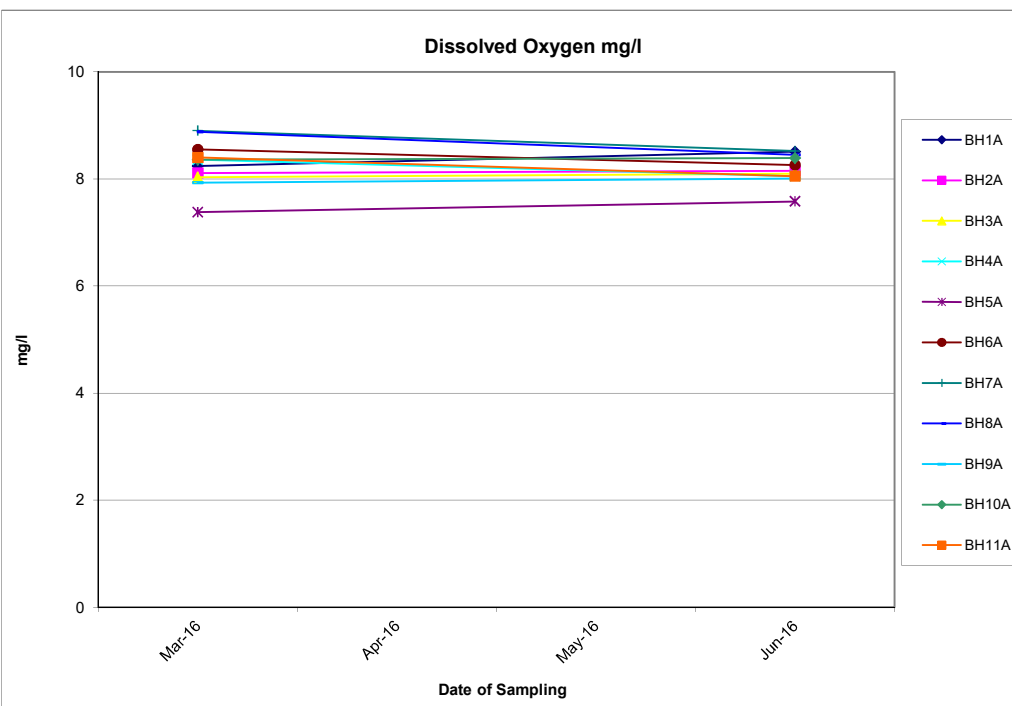
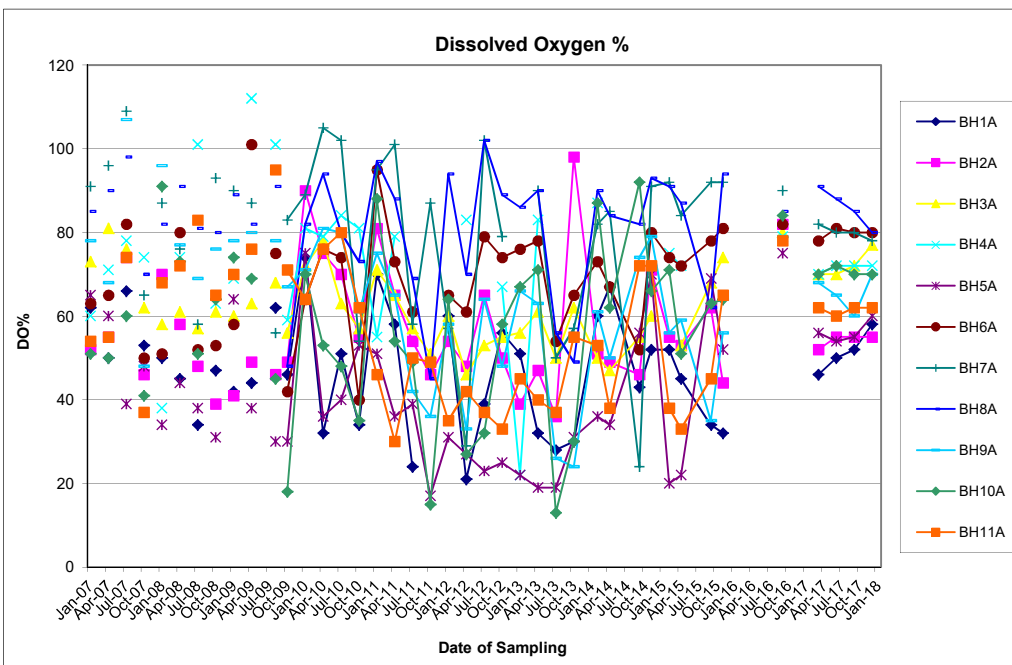
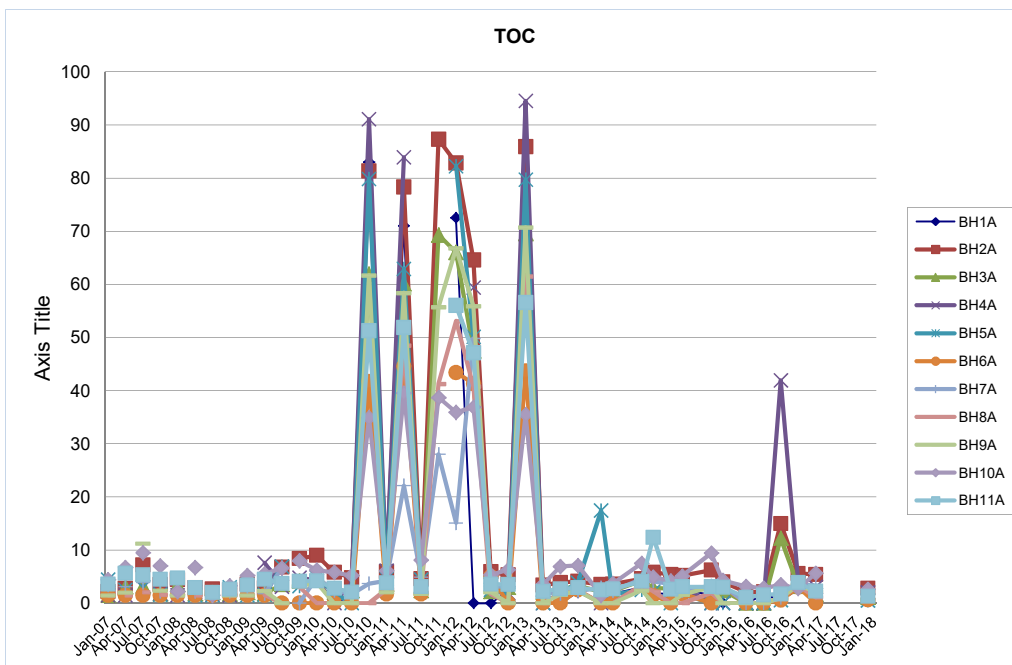


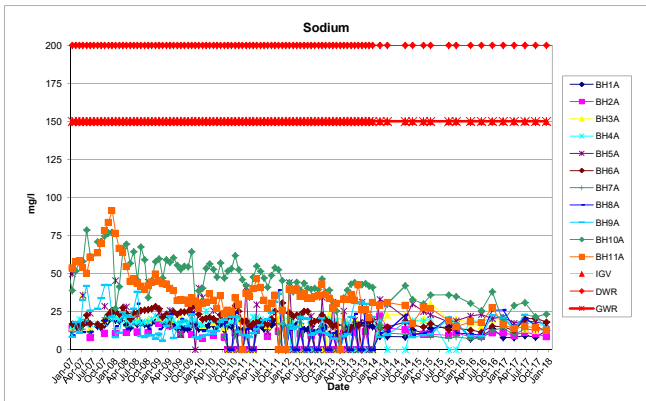
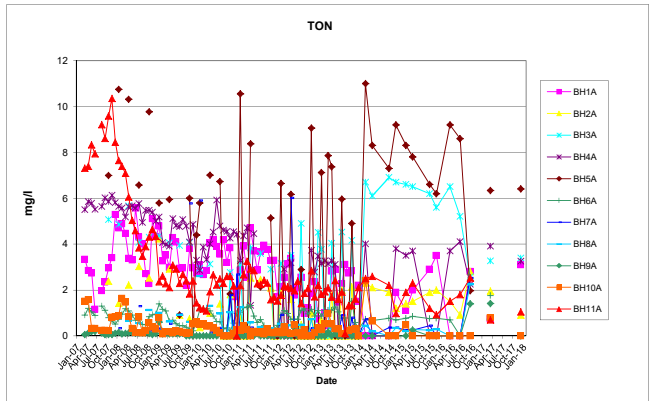
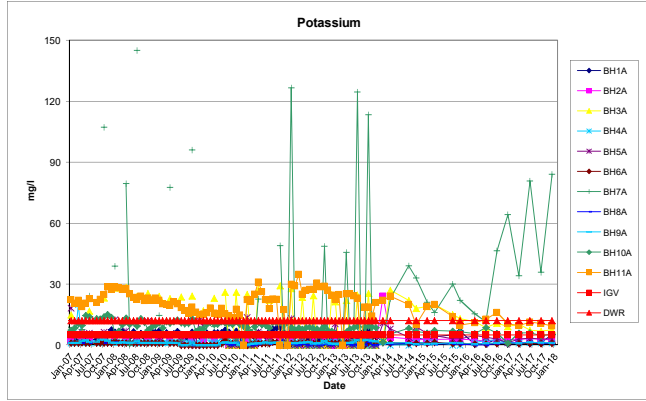
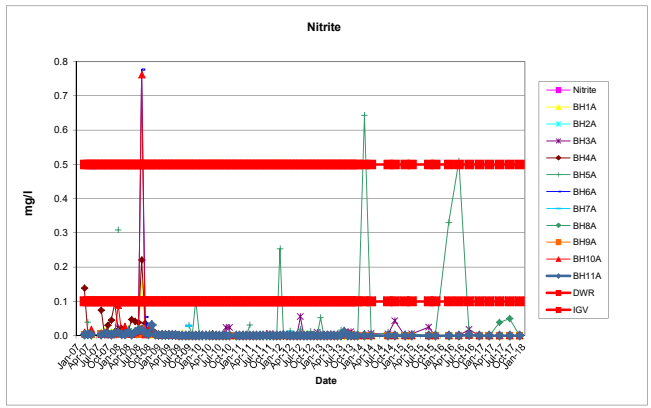
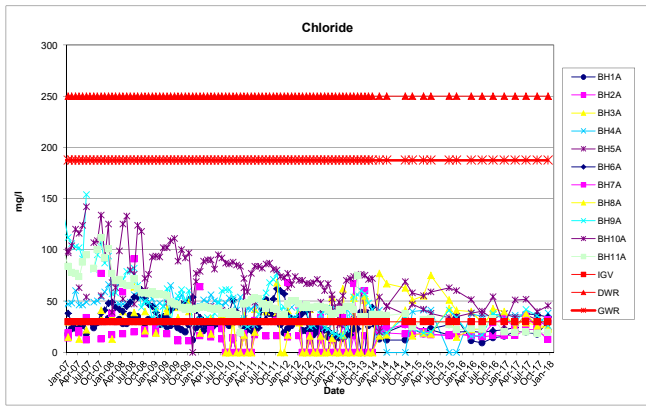


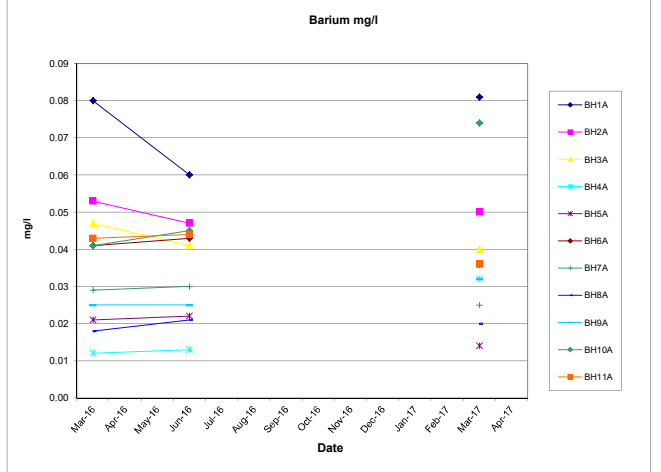
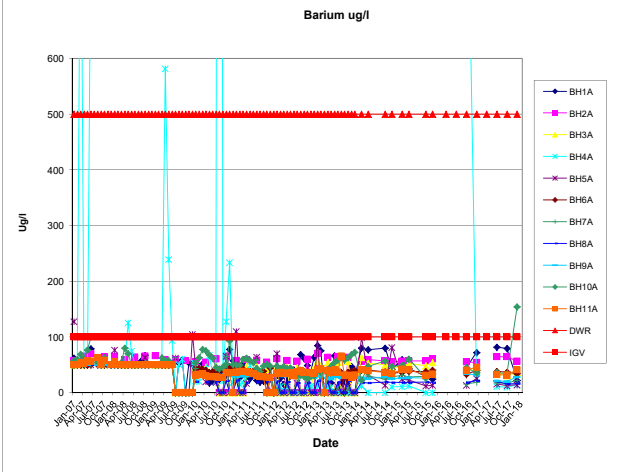
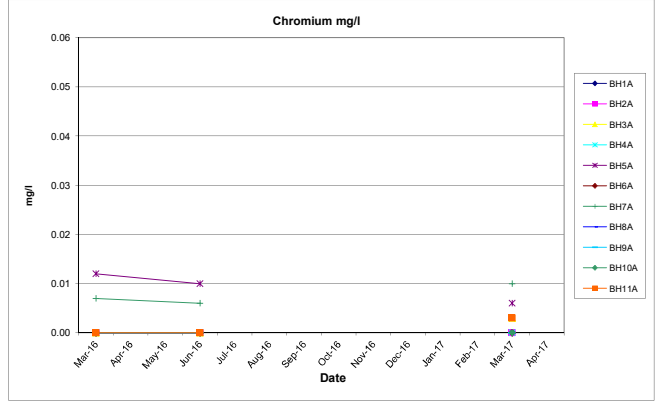
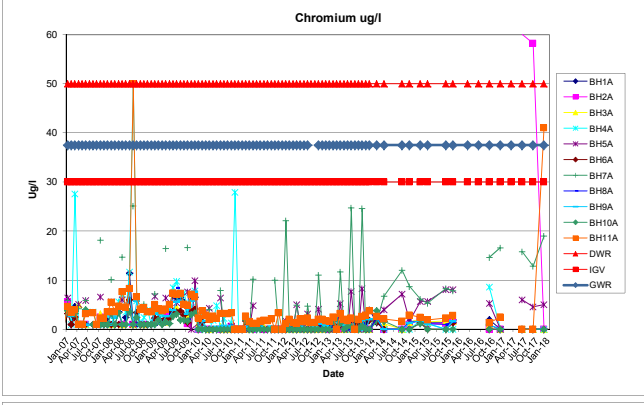
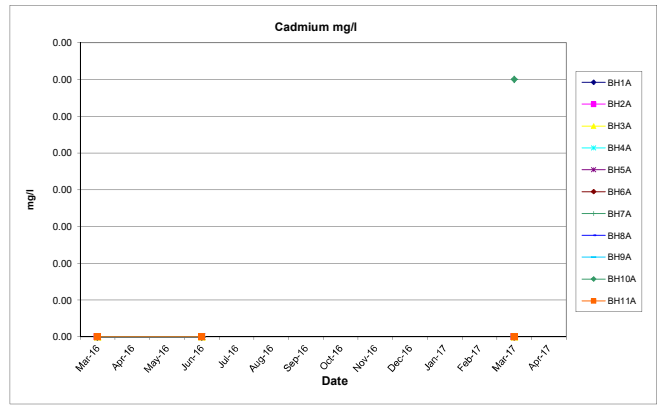
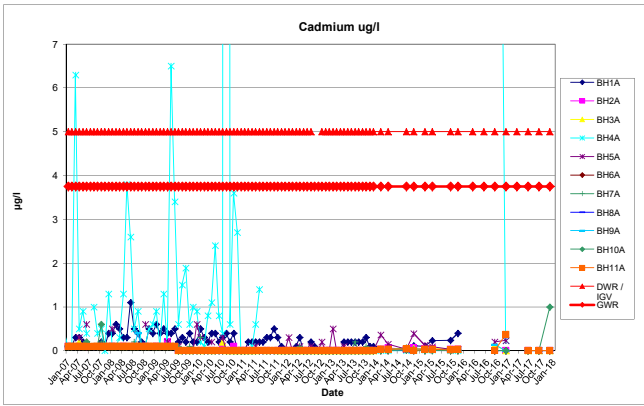


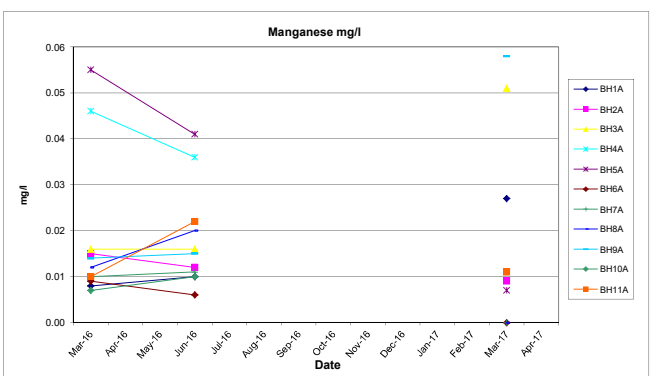
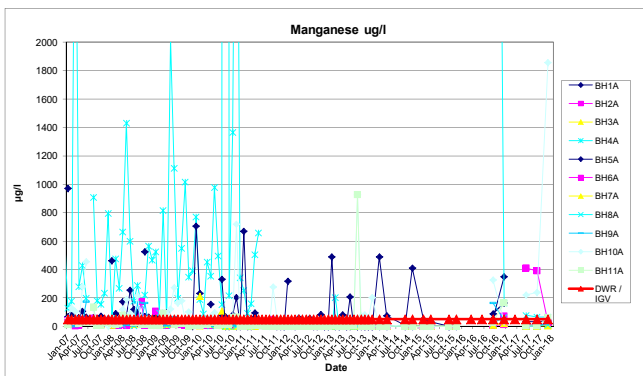
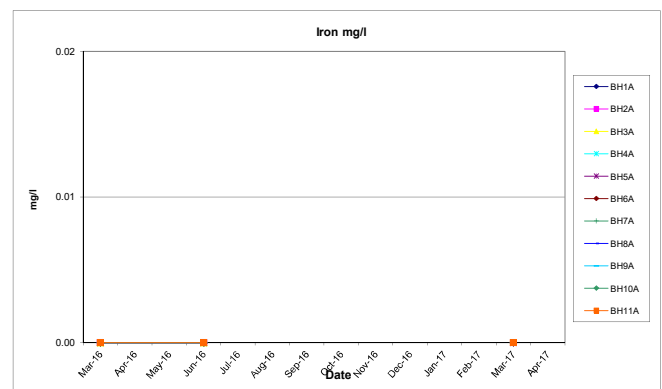
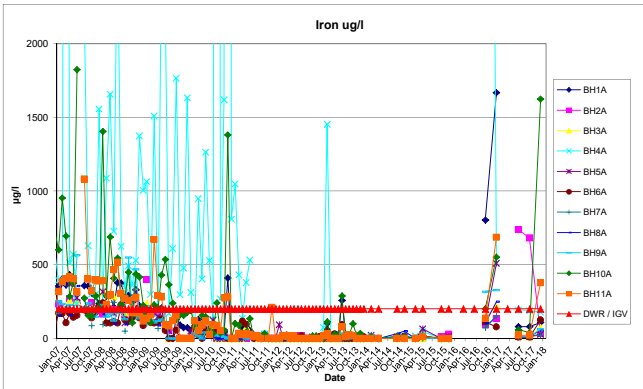
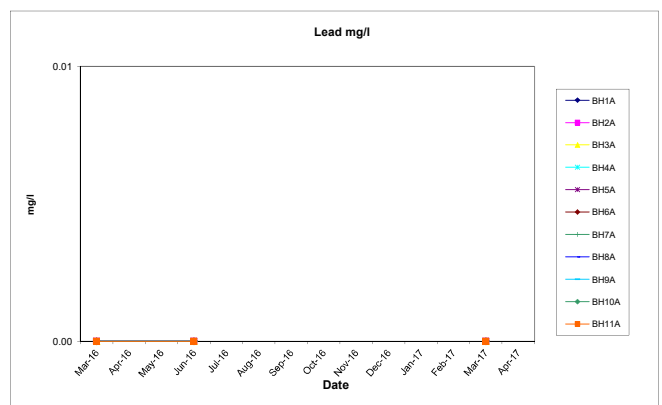
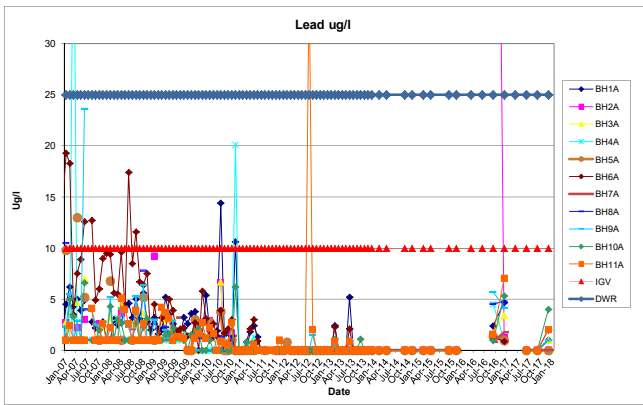


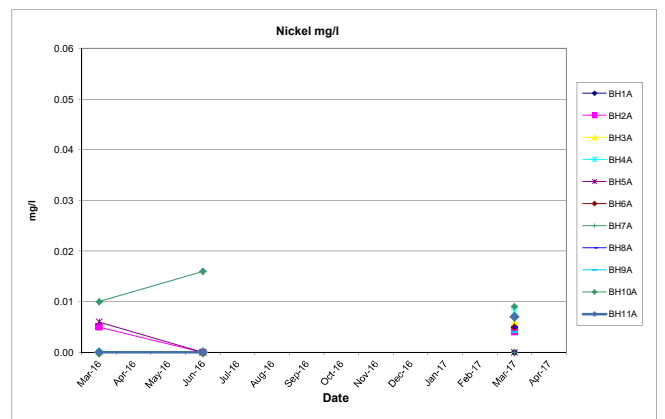
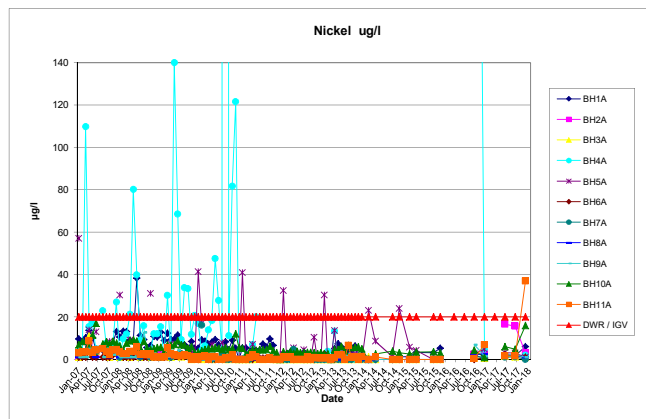
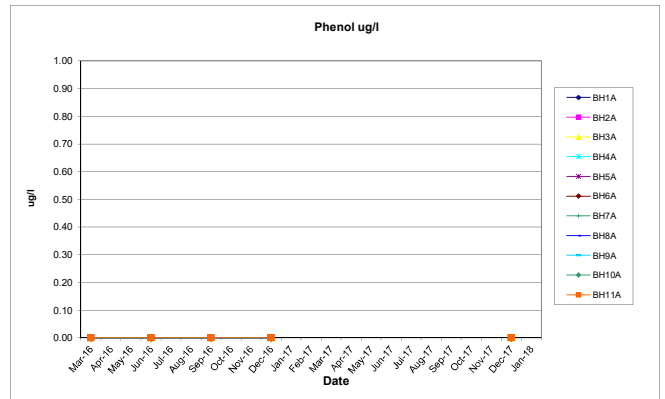
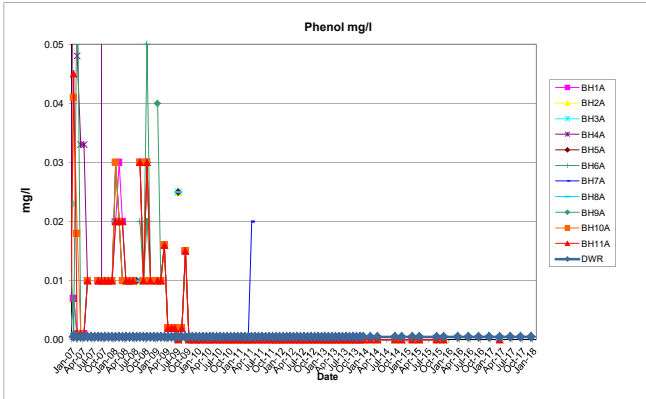
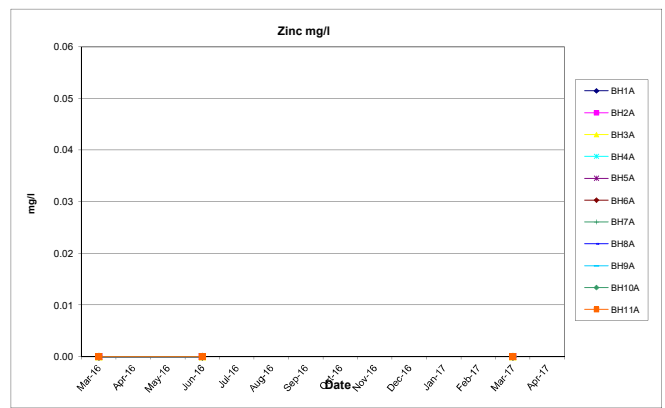
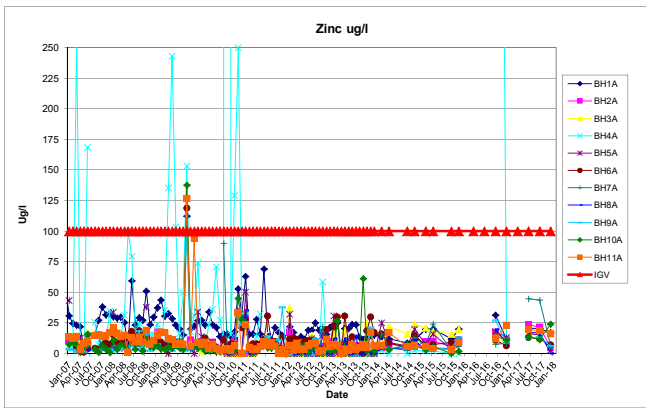












## Appendix E

### Surface Water Results



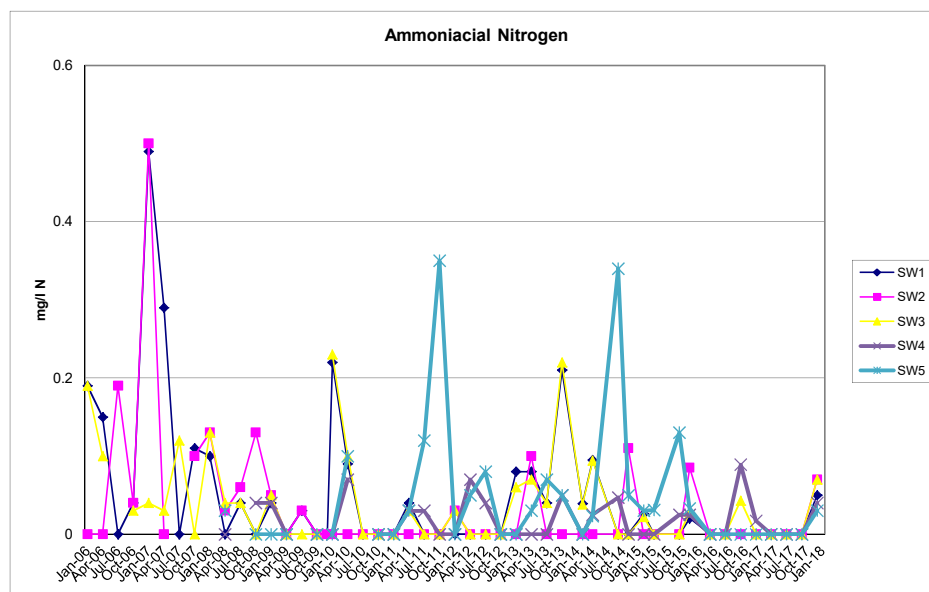
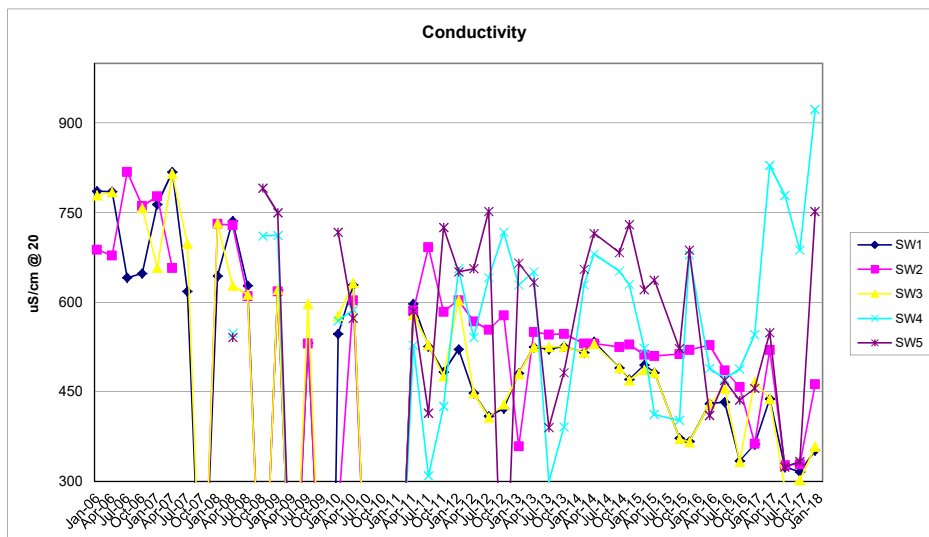
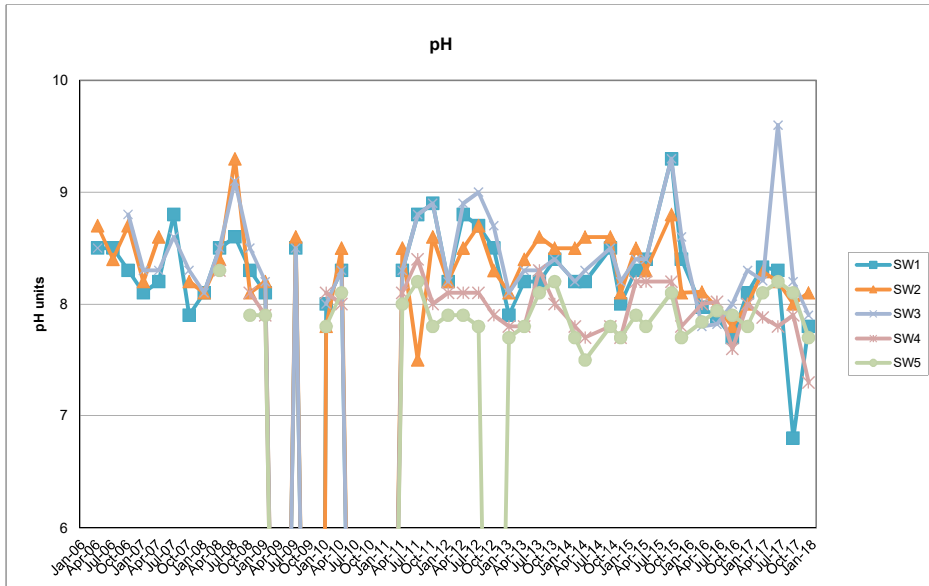


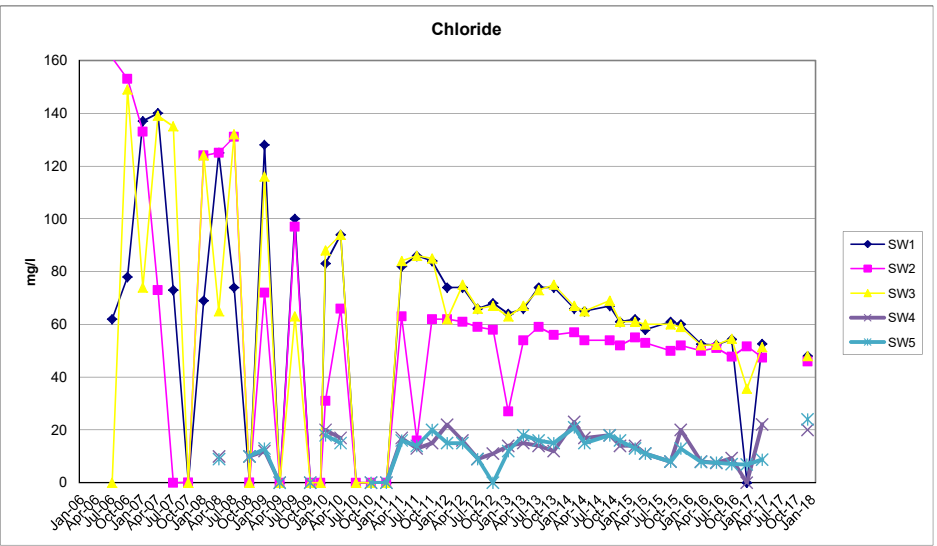
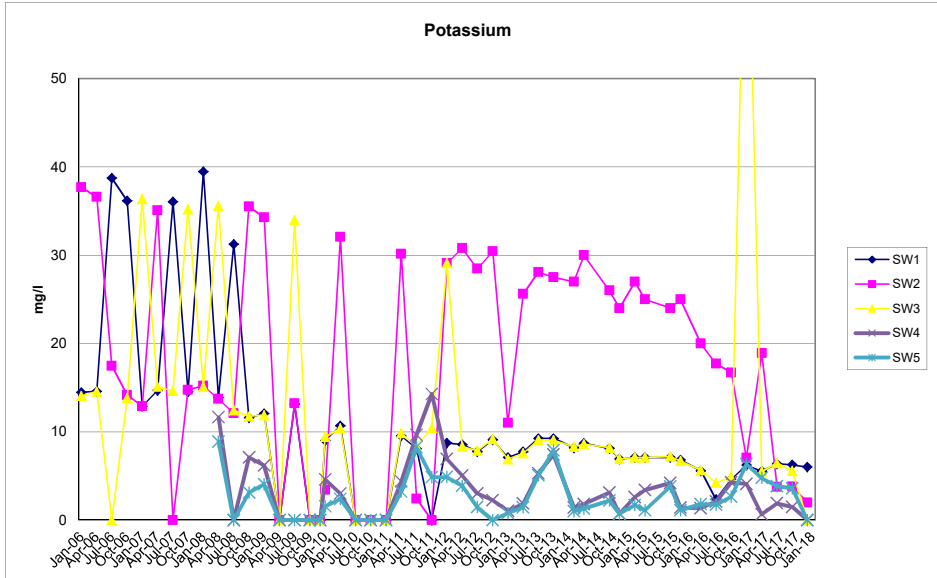












## Appendix F

# Landfill Gas Results

LANDFILL GAS MONITORING FORM		
<b>Facility Name:</b> Drogheda Landfill	<b>Facility Address:</b> Mell Drogheda	
<b>Waste Licence no.:</b> W0033-01		
<b>Licensee:</b> Drogheda Borough Council		
<b>Date of licensing:</b>	<b>Date of sampling:</b> 18-01-2017	<b>Time of sampling:</b> 11.00hrs
<b>Instrument used:</b> GEM5000	<b>Date Next Full Calibration:</b> June 2017	
	<b>Last Field Calibration:</b> (include date and gases)	
<b>Monitoring Personnel:</b> Damien Holmes	<b>Weather:</b> Dry	<b>Barometric pressure</b> 1018mb

Results						
Sample Station Number	CH <sub>4</sub> (%v/v)	CO <sub>2</sub> (% v/v)	O <sub>2</sub> (% v/v)	CO ppm	H <sub>2</sub> S ppm	Comments
BH1A	0.0	0.2	20.4	0	0	31.953m A.O.D Top of Cover
BH2A	0.0	0.2	20.4	0	0	32.362m A.O.D Top of Cover
BH3A	0.0	1.1	19.4	1	1	33.664m A.O.D Top of Cover
BH4A	0.0	0.0	20.04	0	0	33.570m A.O.D Top of Cover
BH5A	0.0	0.4	20.2	2	0	36.130m A.O.D Top of Cover
BH6A	0.0	0.2	20.4	0	0	35.951m A.O.D Top of Cover
BH7A	0.0	0.2	20.4	1	0	25.172m A.O.D Top of Cover
BH8A	0.0	0.0	20.4	1	0	36.151m A.O.D Top of Cover
BH9A	0.0	0.2	20.4	0	0	34.345m A.O.D Top of Cover
BH10A	0.0	0.0	20.4	0	0	32.776m A.O.D Top of Cover
BH11A	0.0	0.0	20.4	1	0	21.715m A.O.D Top of Cover
LG1	0.0	0.2	20.2	1	0	
LG2	0.0	0.2	20.4	1	0	
LG3	0.2	1.3	19.0	0	1	
LG4	0.0	1.0	19.2	0	0	
LG5	0.0	0.4	20.2	0	0	
LG6	0.0	0.2	20.2	1	0	
LG7	0.0	0.0	20.2	0	0	
PZ8	0.0	0.0	20.2	0	0	Constructed 26/02/12
PZ9	0.0	0.2	20.4	1	0	Constructed 26/02/12
PZ10	0.0	0.0	20.2	0	0	Constructed 26/02/12

LANDFILL GAS MONITORING FORM		
<b>Facility Name:</b> Drogheda Landfill	<b>Facility Address:</b> Mell Drogheda	
<b>Waste Licence no.:</b> W0033-01		
<b>Licensee:</b> Drogheda Borough Council		
<b>Date of licensing:</b>	<b>Date of sampling:</b> 17-02-2017	<b>Time of sampling:</b> 14.00hrs
<b>Instrument used:</b> GEM5000	<b>Date Next Full Calibration:</b> June 2017	
	<b>Last Field Calibration:</b> (include date and gases)	
<b>Monitoring Personnel:</b> Damien Holmes	<b>Weather:</b> Dry	<b>Barometric pressure</b> 1021mb

Results						
Sample Station Number	CH <sub>4</sub> (%v/v)	CO <sub>2</sub> (% v/v)	O <sub>2</sub> (% v/v)	CO ppm	H <sub>2</sub> S ppm	Comments
BH1A	0.0	0.0	20.4	0	0	31.953m A.O.D Top of Cover
BH2A	0.0	0.2	20.6	0	0	32.362m A.O.D Top of Cover
BH3A	0.0	1.0	19.5	0	0	33.664m A.O.D Top of Cover
BH4A	0.0	0.4	20.4	1	0	33.570m A.O.D Top of Cover
BH5A	0.0	0.2	20.2	0	0	36.130m A.O.D Top of Cover
BH6A	0.0	0.2	20.2	0	0	35.951m A.O.D Top of Cover
BH7A	0.0	0.0	20.4	0	0	25.172m A.O.D Top of Cover
BH8A	0.0	0.0	20.2	0	0	36.151m A.O.D Top of Cover
BH9A	0.0	0.2	20.2	0	0	34.345m A.O.D Top of Cover
BH10A	0.0	0.0	20.4	0	0	32.776m A.O.D Top of Cover
BH11A	0.0	0.0	20.4	1	1	21.715m A.O.D Top of Cover
LG1	0.0	0.0	20.4	0	0	
LG2	0.0	0.2	21.2	1	0	
LG3	0.0	1.0	19.6	1	0	
LG4	0.0	1.0	19.6	2	0	
LG5	0.0	0.0	20.2	2	0	
LG6	0.0	0.0	20.2	1	0	
LG7	0.0	0.0	20.4	0	0	
PZ8	0.0	0.2	20.4	0	0	Constructed 26/02/12
PZ9	0.0	0.0	20.4	0	0	Constructed 26/02/12
PZ10	0.0	0.0	20.4	0	0	Constructed 26/02/12



**LANDFILL GAS MONITORING FORM**

<b>Facility Name:</b> Drogheda Landfill		<b>Facility Address:</b> Mell Drogheda	
<b>Waste Licence no.:</b> W0033-01			
<b>Licensee:</b> Drogheda Borough Council			
<b>Date of licensing:</b>	<b>Date of sampling:</b> 16-03-2017	<b>Time of sampling:</b> 13.00hrs	
<b>Instrument used:</b> GEM5000	<b>Date Next Full Calibration:</b> June 2017 <b>Last Field Calibration:</b> (include date and gases)		
<b>Monitoring Personnel:</b> Damien Holmes	<b>Weather:</b> Dry	<b>Barometric pressure</b> 1020mb	

Results						
Sample Station Number	CH <sub>4</sub> (%v/v)	CO <sub>2</sub> (% v/v)	O <sub>2</sub> (% v/v)	CO ppm	H <sub>2</sub> S ppm	Comments
BH1A	0.0	0.0	20.4	0	0	31.953m A.O.D Top of Cover
BH2A	0.0	0.0	20.4	0	0	32.362m A.O.D Top of Cover
BH3A	0.0	1.2	19.2	0	0	33.664m A.O.D Top of Cover
BH4A	0.0	0.0	20.4	0	1	33.570m A.O.D Top of Cover
BH5A	0.0	0.0	20.4	0	0	36.130m A.O.D Top of Cover
BH6A	0.0	0.0	20.4	0	0	35.951m A.O.D Top of Cover
BH7A	0.0	0.2	20.4	0	0	25.172m A.O.D Top of Cover
BH8A	0.0	0.4	20.0	0	0	36.151m A.O.D Top of Cover
BH9A	0.0	0.6	19.6	0	0	34.345m A.O.D Top of Cover
BH10A	0.0	0.2	20.4	0	1	32.776m A.O.D Top of Cover
BH11A	0.0	0.4	20.0	0	0	21.715m A.O.D Top of Cover
LG1	0.0	0.2	20.2	0	0	
LG2	0.0	0.2	20.1	1	0	
LG3	0.0	1.2	19.0	0	2	
LG4	0.0	1.2	19.0	1	0	
LG5	0.0	0.2	20.2	0	1	
LG6	0.0	0.2	20.0	0	0	
LG7	0.0	0.0	20.4	0	0	
PZ8	0.0	0.0	20.4	0	0	Constructed 26/02/12
PZ9	0.0	0.2	20.2	1	0	Constructed 26/02/12
PZ10	0.0	0.0	20.4	0	0	Constructed 26/02/12

LANDFILL GAS MONITORING FORM		
<b>Facility Name:</b> Drogheda Landfill	<b>Facility Address:</b> Mell Drogheda	
<b>Waste Licence no.:</b> W0033-01		
<b>Licensee:</b> Drogheda Borough Council		
<b>Date of licensing:</b>	<b>Date of sampling:</b> 20-04-2017	<b>Time of sampling:</b> 11.00hrs
<b>Instrument used:</b> GEM5000	<b>Date Next Full Calibration:</b> June 2017	
	<b>Last Field Calibration:</b> (include date and gases)	
<b>Monitoring Personnel:</b> Damien Holmes	<b>Weather:</b> Dry	<b>Barometric pressure</b> 1020mb

Results						
Sample Station Number	CH <sub>4</sub> (%v/v)	CO <sub>2</sub> (% v/v)	O <sub>2</sub> (% v/v)	CO ppm	H <sub>2</sub> S ppm	Comments
BH1A	0.0	0.0	20.4	0	0	31.953m A.O.D Top of Cover
BH2A	0.0	0.2	20.6	0	2	32.362m A.O.D Top of Cover
BH3A	0.0	1.1	19.4	1	0	33.664m A.O.D Top of Cover
BH4A	0.0	0.2	20.2	1	0	33.570m A.O.D Top of Cover
BH5A	0.0	0.2	20.2	0	0	36.130m A.O.D Top of Cover
BH6A	0.0	0.2	20.4	0	0	35.951m A.O.D Top of Cover
BH7A	0.0	0.0	20.4	0	0	25.172m A.O.D Top of Cover
BH8A	0.0	0.0	20.2	0	0	36.151m A.O.D Top of Cover
BH9A	0.0	0.0	20.4	0	0	34.345m A.O.D Top of Cover
BH10A	0.0	0.0	20.4	0	0	32.776m A.O.D Top of Cover
BH11A	0.0	0.0	20.4	1	1	21.715m A.O.D Top of Cover
LG1	0.0	0.0	20.4	0	0	
LG2	0.0	0.2	20.6	1	0	
LG3	0.0	0.8	19.4	1	1	
LG4	0.0	1.0	19.6	2	0	
LG5	0.0	0.0	20.2	2	0	
LG6	0.0	0.0	20.2	1	0	
LG7	0.0	0.0	20.4	0	0	
PZ8	0.0	0.2	20.4	0	0	Constructed 26/02/12
PZ9	0.0	0.0	20.4	0	0	Constructed 26/02/12
PZ10	0.0	0.0	20.4	0	0	Constructed 26/02/12

LANDFILL GAS MONITORING FORM		
<b>Facility Name:</b> Drogheda Landfill	<b>Facility Address:</b> Mell Drogheda	
<b>Waste Licence no.:</b> W0033-01		
<b>Licensee:</b> Drogheda Borough Council		
<b>Date of licensing:</b>	<b>Date of sampling:</b> 24-05-2017	<b>Time of sampling:</b> 11.00hrs
<b>Instrument used:</b> GEM5000	<b>Date Next Full Calibration:</b> June 2017 <b>Last Field Calibration:</b> (include date and gases)	
<b>Monitoring Personnel:</b> Damien Holmes	<b>Weather:</b> Dry	<b>Barometric pressure</b> 1020mb

Results						
Sample Station Number	CH <sub>4</sub> (%v/v)	CO <sub>2</sub> (% v/v)	O <sub>2</sub> (% v/v)	CO ppm	H <sub>2</sub> S ppm	Comments
BH1A	0.0	0.0	20.4	0	0	31.953m A.O.D Top of Cover
BH2A	0.0	0.0	20.4	0	0	32.362m A.O.D Top of Cover
BH3A	0.0	1.3	19.0	0	0	33.664m A.O.D Top of Cover
BH4A	0.0	0.0	20.4	0	1	33.570m A.O.D Top of Cover
BH5A	0.0	0.0	20.4	0	0	36.130m A.O.D Top of Cover
BH6A	0.0	0.0	20.4	0	0	35.951m A.O.D Top of Cover
BH7A	0.0	0.2	20.4	0	0	25.172m A.O.D Top of Cover
BH8A	0.0	0.4	19.8	0	0	36.151m A.O.D Top of Cover
BH9A	0.0	0.8	19.2	0	0	34.345m A.O.D Top of Cover
BH10A	0.0	0.2	20.4	0	1	32.776m A.O.D Top of Cover
BH11A	0.0	0.2	20.4	0	0	21.715m A.O.D Top of Cover
LG1	0.0	0.2	20.2	0	0	
LG2	0.0	0.2	20.1	1	0	
LG3	0.0	1.0	19.4	0	2	
LG4	0.0	0.6	19.6	0	1	
LG5	0.0	0.2	20.2	0	1	
LG6	0.0	0.2	20.0	0	0	
LG7	0.0	0.0	20.4	0	0	
PZ8	0.0	0.0	20.4	0	0	Constructed 26/02/12
PZ9	0.0	0.2	20.2	1	0	Constructed 26/02/12
PZ10	0.0	0.2	20.4	0	0	Constructed 26/02/12

LANDFILL GAS MONITORING FORM		
<b>Facility Name:</b> Drogheda Landfill	<b>Facility Address:</b> Mell Drogheda	
<b>Waste Licence no.:</b> W0033-01		
<b>Licensee:</b> Drogheda Borough Council		
<b>Date of licensing:</b>	<b>Date of sampling:</b> 21-06-2017	<b>Time of sampling:</b> 12.00hrs
<b>Instrument used:</b> GEM5000	<b>Date Next Full Calibration:</b> June 2017	
	<b>Last Field Calibration:</b> (include date and gases)	
<b>Monitoring Personnel:</b> Damien Holmes	<b>Weather:</b> Dry	<b>Barometric pressure</b> 1020mb

Results						
Sample Station Number	CH <sub>4</sub> (%v/v)	CO <sub>2</sub> (% v/v)	O <sub>2</sub> (% v/v)	CO ppm	H <sub>2</sub> S ppm	Comments
BH1A	0.0	0.0	20.4	0	0	31.953m A.O.D Top of Cover
BH2A	0.0	0.2	20.4	0	0	32.362m A.O.D Top of Cover
BH3A	0.0	1.0	19.4	0	0	33.664m A.O.D Top of Cover
BH4A	0.0	0.2	20.4	0	0	33.570m A.O.D Top of Cover
BH5A	0.0	0.4	20.2	2	0	36.130m A.O.D Top of Cover
BH6A	0.0	0.2	20.4	0	0	35.951m A.O.D Top of Cover
BH7A	0.0	0.0	20.4	0	0	25.172m A.O.D Top of Cover
BH8A	0.0	0.0	20.4	1	0	36.151m A.O.D Top of Cover
BH9A	0.0	0.2	20.4	0	0	34.345m A.O.D Top of Cover
BH10A	0.0	0.0	20.4	0	0	32.776m A.O.D Top of Cover
BH11A	0.0	0.0	20.4	1	0	21.715m A.O.D Top of Cover
LG1	0.0	0.2	20.2	1	0	
LG2	0.0	0.2	20.4	1	0	
LG3	0.2	1.1	18.8	0	0	
LG4	0.0	1.4	19.0	0	0	
LG5	0.0	0.4	20.4	0	0	
LG6	0.0	0.2	20.4	1	0	
LG7	0.0	0.0	20.2	0	0	
PZ8	0.0	0.0	20.4	0	0	Constructed 26/02/12
PZ9	0.0	0.2	20.4	1	0	Constructed 26/02/12
PZ10	0.0	0.0	20.2	0	0	Constructed 26/02/12

**LANDFILL GAS MONITORING FORM**

<b>Facility Name:</b> Drogheda Landfill		<b>Facility Address:</b> Mell Drogheda	
<b>Waste Licence no.:</b> W0033-01			
<b>Licensee:</b> Drogheda Borough Council			
<b>Date of licensing:</b>	<b>Date of sampling:</b> 12-07-2017	<b>Time of sampling:</b> 11.00hrs	
<b>Instrument used:</b> GEM5000	<b>Date Next Full Calibration:</b> December 2017		
	<b>Last Field Calibration:</b> (include date and gases)		
<b>Monitoring Personnel:</b> Damien Holmes	<b>Weather:</b> Dry	<b>Barometric pressure</b> 1021mb	

Results						
Sample Station Number	CH <sub>4</sub> (%v/v)	CO <sub>2</sub> (% v/v)	O <sub>2</sub> (% v/v)	CO ppm	H <sub>2</sub> S ppm	Comments
BH1A	0.0	0.0	20.4	0	0	31.953m A.O.D Top of Cover
BH2A	0.0	0.0	20.4	0	1	32.362m A.O.D Top of Cover
BH3A	0.0	1.1	19.1	0	0	33.664m A.O.D Top of Cover
BH4A	0.0	0.0	20.4	0	2	33.570m A.O.D Top of Cover
BH5A	0.0	0.0	20.4	0	0	36.130m A.O.D Top of Cover
BH6A	0.0	0.0	20.4	0	0	35.951m A.O.D Top of Cover
BH7A	0.0	0.0	20.4	0	0	25.172m A.O.D Top of Cover
BH8A	0.0	0.2	19.6	0	0	36.151m A.O.D Top of Cover
BH9A	0.0	0.8	19.2	0	0	34.345m A.O.D Top of Cover
BH10A	0.0	0.2	20.4	0	1	32.776m A.O.D Top of Cover
BH11A	0.0	0.2	20.4	0	0	21.715m A.O.D Top of Cover
LG1	0.0	0.0	20.4	0	0	
LG2	0.0	0.2	20.1	1	0	
LG3	0.0	1.2	19.6	0	0	
LG4	0.0	0.6	19.6	0	1	
LG5	0.0	0.0	20.2	0	0	
LG6	0.0	0.2	20.0	0	0	
LG7	0.0	0.0	20.4	0	0	
PZ8	0.0	0.0	20.4	0	0	Constructed 26/02/12
PZ9	0.0	0.0	20.4	0	0	Constructed 26/02/12
PZ10	0.0	0.2	20.4	0	0	Constructed 26/02/12

LANDFILL GAS MONITORING FORM		
<b>Facility Name:</b> Drogheda Landfill	<b>Facility Address:</b> Mell Drogheda	
<b>Waste Licence no.:</b> W0033-01		
<b>Licensee:</b> Drogheda Borough Council		
<b>Date of licensing:</b>	<b>Date of sampling:</b> 15-08-2017	<b>Time of sampling:</b> 15.00hrs
<b>Instrument used:</b> GEM5000	<b>Date Next Full Calibration:</b> December 2017	
	<b>Last Field Calibration:</b> (include date and gases)	
<b>Monitoring Personnel:</b> Damien Holmes	<b>Weather:</b> Dry	<b>Barometric pressure</b> 1022mb

Results						
Sample Station Number	CH <sub>4</sub> (%v/v)	CO <sub>2</sub> (% v/v)	O <sub>2</sub> (% v/v)	CO ppm	H <sub>2</sub> S ppm	Comments
BH1A	0.0	0.0	20.4	0	0	31.953m A.O.D Top of Cover
BH2A	0.0	0.3	20.6	0	0	32.362m A.O.D Top of Cover
BH3A	0.0	1.2	19.2	1	0	33.664m A.O.D Top of Cover
BH4A	0.0	0.2	20.2	1	0	33.570m A.O.D Top of Cover
BH5A	0.0	0.2	20.2	0	0	36.130m A.O.D Top of Cover
BH6A	0.0	0.2	20.4	0	0	35.951m A.O.D Top of Cover
BH7A	0.0	0.0	20.4	0	0	25.172m A.O.D Top of Cover
BH8A	0.0	0.2	20.2	0	0	36.151m A.O.D Top of Cover
BH9A	0.0	0.2	20.4	0	0	34.345m A.O.D Top of Cover
BH10A	0.0	0.0	20.4	0	0	32.776m A.O.D Top of Cover
BH11A	0.0	0.0	20.4	1	0	21.715m A.O.D Top of Cover
LG1	0.0	0.0	20.4	0	0	
LG2	0.0	0.4	20.2	0	0	
LG3	0.0	0.8	19.4	1	1	
LG4	0.0	1.1	19.4	1	0	
LG5	0.0	0.0	20.2	2	0	
LG6	0.0	0.0	20.2	1	0	
LG7	0.0	0.0	20.4	0	0	
PZ8	0.0	0.2	20.4	0	0	Constructed 26/02/12
PZ9	0.0	0.0	20.4	0	0	Constructed 26/02/12
PZ10	0.0	0.0	20.4	0	0	Constructed 26/02/12

LANDFILL GAS MONITORING FORM		
<b>Facility Name:</b> Drogheda Landfill	<b>Facility Address:</b> Mell Drogheda	
<b>Waste Licence no.:</b> W0033-01		
<b>Licensee:</b> Drogheda Borough Council		
<b>Date of licensing:</b>	<b>Date of sampling:</b> 27-09-2017	<b>Time of sampling:</b> 15.00hrs
<b>Instrument used:</b> GEM5000	<b>Date Next Full Calibration:</b> December 2017	
	<b>Last Field Calibration:</b> (include date and gases)	
<b>Monitoring Personnel:</b> Damien Holmes	<b>Weather:</b> Dry	<b>Barometric pressure:</b> 1020mb

Results						
Sample Station Number	CH <sub>4</sub> (%v/v)	CO <sub>2</sub> (% v/v)	O <sub>2</sub> (% v/v)	CO ppm	H <sub>2</sub> S ppm	Comments
BH1A	0.0	0.0	20.4	0	0	31.953m A.O.D Top of Cover
BH2A	0.0	0.2	20.4	0	0	32.362m A.O.D Top of Cover
BH3A	0.0	1.1	19.2	0	3	33.664m A.O.D Top of Cover
BH4A	0.0	0.0	20.4	0	0	33.570m A.O.D Top of Cover
BH5A	0.0	0.4	20.2	2	0	36.130m A.O.D Top of Cover
BH6A	0.0	0.2	20.4	0	0	35.951m A.O.D Top of Cover
BH7A	0.0	0.2	20.4	0	0	25.172m A.O.D Top of Cover
BH8A	0.0	0.0	20.4	1	0	36.151m A.O.D Top of Cover
BH9A	0.0	0.2	20.4	0	0	34.345m A.O.D Top of Cover
BH10A	0.0	0.2	20.2	0	2	32.776m A.O.D Top of Cover
BH11A	0.0	0.0	20.4	1	0	21.715m A.O.D Top of Cover
LG1	0.0	0.2	20.2	1	0	
LG2	0.0	0.2	20.4	1	0	
LG3	0.2	1.2	18.8	0	0	
LG4	0.0	1.4	19.0	0	0	
LG5	0.0	0.2	20.4	0	0	
LG6	0.0	0.2	20.4	1	0	
LG7	0.0	0.0	20.2	0	0	
PZ8	0.0	0.0	20.4	0	0	Constructed 26/02/12
PZ9	0.0	0.2	20.4	1	0	Constructed 26/02/12
PZ10	0.0	0.0	20.2	0	0	Constructed 26/02/12

LANDFILL GAS MONITORING FORM		
<b>Facility Name:</b> Drogheda Landfill	<b>Facility Address:</b> Mell Drogheda	
<b>Waste Licence no.:</b> W0033-01		
<b>Licensee:</b> Drogheda Borough Council		
<b>Date of licensing:</b>	<b>Date of sampling:</b> 20-10-2017	<b>Time of sampling:</b> 11.00hrs
<b>Instrument used:</b> GEM5000	<b>Date Next Full Calibration:</b> December 2017	
	<b>Last Field Calibration:</b> (include date and gases)	
<b>Monitoring Personnel:</b> Damien Holmes	<b>Weather:</b> Dry	<b>Barometric pressure</b> 1020mb

Results						
Sample Station Number	CH <sub>4</sub> (%v/v)	CO <sub>2</sub> (% v/v)	O <sub>2</sub> (% v/v)	CO ppm	H <sub>2</sub> S ppm	Comments
BH1A	0.0	0.0	20.2	0	0	31.953m A.O.D Top of Cover
BH2A	0.0	0.2	20.4	0	0	32.362m A.O.D Top of Cover
BH3A	0.0	1.1	19.4	0	3	33.664m A.O.D Top of Cover
BH4A	0.0	0.0	20.4	0	0	33.570m A.O.D Top of Cover
BH5A	0.0	0.4	20.0	2	0	36.130m A.O.D Top of Cover
BH6A	0.0	0.2	20.4	0	0	35.951m A.O.D Top of Cover
BH7A	0.0	0.2	20.4	0	0	25.172m A.O.D Top of Cover
BH8A	0.0	0.0	20.4	1	0	36.151m A.O.D Top of Cover
BH9A	0.0	0.2	20.4	0	0	34.345m A.O.D Top of Cover
BH10A	0.0	0.2	20.0	0	2	32.776m A.O.D Top of Cover
BH11A	0.0	0.0	20.4	1	0	21.715m A.O.D Top of Cover
LG1	0.0	0.2	20.2	1	0	
LG2	0.0	0.2	20.4	1	0	
LG3	0.2	1.1	18.8	0	0	
LG4	0.0	1.2	19.0	0	0	
LG5	0.0	0.2	20.4	0	0	
LG6	0.0	0.2	20.4	1	0	
LG7	0.0	0.0	20.2	0	0	
PZ8	0.0	0.0	20.4	0	0	Constructed 26/02/12
PZ9	0.0	0.2	20.4	1	0	Constructed 26/02/12
PZ10	0.0	0.0	20.2	0	0	Constructed 26/02/12



**LANDFILL GAS MONITORING FORM**

<b>Facility Name:</b> Drogheda Landfill		<b>Facility Address:</b> Mell Drogheda	
<b>Waste Licence no.:</b> W0033-01			
<b>Licensee:</b> Drogheda Borough Council			
<b>Date of licensing:</b>	<b>Date of sampling:</b>	<b>Time of sampling:</b>	
	23-11-2017	12.00hrs	
<b>Instrument used:</b> GEM5000	<b>Date Next Full Calibration:</b> December 2017		
	<b>Last Field Calibration:</b> (include date and gases)		
<b>Monitoring Personnel:</b>	<b>Weather:</b>	<b>Barometric pressure</b>	
Damien Holmes	Dry	1016mb	

**Results**

Sample Station Number	CH <sub>4</sub> (%v/v)	CO <sub>2</sub> (% v/v)	O <sub>2</sub> (% v/v)	CO ppm	H <sub>2</sub> S ppm	Comments
BH1A	0.0	0.2	20.5	0	0	31.953m A.O.D Top of Cover
BH2A	0.0	0.3	20.6	0	0	32.362m A.O.D Top of Cover
BH3A	0.0	1.0	19.2	1	0	33.664m A.O.D Top of Cover
BH4A	0.0	0.2	20.2	1	0	33.570m A.O.D Top of Cover
BH5A	0.0	0.2	20.2	0	0	36.130m A.O.D Top of Cover
BH6A	0.0	0.2	20.4	0	0	35.951m A.O.D Top of Cover
BH7A	0.0	0.0	20.4	0	0	25.172m A.O.D Top of Cover
BH8A	0.0	0.2	20.2	0	0	36.151m A.O.D Top of Cover
BH9A	0.0	0.2	20.2	0	0	34.345m A.O.D Top of Cover
BH10A	0.0	0.0	20.4	0	0	32.776m A.O.D Top of Cover
BH11A	0.0	0.0	20.4	1	0	21.715m A.O.D Top of Cover
LG1	0.0	0.0	20.4	0	0	
LG2	0.0	0.4	20.4	0	0	
LG3	0.0	0.8	19.4	1	1	
LG4	0.0	1.	19.4	1	0	
LG5	0.0	0.0	20.2	2	0	
LG6	0.0	0.0	20.2	1	0	
LG7	0.0	0.0	20.6	0	0	
PZ8	0.0	0.2	20.4	0	0	Constructed 26/02/12
PZ9	0.0	0.2	20.4	0	0	Constructed 26/02/12
PZ10	0.0	0.0	20.4	0	0	Constructed 26/02/12

LANDFILL GAS MONITORING FORM		
<b>Facility Name:</b> Drogheda Landfill	<b>Facility Address:</b> Mell Drogheda	
<b>Waste Licence no.:</b> W0033-01		
<b>Licensee:</b> Drogheda Borough Council		
<b>Date of licensing:</b>	<b>Date of sampling:</b> 14-12-2017	<b>Time of sampling:</b> 14.00hrs
<b>Instrument used:</b> GEM5000	<b>Date Next Full Calibration:</b> December 2017	
	<b>Last Field Calibration:</b> (include date and gases)	
<b>Monitoring Personnel:</b> Damien Holmes	<b>Weather:</b> Dry	<b>Barometric pressure</b> 1020mb

Results						
Sample Station Number	CH <sub>4</sub> (%v/v)	CO <sub>2</sub> (% v/v)	O <sub>2</sub> (% v/v)	CO ppm	H <sub>2</sub> S ppm	Comments
BH1A	0.0	0.2	20.2	0	0	31.953m A.O.D Top of Cover
BH2A	0.0	0.0	20.4	0	1	32.362m A.O.D Top of Cover
BH3A	0.0	1.0	19.2	0	0	33.664m A.O.D Top of Cover
BH4A	0.0	0.0	20.4	0	2	33.570m A.O.D Top of Cover
BH5A	0.0	0.0	20.4	0	0	36.130m A.O.D Top of Cover
BH6A	0.0	0.0	20.4	0	0	35.951m A.O.D Top of Cover
BH7A	0.0	0.0	20.4	0	0	25.172m A.O.D Top of Cover
BH8A	0.0	0.0	19.8	0	0	36.151m A.O.D Top of Cover
BH9A	0.0	1.0	19.0	0	0	34.345m A.O.D Top of Cover
BH10A	0.0	0.2	20.4	0	1	32.776m A.O.D Top of Cover
BH11A	0.0	0.2	20.4	0	0	21.715m A.O.D Top of Cover
LG1	0.0	0.0	20.4	0	0	
LG2	0.0	0.2	20.1	1	0	
LG3	0.0	1.2	19.6	0	0	
LG4	0.0	0.6	19.6	0	1	
LG5	0.0	0.2	20.2	0	0	
LG6	0.0	0.2	20.0	0	0	
LG7	0.0	0.0	20.4	0	0	
PZ8	0.0	0.0	20.4	0	0	Constructed 26/02/12
PZ9	0.0	0.2	20.2	0	0	Constructed 26/02/12
PZ10	0.0	0.2	20.4	0	0	Constructed 26/02/12