



ANNUAL ENVIRONMENTAL REPORT

By

Louth County Council

To

Environmental Protection Agency

For

Waste licence Reference (W0033-01)

Reporting Period January – December 2014

DROGHEDA LANDFILL SITE COUNTY LOUTH



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ANNUAL ENVIRONMENTAL REPORT
JANUARY – DECEMBER 2014

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1.0 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 30th 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

AER Reporting Year	2014
Licence Register Number	W0033-01
Name of site	Drogheda Landfill Site
Site Location	Collon Road
NACE Code	3821
Class/Classes of Activity	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 and the 'status' is obtained from the Water Framework Directive website: 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 101,650m²).
- Reinforcement of the capping system using geogic 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 2014.

2.0 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.

3.0 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 30th 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 2014. 317 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 ¹	86,000 ¹	40,000 ¹	58,506 ¹	27,085 ¹
Waste Types	2002	2003	2004	2005	2006
Total	21,288 ¹	-	8,744	-	58,584 ²

Table 3.2 Waste Quantities (Tonnes) at Civic Waste Facility

Waste Types	2006	2007	2008	2009	2010	2011	2012	2013	2014
Accepted for Recycling	1,405		3,170	3,521	4,020	3,447	3,086	2,578	2,622
To landfill					52		390	387	317

Table 3.3 Waste Quantities Accepted for Recycling at Drogheda Civic Waste Facility in 2014

Material Type	EWC Codes	Tonnage	Name of Destination Facility(ies), or Collector(s) if Directly Exported
Mixed residual waste	20 03 01	317	Indaver Incinerator W0167-02
Garden	20 02 01	1,082	Dundalk Town Council W0034
Cardboard packaging	15 01 01	302	Dundalk Town Council W0034-02
Newspaper and magazines	20 01 01	135	Dundalk Town Council W0034-02

¹ 1997 to 2002 figures based on estimates.

² Capping material under the Capping and Restoration Contract.

Material Type	EWC Codes	Tonnage	Name of Destination Facility(ies), or Collector(s) if Directly Exported
Glass packaging	15 01 07	164	Glasson NI LN06/08
Metals (aluminium cans)	15 01 04	9	Tinnelly WMEX 20/01
Metals (steel cans)	15 01 04	23	Tinnelly WMEX 20/01
Metals (other metals non-packaging)	20 01 40	232	Tinnelly WMEX 20/01
plastic packaging	15 01 02	97	Shabra Plastics Licence No15/5
Textiles	20 01 11	35	Cookstown NI wmex01/11
wood packaging	15 01 03	168	Dundalk Town Council W0034-02
wood non-packaging	20 01 38	360	Dundalk Town Council W0034-02
lead acid batteries and accumulators	16 06 01*	15	Rilta W0192-02
Total		2,939	

4.0 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 (CWF) is open;

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

The following are accepted at the CWF;

- cardboard,
- magazines/paper,
- glass (green, brown, clear),
- aluminium drink cans,
- steel food tins,
- domestic plastics,
- textiles (e.g. clothes) and footwear,
- car and household batteries,
- scrap metal,
- wood,
- electrical and domestic appliances,
- green garden waste,
- miscellaneous,

All waste deposited at the CWF 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.

5.0 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 6.12.

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 750m³/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 111,132.0 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)	252,845.0
Methane flared	141,714.0
Methane utilised in engine/s	0.0
Net Methane Emission	111,131.0

5.1.1 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 101,650m² has been 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 equate to 2,568 m³ to 10,060 m³ 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 6.9.

5.1.2 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 6.10.

Condensate from the landfill gas extraction system is currently transported off site to Drogheda wastewater treatment plant via tanker. An estimated 25 m³ was sent for disposal. The estimated volume discharged from Civic Waste Facility (area 13,500 m²) is approximately 12,517 m³ for 2014. This is within the volume limit of the licence.

6.0 SUMMARY OF RESULTS AND INTERPRETATIONS OF ENVIRONMENTAL MONITORING, INCLUDING PLANS OF ALL MONITORING LOCATIONS INCLUDING 12 DIGIT GRID REFERENCES

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 values³ (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 (GWR 2010).
- 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).

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. IBR0509/100 Monitoring Locations in Appendix C.

Table 6.1 Grid References of Monitoring Points

Monitoring Points	Easting	Northing
Groundwater Boreholes		
BH1A	306777	276414
BH2A	306869	276471
BH3A	307055	276063
BH4A	306959	276523

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

Monitoring Points	Easting	Northing
BH5A	307047	276563
BH6A	307182	275918
BH7	307239	276620
BH8A	307246	275890
BH9A	307394	275853
BH10A	307500	275928
BH11A	307699	276158
Surface Water		
SW1	307164	276270
SW2	307414	276470
SW3	307388	275910
Gas Piezometers		
LG1	306773	276393
LG2	306820	276330
LG3	306867	276283
LG4	306913	276218
LG5	306949	276171
LG6	307564	276281
LG7	307580	276241
LG8	TBS ⁴	TBS
LG9	TBS	TBS
LG10	TBS	TBS
Leachate		
L1A	307021	276228
L2A	307028	276337
L3A	307216	276378

⁴ Monitoring points to be surveyed

Monitoring Points	Easting	Northing
L4A	307291	276334
L5A	307359	276279
Noise		
N1	306786	276384
N2	306850	276238
N3	307311	275840
Dust		
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 BH7 provide an indication of the up-gradient baseline groundwater characteristics whilst BH3a, BH6a, BH8a, BH9a, BH10a and BH11a considered as intermediate and downgradient locations.

BH6A, BH8A and BH9A typify the down-gradient 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 down-gradient 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 2014 from groundwater monitoring boreholes throughout the monitoring period.

Table 6.3 Summary of 2014 Results from Groundwater Monitoring Boreholes

	Units	No. of Samples	Minimum	Maximum	Mean	Standard Deviation
Alkalinity	mg/l CaCO ₃	10	142	353	226	61
Aluminium	ug/l	42	<10.0	13	11	
Ammonia	mg/l N	42	<0.020	5.8	1.16	2.21
Antimony	ug/l	42	<1.0	1.2	1.20	
Arsenic	ug/l	42	<1.0	15	10.10	
Barium	ug/l	42	10	99	41.38	21.01
Beryllium	ug/l	42	<1.0	<1.0		
Boron	µg/l	42	11	190	66.21	54.93
Cadmium	µg/l	42	0.02	0.39	0.07	0.09
Calcium	mg/l Ca	42	39	160	92.67	30.83
Chloride	mg/l Cl	42	12	77	32.50	16.98
Chromium	µg/l	42	<1.0	12	2.96	2.65
Cobalt	µg/l	42	<1.0	<1.0		
Coliform Bacteria	(No/100 ml)	10	0	365	127.11	120.66
Conductivity	µS/cm @ 25	42	330	922	621	174
Copper	µg/l	42	<1.0	6.6	2.68	1.54
Cyanide	mg/l	10	<0.05	<0.05		

	Units	No. of Samples	Minimum	Maximum	Mean	Standard Deviation
D.O.	% Saturation	42	24	93	63.38	18.42
E_ Coli	No/100 ml	10	0	3	0.80	1.23
Fluoride	mg/l	10	0.15	0.22	0.18	0.03
Iron	µg/l	42	<10.0	50	20.25	11.43
Lead	µg/l	42	<0.002	<0.002		
Magnesium	mg/l Mg	42	2.5	29	9.80	6.60
Manganese	µg/l	42	7	490	144	211
Mercury	µg/l	10	<0.050	<0.050		
Molybdenum	µg/l	42	<1.0	22	12.65	7.80
Nickel	µg/l	42	<1.0	24	7.01	8.97
Nitrite	mg/l N	42	0.004	0.643	0.10	0.24
o-Phosphate	mg/l P	21	0.012	0.039	0.03	0.01
pH	0	42	7.1	8.1	7.42	0.30
Phenol	mg/l	42	<0.002	<0.002		
Potassium	mg/l	42	0.32	39	8.31	10.38
Sampling Depth	m	42	9.4	29.1	22.74	5.25
Selenium	µg/l	42	<1.0	110	50	54
Sodium	mg/l	42	8.1	42	18.18	8.58
Strontium	µg/l	42	86	260	156	53
Sulphate	mg/l SO4	21	4.9	125.6	39.67	41.97
Temp	°C	42	8.6	16.6	11.33	1.78
Thallium	µg/l	42	<1.0	2.4	2.20	0.28
T.O.C.	mg/l	42	1.5	17.4	3.89	3.25
T.O.N	mg/l N	42	0.2	11	3.10	3.07
Uranium	µg/l	42	<1.0	17	3.29	4.73
Vanadium	µg/l	42	<1.0	7.4	4.43	2.33
Zinc	µg/l	42	2.3	25	9.30	6.00

6.3 UP-GRADIENT

The pH levels for all up-gradient boreholes remain between the IGV and DWR of 6.5 and 9.5.

All up-gradient boreholes Electrical Conductivity levels were below the IGV of 1,000µS/cm and DWR of 2,500µS/cm.

Ammonia concentrations were below the GWR 2010 (0.175 mg/l N), IGV (0.15 mg/l) and DWR (0.30 mg/l) throughout the year.

Chloride levels exceeded the IGV of 30 mg/l in BH4A. All boreholes up-gradient were below the GWR 2010 (187.5 mg/l Cl) and DWR (250 mg/l). The highest chloride level was 77 mg/l in BH3A.

Elevated concentrations of potassium were consistently recorded at BH3A and BH7A. Potassium levels were highest in BH7A in September (39 mg/l).

Aluminium, Antimony, Barium, Boron, Calcium, Cadmium, Chromium, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Nitrite, Sodium and Zinc concentrations were below the GWR 2010, DWR and IGV.

Arsenic exceeded the GWR 2010 at BH7A in September and November. Selenium exceeded the DWR at BH7A in 3 of the 4 monitoring dates.

All up gradient boreholes showed no abnormal change in TOC and TON concentrations.

Total Phenol levels were analysed and were less than the lower detection limit for the methodology used. (This varies throughout the monitoring period) and as a result could be below the IGV of 0.5 µg/l. Ortho-Phosphate exceeded the IGV at BH1A and BH2A in April

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

- Strontium
- Vanadium
- Uranium⁵

Cyanide concentration of <0.05 mg/l were detected in all upgradient boreholes. This concentration is the lowest limit of detection for the methodology used for cyanide; therefore this could be lower than the WTL and IGV of 0.01 mg/l. The results were below the DWR of 0.05 mg/l.

All other parameters were below the IGV, GWR 2010 and DWR for those comparable or below the limit of detection.

⁵ 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.

6.4 DOWN GRADIENT

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

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

Ammonia concentrations were below the GWR 2010 (0.175 mg/l N), IGV of 0.15 mg/l and the DWR of 0.3 mg/l

Chloride levels exceeded the IGV of 30 mg/l in BH3A and BH10A. All boreholes up-gradient were below the GWR 2010 (187.5 mg/l Cl) and DWR (250 mg/l). The highest chloride level was 69 mg/l in BH3A.

Elevated concentrations of potassium were consistently recorded BH11A. BH10A concentrations of potassium slightly exceeded the IGV throughout the monitoring period. Potassium levels were highest in BH11A in April (24 mg/l).

Aluminium, Antimony, Arsenic Barium, Cadmium, Chromium, Lead, Iron, Manganese Molybdeum Sodium, Nickel, Nitrite, Zinc concentrations were below the GWR 2010, DWR and IGV.

As with the up gradient boreholes, all down gradient boreholes also showed no abnormal change in TOC concentrations.

TON levels were highest downstream in BH3A (6.9 mg/l) in September. The concentrations in the remaining borehole show no significant fluctuations over the past year of monitoring.

Total Phenol levels were analysed and were less than the lower detection limit for the methodology used. (This varies throughout the monitoring period) and as a result could be below the IGV of 0.5 $\mu\text{g}/\text{l}$.

Concentrations above the limit of detection were measured for Strontium.

Cyanide concentration of <0.05 mg/l were detected in all down gradient boreholes. This concentration is the lowest limit of detection for the methodology used for cyanide; therefore this could be lower than the WTL and IGV of 0.01 mg/l. The results are below the DWR of 0.05 mg/l.

All other parameters were below the IGV, GWR 2010 and DWR for those comparable or below the limit of detection.

6.5 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 IGV and DWR of 6.5 and 9.5.

Ammonia concentration ranged from 0.085 to 5.8 mg/l N during the monitoring period. BH5A exceeded the GWR 2010 (0.175 mg/l N), IGV (0.15 mg/l) and DWR (0.30 mg/l) for ammonia for the majority of the year.

Chloride concentrations were above the IGTV of 30 mg/l but were below the GWR 2010 of 187.5 mg/l C (ranging between 37 and 54 mg/l).

Elevated concentrations of manganese and potassium were recorded above the IGTV during the monitoring period. These parameters exceeded the IGTV in 3 of the 4 monitoring dates.

Aluminium, Barium, Electrical Conductivity, Cadmium, Chromium, Iron, Molybdenum, Sodium, Zinc concentrations were below the GWR 2010, DWR and IGTV.

Nitrite (0.643 ug/l) and Nickel (23.0 ug/l) concentrations above the IGTV were also recorded

Total Phenol levels were analysed and were less than the lower detection limit for the methodology used. (This varies throughout the monitoring period) and as a result could be below the IGTV of 0.5µg/l.

BH5A recorded the highest TON concentration (9.2 mg/l) during the monitoring period.

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

- Strontium;
- Thallium;
- Uranium⁶.

All other parameters were below the IGTV, GWR 2010 and DWR for those comparable or below the limit of detection.

6.6 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 and manganese within BH5a and manganese, iron, nickel and barium within BH4a have regularly been recorded above typical background concentrations for the general region in addition to the IGTV and GWR. 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.

6.7 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, IGTV and GWR 2010. Monitoring point SW2 is located in the cement works pond, which is adjacent and up-gradient of the site.

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.

⁶ 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.

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

Table 6.5 provides a summary of results in 2014 from quarry surface water locations throughout the monitoring period.

Table 6.5 Summary of 2014 Results from surface water Monitoring locations

	Units	No. of Samples	Minimum	Maximum	Mean	Standard Deviation
Alkalinity	mg/l CaCO ₃	3	142	144	143	1
Aluminium	ug/l	12	<10.0	12		
Ammonia	mg/l N	12	<0.020	0.11		
Antimony	ug/l	12	<1.0	1.4		
Arsenic	ug/l	12	<1.0	1.2		
Barium	ug/l	12	38	77	57	16
Beryllium	ug/l	12	<1.0	<1.0		
B.O.D.	mg/l O ₂	12	<1.0	1.8		
Boron	µg/l	12	170	200	179	10
Cadmium	µg/l	12	<0.020	<0.020		
Calcium	mg/l Ca	12	35	52	42	7
C.O.D.	mg/l O ₂	12	<20	26		
Chloride	mg/l Cl	12	52	69	62	6
Chromium	µg/l	12	<1.0	<1.0		
Cobalt	µg/l	12	<1.0	<1.0		
Conductivity	µS/cm @ 25	12	469	534	511	24
Copper	µg/l	12	1	1.3	1	1

	Units	No. of Samples	Minimum	Maximum	Mean	Standard Deviation
D.O.	% Saturation	12	71	108	96	10
Iron	µg/l	12	<10.0	18	14	7
Lead	µg/l	12	<1.0	<1.0		
Magnesium	mg/l Mg	12	8.8	21	13	5
Manganese	µg/l	12	5.5	19	10	7
Mercury	µg/l	3	<0.050	<0.050		
Molybdenum	µg/l	12	<1.0	2.2	1.6	0.9
Nickel	µg/l	12	1.3	4.9	3.4	1.4
Nitrite	mg/l N	12	<0.004	<0.004		
o-Phosphate	mg/l P	6	<0.010	0.01	0	0
pH	0	12	8	8.6	8.3	0.2
Phenol	mg/l	12	<0.002	<0.002		
Potassium	mg/l	12	6.9	30	14	9
Selenium	µg/l	12	<1.0	1.4	1	1
Sodium	mg/l	12	22	42	34	8
Strontium	µg/l	12	110	190	139	32
Sulphate	mg/l SO4	6	27.6	44.3	33.2	19.2
Suspended Solids	mg/l	12	4	8	6	3
Temp	°C	12	5.5	18	11	5
Thallium	µg/l	12	<1.0	<1.0		
T.O.N	mg/l N	12	<0.20	0.2		
Uranium	µg/l	12	<1.0	<1.0		
Vanadium	µg/l	12	<1.0	<1.0		
Zinc	µg/l	12	1.8	12	5	3

6.8 QUARRY LAKE

SW1, SW2, SW3 were below the DWR, IGV and GWR 2010 for the following parameters, Aluminium, Ammonia, Antimony, Arsenic, Barium, Boron, Cadmium, Calcium, Chromium, Conductivity, Copper Iron, Lead, Magnesium Manganese, Mercury, Molybdenum, Nickel, Nitrite, pH, Sodium, and Zinc.

Potassium exceeded the IGV of 5 mg/l in all locations. Chloride concentrations were above the IGV of 30 mg/l in all locations but were within the GWR 2010 overall threshold value range of 24-187.5 mg/l Cl. TON concentrations ranged from <0.20 mg/l to 0.2 mg/l. Dissolved oxygen ranged from 71% to 104%.

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

- Selenium SW2 (1.4 µg/l)
- Strontium (ranging 110 µg/l to 190 µg/l).

All locations recorded < (less than) the limit of detection for phenol. Phenol concentration were <0.002 mg/l. These are the lower limit of detection for the methodology used and as a result could be below the IGV of 0.5µg/l.

All other parameters were below the IGV, GWR 2010 and DWR for those comparable or below the limit of detection.

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6.9 CAPPED AREA

Table 6.6 provides a summary of results in 2014 from surface water locations throughout the monitoring period.

Table 6.6 Summary of 2014 Results from Capped Area

	Units	No. of Samples	Minimum	Maximum	Mean	Standard Deviation
Alkalinity	mg/l CaCO ₃	2	333	367	350	24
Aluminium	ug/l	8	23	26	25	11
Ammonia	mg/l N	8	0.023	0.34	0.10	0.11
Antimony	ug/l	8	<1.0	<1.0		
Arsenic	ug/l	8	<1.0	<1.0		
Barium	ug/l	8	41	55	48	23
Beryllium	ug/l	8	<1.0	<1.0		
B.O.D.	mg/l O ₂	8	<1.0	3.2		
Boron	µg/l	8	29	48	36	18
Cadmium	µg/l	8	0.02	0.14	0.05	0.05
Calcium	mg/l Ca	8	110	140	123	58
C.O.D.	mg/l O ₂	8	<20	20	20	7
Chloride	mg/l Cl	8	14	18	16	8
Chromium	µg/l	8	<1.0	<1.0		
Cobalt	µg/l	8	<1.0	<1.0		
Conductivity	µS/cm @ 25	8	630	730	682	317
Copper	µg/l	8	2.2	3.3	2.7	1.3
D.O.	% Saturation	8	19	98	70	42
Iron	µg/l	8	14	15	15	7
Lead	µg/l	8	<1.0	<1.0		
Magnesium	mg/l Mg	8	6.9	11	9	4
Manganese	µg/l	8	8.9	11	10	5
Mercury	µg/l	2	<0.050	<0.050		

	Units	No. of Samples	Minimum	Maximum	Mean	Standard Deviation
Molybdenum	µg/l	8	<1.0	1.8	1	1
Nickel	µg/l	8	<1.0	<1.0		
Nitrite	mg/l N	8	0.021	0.057	0.0	0.0
o-Phosphate	mg/l P	4	0.016	0.018	0	0
pH	0	8	7.5	7.8	8	4
Phenol	mg/l	8	<0.002	<0.002		
Potassium	mg/l	8	0.73	3.1	1.6	1.1
Selenium	µg/l	8	<1.0	<1.0		
Sodium	mg/l	8	8.5	13	11	5
Strontium	µg/l	8	200	270	235	111
Sulphate	mg/l SO4	4	18.7	28.5	24	14
Suspended Solids	mg/l	8	4	7	6	3
Temp	°C	8	9.1	14.5	11	6
Thallium	µg/l	8	<1.0	<1.0		
T.O.N	mg/l N	8	0.32	1.1	0.7	0.4
Uranium	µg/l	8	1.9	2.9	2	1
Vanadium	µg/l	8	<1.0	<1.0		
Zinc	µg/l	8	1.6	7.1	5	3

SW4 and SW5 monitor the surface water arising from the capped area. The majority of the parameters were below the lower level of detection for the methodology used for analysis or the Surface Water Quality Standards (SWQS) laid out in the European Communities (Quality of Surface Water Intended for the Abstraction of Drinking Water) Regulations 1989, European Communities Environmental Objectives (Surface Water) Regulations 2009 Environmental quality standard (EQS) and the European communities (Drinking Water) (No. 2) Regulations 2007 parametric value (DWR) were comparable.

Barium, BOD, COD, Cadmium, Chromium, Chloride, Dissolved Oxygen, Electrical Conductivity, Lead, Iron, Nickel, Nitrite Potassium ,pH, Total Suspended Solids, were below the SWQS, EQS and DWR.

Ammonia concentrations were above the EQS and DWR at SW5 in September. Phenol concentration were <0.002 mg/l. These are the lower limit of detection for the methodology used and as a result could be below the IGW of 0.5 µg/l. Dissolved Oxygen levels ranged from 19 to 98%.

TON concentrations ranged from 0.32 mg/l to 1.1 mg/l.

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

- Strontium

- Uranium

All other parameters were below the IGV, GWR 2010 and DWR for those comparable or below the limit of detection.

6.10 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 m²) was approximately 12,517 m³ for 2014. This is within the limit of the licence.

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

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	Jan	April	Sept	Nov
BOD ₅	335	1.5	<1.0	2.2	3.0
COD	450	<20	<20	25	<20
Ammoniacal Nitrogen NH ₄ -N	35	0.032	nm	2.8	0.14
Suspended Solids	294	6	4	<4	6
Sulphates (as SO ₄)	240	14.9	20.9	6	6
pH	6 – 9	7.8	7.8	7.5	7.5
Temperature	32°C	8.0	12.1	16.2	10.3

6.11 PERIMETER GAS MONITORING

The licence trigger levels for the following landfill gases are greater than or equal to 1.0% v/v Methane and greater than or equal to 1.5% v/v Carbon Dioxide. Landfill gas monitoring results have been provided for the period and are shown in Appendix F. Monitoring was not undertaken during January and June.

From the results it can be seen that methane (CH₄) was detected around the perimeter of the site (LG1 – LG9). Readings ranged from 0.1% v/v to 0.4% v/v which is below the trigger level.

LG3 and LG4 exceed the carbon dioxide licence requirements of 1.5% v/v during the monitoring period.

In the groundwater boreholes (BH1A to BH11A) from the results it can be seen that methane was not detected greater than 0.4% v/v. BH3A and BH5A exceed the carbon dioxide trigger level of 1.5% v/v.

6.12 FLUE GAS MONITORING

Flue gas monitoring was also undertaken 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, NO_x as NO₂ and SO₂ results were within the typical emission limit values used for such installations in Ireland.

6.13 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/m²/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/m²/day)

Sampling Location	Dust Monitor 1	Dust Monitor 2	Dust Monitor 3	Dust Monitor 4
January	203.0	87.8	48.1	67.2
August	38.8	42.6	60.7	36.1
September	116.3	65.6	41.0	225.4
November	110.7	64.0	20.5	15.9

6.14 NOISE

The measurements were completed on Tuesday and Wednesday 25th and 26th November 2014 in accordance with the following environmental noise standards:

- ISO 1996: 2007 Acoustics – Description and Measurement of Environmental Noise, Parts 1-4
- EPA Guidance Note for Noise (NG4) 2012

The range of noise levels at each noise sensitive location during respective measuring periods were as follows:

- NSL 1: Daytime: LAeq (T 30 min) 77-76 dBA;
Evening time: LAeq (T 15 min) constant at 72dBA;
Night time: LAeq (T 15 min) 65-53 dBA
- NSL 2: Daytime: LAeq (T 30 min) 78-77 dBA;
Evening time: LAeq (T 15 min) constant at 72 dBA;
Night time: LAeq (T 15 min) constant at 65-60 dBA.
- NSL 3: Daytime: LAeq (T 30 min) constant at 66dBA;
Evening time: LAeq (T 15 min) constant at 68dBA;
Night time: LAeq (T 15 mins) 55-48dBA

The report found that traffic was found to be the predominant source of noise at all locations. Reduced traffic noise levels during the night-time measuring period provides a more accurate representation of background noise against which any potential noise levels arising from the site activities could be compared. The findings show that during the night-time measurements and during lulls in traffic noise there was no noise audible from the landfill site. Hence it is considered to be in compliance with NG4 and the requirements of Waste Licence W0033.

6.15 ECOLOGY

An assessment of the ecology of the Quarry Lake and adjoining habitats was undertaken on 11th September 2013. This has been submitted to the EPA.

7.0 RESOURCE 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. Consumption of resources for the reporting period is shown in Table 7.1 below.

Table 7.1 Consumption of Resources

Parameters	Unit	CWF and Landfill 2013	CWF and Landfill 2014	Energy Consumption +/- %
Water	m ³	340	310	-9
Electricity	kWh	3,560	3,120	-13

8.0 DEVELOPMENT WORKS

8.1 PROPOSED DEVELOPMENT OF THE SITE AND TIMESCALE OF SUCH DEVELOPMENT

Completion of Phase 2 of capping works when consultation with landowners re - historical waste deposited outside the facility boundary is complete.

8.2 REPORT ON DEVELOPMENT WORKS UNDERTAKEN DURING THE REPORTING PERIOD, AND THOSE PROPOSED DURING THE COMING YEAR

No development works were undertaken in 2014. There are no proposed development works to be undertaken in 2015.

8.3 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.

9.0 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 3,000m²). 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 25 m³ was sent for disposal.

9.1 MONTHLY WATER BALANCE CALCULATION AND INTERPRETATION

The calculation for monthly water balance is as follows

$$L_o = [ER (A) + LW + IRCA + ER (1)] - [aW]$$

Where;

L_o = leachate produced (m³)

ER = effective rainfall

A = area of cell (m²)

LW = liquid waste

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

a = absorptive capacity of waste (m³/t)

W = weight of waste deposited

I = surface area of lagoons (m²)

A water balance calculation for 2014 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 2014 will be in the range of 2,568 m³ to 10,060 m³.

10.0 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. A topographical survey was also undertaken in 2014.

11.0 ESTIMATED ANNUAL AND CUMULATIVE QUANTITIES OF LANDFILL GAS EMITTED FROM THE SITE

A 750m³/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 2014 was 183 m³/hr. The average methane concentration was 25% v/v. The total hours run was 4,632.

The landfill gas extraction system shut down periodically during 2014 due to a low flow or low methane levels. Once landfill gas flow and concentration are sufficient the flare was restarted.

12.0 ESTIMATED ANNUAL AND CUMULATIVE 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 3,000m²). 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 25 m³ 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 2014 will be in the range of 2,568 m³ to 10,060 m³.

13.0 ENVIRONMENTAL OBJECTIVES AND TARGETS

13.1 SCHEDULE OF ENVIRONMENTAL OBJECTIVES AND TARGETS FOR THE FORTHCOMING YEAR

Objectives and targets to be undertaken in 2015 for Drogheda Landfill Site are as follows:

- Continue to liaise with landowners re - historical waste deposited outside the facility boundary. This is an ongoing process.

- Investigate downsizing flare to improve run times

14.0 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.

15.0 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.

16.0 REPORTED INCIDENTS AND COMPLAINTS SUMMARIES

No complaints were reported to the EPA during the monitoring period. One incident was reported in 2014 as shown on Table 16.1

Table 16.1 Incidents for 2014

Incident	Description of Incident
16/11/2014 Category 1	Slip of top 1 Meter of final cap on the side slope of Drogheda landfill. Area Approx 10m x 50m. The geo grid and liner are still in place and in tact. It looks like water caused the slippage due to the extremely wet weather over the past week. A Review of Slope Failure report has been completed and sent to EPA containing recommendations on actions to be undertaken for approval.

17.0 REPORTS ON FINANCIAL PROVISION MADE UNDER THIS LICENCE, MANAGEMENT AND STAFFING STRUCTURE OF THE FACILITY, AND A PROGRAMME FOR PUBLIC

17.1 MANAGEMENT AND STAFFING STRUCTURE

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

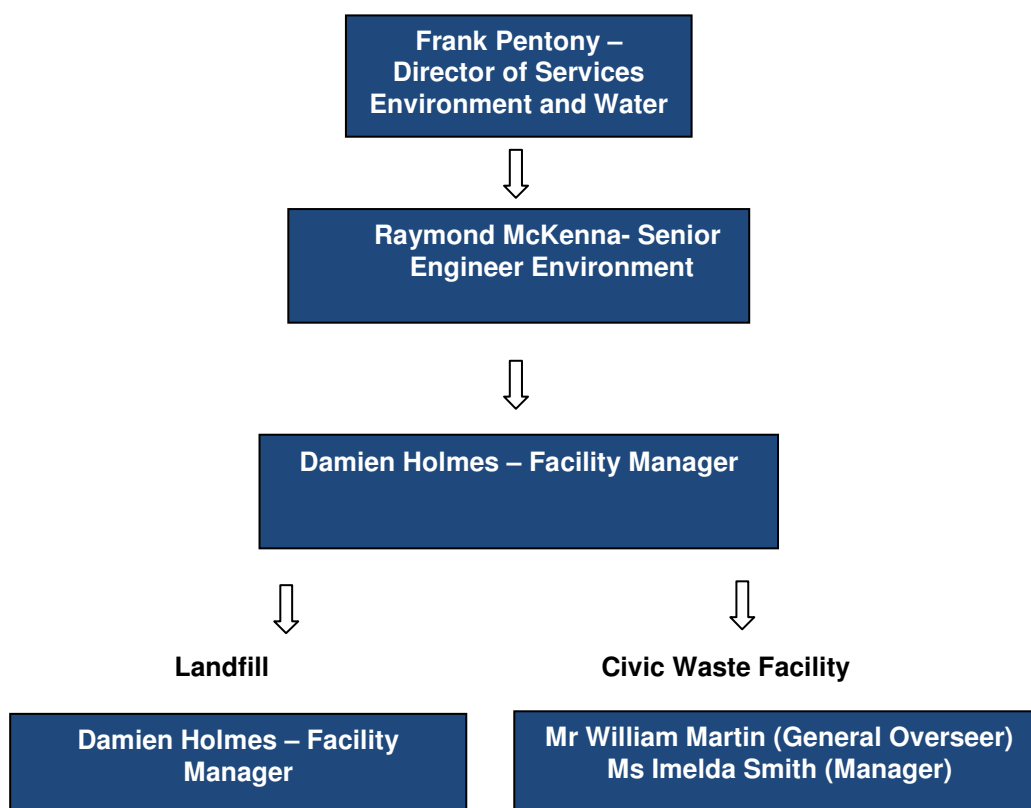


Figure 17.1 Management Structure at Drogheda Landfill Site

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

17.2 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 €2.00 entrance charge is applicable to all users of the site except for the disposal of electrical goods.

Funding is provided by Drogheda Borough Council for all monitoring requirements.

17.3 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



| PRTR# : W0033 | Facility Name : Drogheda Landfill - Drogheda Borough Council |
 Filename : W0033_2014(1).xls | Return Year : 2014 |

02/04/2015 13:50

[Guidance to completing the PRTR workbook](#)

AER Returns Workbook

Version 1.1.18

REFERENCE YEAR	2014
-----------------------	------

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
AER Returns Contact Name	Damien Holmes
AER Returns Contact Email Address	damien.holmes@louthcoco.ie
AER Returns Contact Position	Executive Scientist
AER Returns Contact Telephone Number	042 9392920
AER Returns Contact Mobile Phone Number	086 6097315
AER Returns Contact Fax Number	041 6854623
Production Volume	0.0
Production Volume Units	
Number of Installations	0
Number of Operating Hours in Year	0
Number of Employees	6
User Feedback/Comments	Bigger difference between gas model prediction and the actual volume flared.
Web Address	

2. PRTR CLASS ACTIVITIES

Activity Number	Activity Name
50.1	General
50.1	General

3. SOLVENTS REGULATIONS (S.I. No. 543 of 2002)

Is it applicable?	
Have you been granted an exemption ?	
If applicable which activity class applies (as per Schedule 2 of the regulations) ?	
Is the reduction scheme compliance route being used ?	

4. WASTE IMPORTED/ACCEPTED ONTO SITE

[Guidance on waste imported/accepted onto site](#)

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

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

4.1 RELEASES TO AIR

[Link to previous years emissions data](#)

| PRTR# : W0033 | Facility Name : Drogheda Landfill - Drogheda Borough Council | Filename : W0033_2014(1).xls | Return Year : 2014 |

02/04/2015 13:50

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
		M			0.0	0.0	0.0	0.0
					0.0	0.0	0.0	0.0
					0.0	0.0	0.0	0.0

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

SECTION B : REMAINING PRTR POLLUTANTS

POLLUTANT		METHOD			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	Gassim minus actual flared	0.0	111131.0	0.0	111131.0

* 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		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: Please enter summary data on the quantities of methane flared and / or utilised	Drogheda Landfill - Drogheda Borough Council				
	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)	252845.0	C	Gassim model	from model	N/A
Methane flared	141714.0	C	Actual flared	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)	111131.0	C	Gassim minus actual flared	Net figure	N/A

5. ONSITE TREATMENT & OFFSITE TRANSFERS OF WASTE

| PRTR# : W0033 | Facility Name : Drogheda Landfill - Drogheda Borough Council | Filename : W0033_2014(1).xls | Return Year : 2014 |

02/04/2015 13:50

Please enter all quantities on this sheet in Tonnes

17

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	Haz Waste : Name and Licence/Permit No of Recover/Disposer	Haz Waste : Address 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)
						Non	Non		Non				
						M/C/E	Method Used						
Within the Country	15 01 01	No	302.0	paper and cardboard packaging	R3	M	Weighed	Offsite in Ireland	V&W Recycling,W0034-02		Newry Road ,Dundalk,Co Louth,.,Ireland		
Within the Country	15 01 02	No	97.0	plastic packaging	R3	M	Weighed	Offsite in Ireland	Shrabra,Licence No 15/5 Dundalk Town Coucil,W0034-02		Bree,Castleblayey,Co Monaghan ,Ireland		
Within the Country	15 01 03	No	168.0	wooden packaging	R3	M	Weighed	Offsite in Ireland	John Tinnelly & Sons,WMEX 20/01		Newry Road,.,Dundalk,.,Ireland Newtowncloughogue,Newry, Co Down,BT38 8LZ,United Kingdom		
To Other Countries	15 01 04	No	32.0	metallic packaging	R4	M	Weighed	Abroad	Glassdon ,NI licenceLN/06/08		52 Creagh Road,Toomebridge.Co Antrim,BT41 3SE,United Kingdom		
To Other Countries	15 01 07	No	164.0	glass packaging	R5	M	Weighed	Abroad				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	15.0	lead batteries	R4	M	Weighed	Offsite in Ireland	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 04	No	0.0	alkaline batteries (except 16 06 03) landfill leachate other than those mentioned	R4	M	Weighed	Offsite in Ireland	Rilta Environmental Ltd,Licence No W0192-02		Dublin,Ireland		
Within the Country	19 07 03	No	25.0	in 19 07 02	D9	C	Volume Calculation	Offsite in Ireland	Drogheda Waste Water Treatment Plant ,D0041-01		Marsh Road ,Drogheda ,Co Louth,.,Ireland		
Within the Country	20 01 01	No	135.0	newspaper and magazines	R3	M	Weighed	Offsite in Ireland	V&W Recycling,W0034-02		Newry Road ,Dundalk,Co Louth,.,Ireland		
To Other Countries	20 01 11	No	35.0	textiles	R3	M	Weighed	Abroad	Cookstown NI,WMEX 01/11		36 Magheralane Road,Randalstown,County Antrim,BT41 2NT,United Kingdom		
Within the Country	20 01 38	No	360.0	wood other than that mentioned in 20 01 37	R3	M	Weighed	Offsite in Ireland	V&W Recycling,W0034-02		Newry Road ,Dundalk,Co Louth,.,Ireland Newtowncloughogue,Newry, Co Down,BT38 8LZ,United Kingdom		
To Other Countries	20 01 40	No	232.0	metals	R4	M	Weighed	Abroad	John Tinnelly & Sons,WMEX 20/01		Newry Road ,Dundalk,Co Louth,.,Ireland		
Within the Country	20 02 01	No	1082.0	biodegradable waste	R3	M	Weighed	Offsite in Ireland	V&W Recycling,W0034-02		Newry Road ,Dundalk,Co Louth,.,Ireland		
Within the Country	20 03 01	No	317.0	mixed municipal waste	D5	M	Weighed	Offsite in Ireland	Indaver Ireland,W0167-02		Carranstown,Duleek,.,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 2014	Active Phase	Active Area A(m ²)	Waste Input t/year	Active Area Infiltration R(A)(m ³)	Liquid Waste LW(m ³)	Temporary Restored Area	Temporary Restored area infiltration IRCA(m ³)	Permanently Restored Area	Restored area infiltration IRCA(m ³)	Total Water	Cumulative Water	Absorptive Capacity aW(m ³)	Cumulative Absorptive Capacity	Cumulative leachate	Leachate produced Lo(m ³)
2014	Closed	0	0	927.20	0	3,000	695	101000	1873	2568	2568	0	0	2568	2568
Total				927											2568











<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 ³ . Estimated absorptive capacity	0.06	t/m ³
3. Rainfall data (R) taken from Dublin Airport (=		927.2	mm
4. Capping Area		101,000	m ²
Future permanent cap area		3,000	m ²

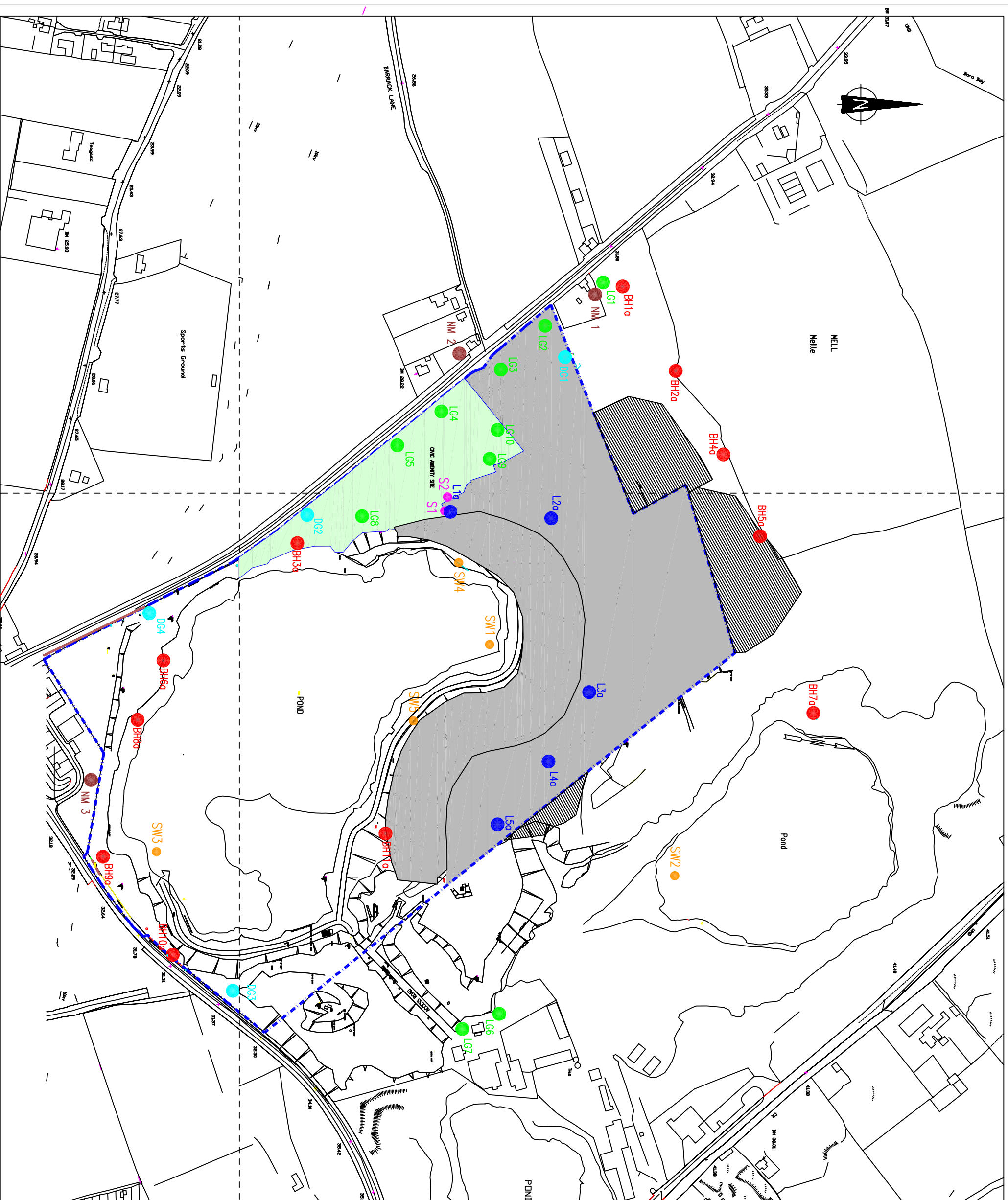
APPENDIX C

DRAWINGS

NOTES

1. Verifying Dimensions.
The contractor shall verify dimensions against such other drawings or site conditions as pertain to this part of the work.
2. Existing Services.
Any information concerning the location of existing services indicated on this drawing is intended for general guidance only. It shall be the responsibility of the contractor to determine and verify the exact horizontal and vertical alignment of all cables, pipes, etc. (both underground and overhead) before work commences.
3. Issue of Drawings.
Hard copies, .dwg and .pdf will form a controlled issue of the drawing. All other formats (.img, .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 call the recipient's drawing production, or setting out on site.
4. Datum:

5. Key
 -  Site Boundary
 -  Capped Area within Licensed Boundary
 -  Approx. Extent of Waste Outside Licensed Boundary
 -  L1 Leachate Borehole
 -  LG Landfill Gas Monitoring Point
 -  DG Dust Monitoring Gauge
 -  BH Groundwater Borehole
 -  NM Noise Monitor
 -  SW Surface Water Monitoring Point
 -  SI Sewer



rev	amendments	drawn	date

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Client
Drogheda Borough Council

Project
Drogheda Landfill Site

Title
Monitoring Locations

Drawing Status	Sheet Size	Drawing Scale
Preliminary	A3	1:4,000

Drawing Number	Rev
IBR0509/100	-

Project Leader	Drawn By	Date	Initial Review
DD	AMCG	May 2013	AMCG

APPENDIX D

GROUNDWATER RESULTS

Drogheda Landfill Site Groundwater Quality

Monitoring Point:		BH2A																		
Date Collected		DWR	IGV	2010 GW Regs	31-Jan-13	12-Feb-13	26-Mar-13	16-Apr-13	08-May-13	11-Jun-13	23-Jul-13	07-Aug-13	17-Sep-13	08-Oct-13	19-Nov-13	03-Dec-13	18-Feb-14	08-Apr-14	09-Sep-14	18-Nov-14
Alkalinity	mg/l CaCO3							348										353		
Aluminium	ug/l	200	200	150	<5			5.5			5.1			<5			<10.0	<10.0	<10.0	<10.0
Ammonia	mg/l N	0.23 mg/l N	0.11 mg/l N	0.175	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.020	<0.020	<0.020	0.021	<0.020	<0.020
Antimony	ug/l	5			<0.5			<0.5			<0.5			<0.5			<1.0	<1.0	<1.0	<1.0
Arsenic	ug/l		10	7.5	0.51			0.6			<0.5			<0.5			<1.0	<1.0	<1.0	<1.0
Barium	ug/l		100		69.8			63			64.2			62.9			56	57	57	55
Beryllium	ug/l				<0.5			<0.5			<0.5			<0.5			<1.0	<1.0	<1.0	<1.0
B.O.D.	mg/l O2																			
Boron	ug/l	1000	1000	750	19.3			28.5			30.3			33.1			58	36	32	25
Cadmium	ug/l	5	5	3.75	<0.1			<0.1			<0.1			<0.1			0.03	0.06	0.03	0.06
Calcium	mg/l Ca		200		118.55			124.92			128.86			128.36			140	130	120	110
C.O.D.	mg/l O2																			
Chloride	mg/l Cl	250	30		12			14			16			16			20	19	18	18
Chromium	ug/l	50	30	37.5	<0.5			1.5			1.4			1.4			2.2	<1.0	<1.0	1
Cobalt	ug/l				<0.5			<0.5			<0.5			<0.5			<1.0	<1.0	<1.0	<1.0
Coliform Bacteria	(No/100 ml)	0						10										365		
Conductivity	uS/cm @ 25	2500	1000	1875	675	694	691	707	724	722	719	726	730	728	738	735	719	724	703	664
Copper	ug/l	2000	30	1500	2.8			5.3			1.6			1.8			<1.0	2.1	2	2.7
Cyanide	mg/l	0.05	10					<0.05										<0.05		
D.O.	% Saturation				39			47			36						51	49	56	71
E. Coli	No/100 ml	0						0										3		
Fluoride	mg/l	0.8	1000					<0.150										0.16		
Iron	ug/l	200	200		<10			20			<10			<10			<10.0	<10.0	<10.0	<10.0
Lead	ug/l	25	10	18.75	<0.5			<0.5			<0.5			<0.5			<1.0	<1.0	<1.0	<1.0
Magnesium	mg/l Mg		50		10.03			11.3			11.42			11.27			9.4	<1.0	12	10
Manganese	ug/l	50	50		2.3			2.6			3.2			<1			<5.0	<5.0	<5.0	<5.0
Mercury	ug/l	1	1	0.75	nm			<0.05			nm			nm				<0.050		
Molybdenum	ug/l		35		<0.5			<0.5			<0.5			<0.5			<1.0	<1.0	<1.0	<1.0
Nickel	ug/l	20	20	15	<0.5			2.9			<0.5			1			<1.0	<1.0	<1.0	<1.0
Nitrite	mg/l N	0.5	0.1	0.375	<0.002			<0.002			<0.002			<0.002			<0.004	<0.004	<0.004	<0.004
o-Phosphate	mg/l P		30					0.04										0.033		
pH		6.5 - 9.5			7	7.2	7.1	7.1	7.1	7.1	7.1	7.2	7.2	7.1	7.2	7.2	7.2	7.2	7.4	7.1
Phenol	mg/l		0.0005		<0.002			<0.002			<0.002			<0.002			<0.002	<0.002	<0.002	<0.002
Potassium	mg/l		5		2.51			3.06			3.23			3.44			24	3.9	3.1	2.6
Sampling Depth	m				17.8	15.9	15.6	19.4	21	21.7	22.7	24.5	25	14.2	14.9	22.4	17	21.1	22	21.7
Selenium	ug/l	10			<0.5			0.7			0.7			<0.5			<1.0	<1.0	<1.0	<1.0
Silver	ug/l				nm			nm												
Sodium	mg/l	200	150	150	8.92			10.64			11.19			11.83			22	14	13	9.8
Strontium	ug/l				199.05			213.84			219.43			228.56			200	210	210	190
Sulphate	mg/l SO4	250	200	187.5				15.8										20.7		
Suspended Solids	mg/l																			
Temp	°C				9.4	7.4	6	11	11.5	11.3	21.4	14.5	10.5	15.2	9.2	nm	8.6	10.7	10.9	12.4
Thallium	ug/l				<0.1			0.11			<0.1			0.11			<1.0	<1.0	<1.0	<1.0
Time sampled					11:25	13:10	13:25	10:55	13:00	12:40	11:15	12:50	13:05	11:20	10:50	13:15	12:40	11:15	12:40	10:50
Tin (ug/l)	ug/l				nm			nm												
T.O.C.	mg/l	NAC			85.9			3.4			3.9			4.1			3.5	3.6	4.6	5.8
T.O.N	mg/l N		NAC		0.73			1.74			2			2.13			2.3	2.1	1.9	1.2
Total S Solids	mg/l																			
Uranium	ug/l				0.94			1.06			0.99			1.07			<1.0	1	1	<1.0
Vanadium	ug/l				0.75			<0.5			0.55			0.75			<1.0	<1.0	<1.0	<1.0
Zinc	ug/l		100		9.6			7.4			6.4			7.6			5.2	8.1	4.7	5.7
Water Level m OD		32.362			14.562	16.462	16.762	12.962	11.362	10.662	9.662		7.362		17.462		15.362	11.262	10.362	

Drogheda Landfill Site Groundwater Quality

Monitoring Point:		BH3A																			
Date Collected		DWR	IGV	2010 GW Regs	31-Jan-13	12-Feb-13	26-Mar-13	16-Apr-13	08-May-13	11-Jun-13	23-Jul-13	07-Aug-13	17-Sep-13	08-Oct-13	19-Nov-13	03-Dec-13	18-Feb-14	08-Apr-14	09-Sep-14	18-Nov-14	
Alkalinity	mg/l CaCO3							272										254			
Aluminium	ug/l	200	200	150	<5			<5			<5			5.2			<10.0	<10.0	<10.0	<10.0	
Ammonia	mg/l N	0.23 mg/l N	0.11 mg/l N	0.175	<0.03	0.03	<0.03	0.03	<0.03	<0.03	<0.03	<0.03	0.23	0.04	0.9	0.34	<0.020	0.058	<0.020	0.038	
Antimony	ug/l	5			<0.5			<0.5			<0.5			<0.5			<1.0	<1.0	<1.0	<1.0	
Arsenic	ug/l		10	7.5	<0.5			<0.5			<0.5			<0.5			<1.0	<1.0	<1.0	<1.0	
Barium	ug/l		100		56.6			54.5			54.3			56.5			63	53	50	44	
Beryllium	ug/l				<0.5			<0.5			<0.5			<0.5			<1.0	<1.0	<1.0	<1.0	
B.O.D.	mg/l O2																				
Boron	ug/l	1000	1000	750	52.7			56.4			61.6			59.4			31	66	66	58	
Cadmium	ug/l	5	5	3.75	<0.1			<0.1			<0.1			<0.1			0.04	0.03	0.06	0.05	
Calcium	mg/l Ca		200		128.73			135.93			139.73			134.28			130	140	140	120	
C.O.D.	mg/l O2																				
Chloride	mg/l Cl	250	30		54			62			56			51			77	67	63	51	
Chromium	ug/l	50	30	37.5	0.6			1.7			2			2			2.1	1.1	<1.0	1.4	
Cobalt	ug/l				<0.5			<0.5			<0.5			<0.5			<1.0	<1.0	<1.0	<1.0	
Coliform Bacteria	(No/100 ml)	0						14										>2420			
Conductivity	uS/cm @ 25	2500	1000	1875	849	822	840	883	895	889	879	862	864	874	903	901	922	898	882	812	
Copper	ug/l	2000	30	1500	1.1			0.8			<0.5			1.2			4.2	<1.0	2.1	<1.0	
Cyanide	mg/l	0.05	10					<0.05										<0.05			
D.O.	% Saturation				56			61			50			62			50	47	52	60	
E. Coli	No/100 ml	0						0										0			
Fluoride	mg/l	0.8	1000					<0.150										0.16			
Iron	ug/l	200	200		17.4			<10			<10			11.9			<10.0	<10.0	<10.0	<10.0	
Lead	ug/l	25	10	18.75	<0.5			<0.5			<0.5			<0.5			<1.0	<1.0	<1.0	<1.0	
Magnesium	mg/l Mg		50		8.18			8.89			9.09			9.03			12	9.5	9.6	7.9	
Manganese	ug/l	50	50		7.5			6.5			3.1			4.6			<5.0	<5.0	7.4	11	
Mercury	ug/l	1	1	0.75	nm			<0.05			nm			nm				<0.050			
Molybdenum	ug/l		35		<0.5			<0.5			<0.5			<0.5			<1.0	<1.0	<1.0	<1.0	
Nickel	ug/l	20	20	15	<0.5			0.8			<0.5			1			1.2	<1.0	<1.0	<1.0	
Nitrite	mg/l N	0.5	0.1	0.375	0.004			0.004			0.002			0.012			<0.004	0.006	0.005	0.043	
o-Phosphate	mg/l P		30					0.02										0.039			
pH		6.5 - 9.5			7.2	7.2	7.1	7.2	7.2	7.2	7.1	7.2	7.1	7.1	7.1	7.1	7.1	7.1	7.2	7.2	7.1
Phenol	mg/l		0.0005		<0.002			<0.002			<0.002			<0.002			<0.002	<0.002	<0.002	<0.002	
Potassium	mg/l		5		21.35			22.02			24.58			25.5			3.4	27	22	18	
Sampling Depth	m				23	23.8	26.1	24.9	25	26.4	26.8	26.3	27	13	13.2	27.8	26.1	26.8	25.8	24.9	
Selenium	ug/l	10			0.9			0.6			0.7			0.7			<1.0	<1.0	<1.0	<1.0	
Silver	ug/l				nm			nm													
Sodium	mg/l	200	150	150	17.77			20.7			20.88			20.53			13	23	23	19	
Strontium	ug/l				177.3			189.75			195			204.77			220	180	190	170	
Sulphate	mg/l SO4	250	200	187.5				75.4										74.7			
Suspended Solids	mg/l																				
Temp	°C				9.4	9.5	9.2	11.1	11.1	11	13.8	13	10.7	11.8	10.4	8.6	10.3	10.7	11.8	10.9	
Thallium	ug/l				<0.1			<0.1			<0.1			<0.1			<1.0	<1.0	<1.0	<1.0	
Time sampled					13:05	10:15	10:25	13:45	10:35	10:10	10:30	10:00	14:30	10:40	11:35	nt	09:35	13:40	14:40	10:30	
Tin (ug/l)	ug/l				nm			nm													
T.O.C.	mg/l	NAC			69.6			2.1			2.6			3.3			2.1	2.3	4.3	2.9	
T.O.N	mg/l N		NAC		3.76			4.03			4.52			4.16			6.7	6.1	6.9	6.7	
Total S Solids	mg/l																				
Uranium	ug/l				0.66			0.69			0.71			0.73			1	<1.0	<1.0	<1.0	
Vanadium	ug/l				0.56			<0.5			<0.5			0.59			<1.0	<1.0	<1.0	<1.0	
Zinc	ug/l		100		17.1			19.5			5.9			25			8.3	22	16	24	
Water Level m OD		33.664			10.664	9.864	7.564	8.764	8.664	7.264	6.864		6.664		20.464	5.864	7.564	6.864	7.864	8.764	

Drogheda Landfill Site Groundwater Quality

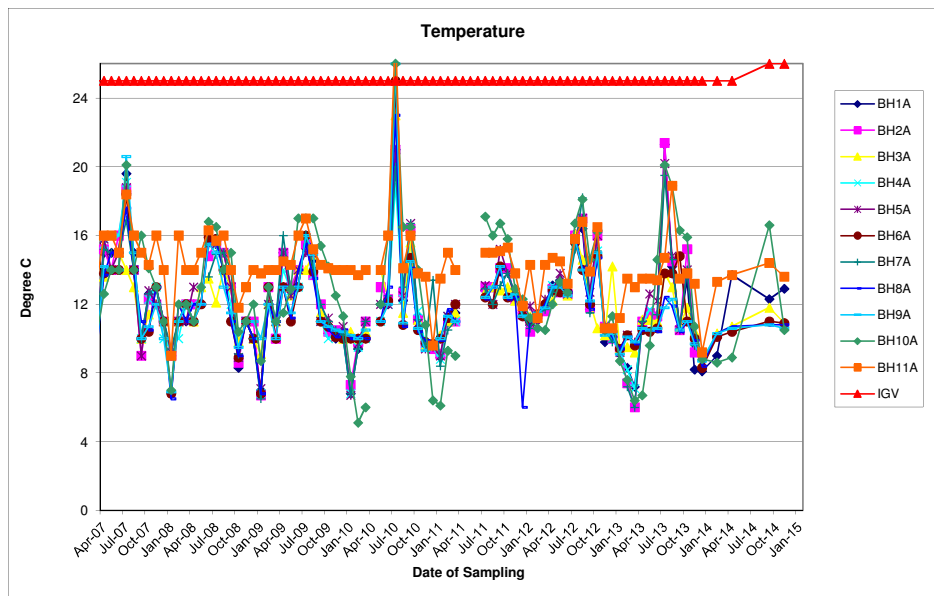
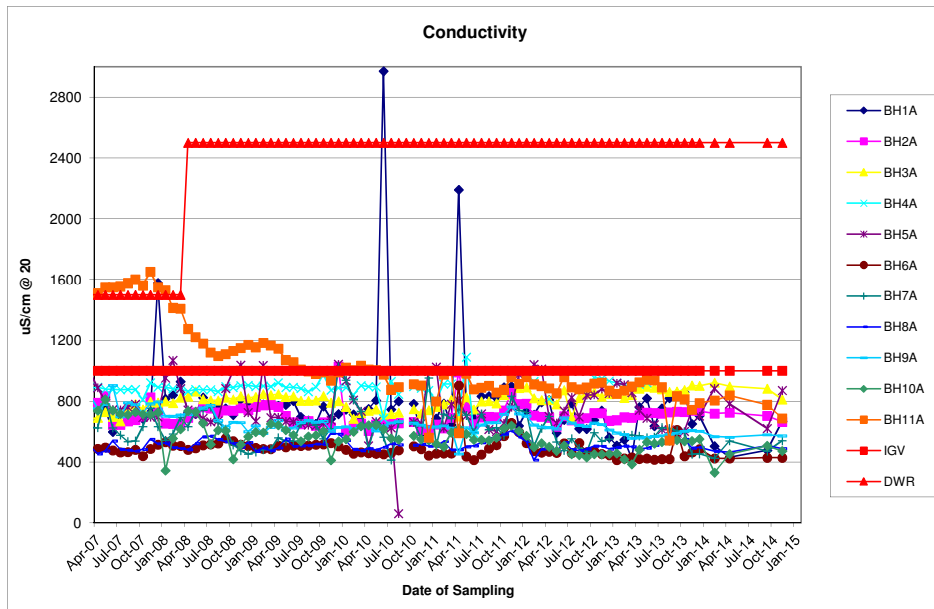
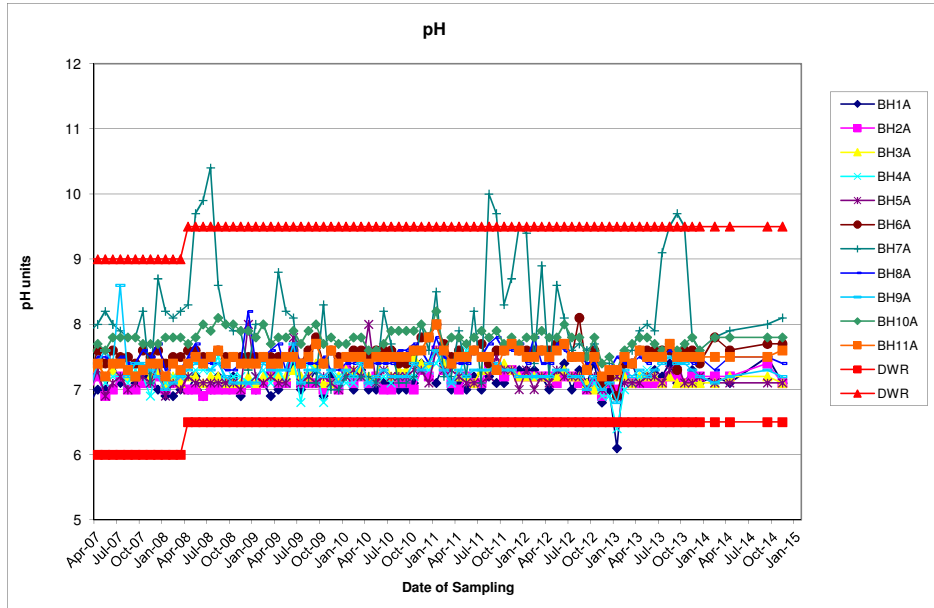
Monitoring Point:		BH5A																		
Date Collected		DWR	IGV	2010 GW Regs	31-Jan-13	12-Feb-13	26-Mar-13	16-Apr-13	08-May-13	11-Jun-13	23-Jul-13	07-Aug-13	17-Sep-13	08-Oct-13	19-Nov-13	03-Dec-13	18-Feb-14	08-Apr-14	09-Sep-14	18-Nov-14
Alkalinity	mg/l CaCO3							266										278		
Aluminium	ug/l	200	200	150	<5			<5			<5		<5	<5			13	<10.0	<10.0	<10.0
Ammonia	mg/l N	0.23 mg/l N	0.11 mg/l N	0.175	6.78	6.13	3.44	2.37	1.27	0.49	0.15	0.08	<0.03	0.04	2.5	0.96	5.8	3.1	0.085	5.7
Antimony	ug/l	5			<0.5			<0.5			<0.5		<0.5	<0.5			<1.0	<1.0	<1.0	<1.0
Arsenic	ug/l		10	7.5	<0.5			<0.5			<0.5		<0.5	<0.5			<1.0	<1.0	<1.0	<1.0
Barium	ug/l		100		101.2			20.9			10.9		27.9	9.7			99	31	13	81
Beryllium	ug/l				<0.5			<0.5			<0.5		<0.5	<0.5			<1.0	<1.0	<1.0	<1.0
B.O.D.	mg/l O2																			
Boron	ug/l	1000	1000	750	169.7			105.4			68.7		117.3	61.5			180	130	77	170
Cadmium	ug/l	5	5	3.75	0.5			0.1			<0.1		<0.1	<0.1			0.36	0.15	0.03	0.39
Calcium	mg/l Ca		200		117.23			99.8			89.33		73.45	86.2			110	110	90	110
C.O.D.	mg/l O2																			
Chloride	mg/l Cl	250	30		52		49	42			37		60	39			54	45	37	47
Chromium	ug/l	50	30	37.5	<0.5			5.2			7.7		<0.5	8.3			2.5	4	7.2	1.7
Cobalt	ug/l				0.6			<0.5			<0.5		<0.5	<0.5			<1.0	<1.0	<1.0	<1.0
Coliform Bacteria	(No/100 ml)	0						78										62		
Conductivity	uS/cm @ 25	2500	1000	1875	919	908	856	740	688	645	613	611	590	601	742	702	884	782	620	870
Copper	ug/l	2000	30	1500	5.1			2.1			0.6		0.9	<0.5			3.3	1.6	<1.0	3.2
Cyanide	mg/l	0.05	10					<0.05										<0.05		
D.O.	% Saturation				22		25	19			19			31			36	34	24	28
E. Coli	No/100 ml	0						61										0		
Fluoride	mg/l	0.8	1000					<0.150										0.17		
Iron	ug/l	200	200		<10			10.9			<10		16.8	<10			21	<10.0	10	<10.0
Lead	ug/l	25	10	18.75	<0.5			<0.5			<0.5		<0.5	<0.5			<1.0	<1.0	<1.0	<1.0
Magnesium	mg/l Mg		50		15.37			13.44			11.33		4.74	10.48			15	15	12	15
Manganese	ug/l	50	50		490.3			81.1			15.3		<1	1.7			490	75	7	410
Mercury	ug/l	1	1	0.75	nm			<0.05			nm		nm	nm				<0.050		
Molybdenum	ug/l		35		<0.5			<0.5			<0.5		<0.5	<0.5			<1.0	<1.0	<1.0	<1.0
Nickel	ug/l	20	20	15	30.3			13.5			3.3		2	2.4			23	8.5	1.4	24
Nitrite	mg/l N	0.5	0.1	0.375	0.053			0.006			0.016		<0.002	<0.002			0.643	<0.004	0.01	0.004
o-Phosphate	mg/l P		30				0.03	0.04										0.032		
pH		6.5 - 9.5			7.2	7.1	7.1	7.1	7.2	7.2	7.1	7.3	7.4	7.1	7.1	7.2	7.1	7.1	7.1	7.1
Phenol	mg/l		0.0005		<0.002			<0.002			<0.002		<0.002	<0.002			<0.002	<0.002	<0.002	<0.002
Potassium	mg/l		5		10.4			6.11			3.87		2.5	3.45			11	8	3.9	9.1
Sampling Depth	m				22.7	23		24	23.9	25.9	25.3	27.6	28.1	27.1	18	26	22.3	25.1	26	25.4
Selenium	ug/l	10			0.6			0.5			<0.5		<0.5	<0.5			<1.0	<1.0	<1.0	<1.0
Silver	ug/l				nm			nm												
Sodium	mg/l	200	150	150	31.31			25.51			19.42		31.43	17.64			33	30	21	30
Strontium	ug/l				227.34			143.67			108.87		94.35	109.61						
Sulphate	mg/l SO4	250	200	187.5			31.9	24.5										29.6		
Suspended Solids	mg/l																			
Temp	°C				9.2	10.2	9.8	10.8	12.6	12.2	20.2	14.8	10.5	14	9.9	nm	10.3	12.3	10.9	12.4
Thallium	ug/l				2.66			0.57			0.22		<0.1	0.13			2.4	<1.0	<1.0	2
Time sampled					12:25	12:35	12:05	11:55	12:30	12:15	11:45	12:30	11:45	11:50	11:20	13	12:00	11:50	12:15	11:40
Tin (ug/l)	ug/l				nm			nm												
T.O.C.	mg/l	NAC			79.7			<1.5			1.9			3.8			17.4	1.7	2.5	2.2
T.O.N	mg/l N		NAC		7.12		7.85	7.36			5.96		0.23	4.89			11	8.3	7.3	9.2
Total S Solids	mg/l																			
Uranium	ug/l				0.93			1.34			1.03		0.24	1.04			<1.0	1.2	1	<1.0
Vanadium	ug/l				0.75			<0.5			0.58		<0.5	0.77			<1.0	<1.0	<1.0	<1.0
Zinc	ug/l		100		30.9			9.2			6.2		5.1	5.3			25	9	6.3	20
Water Level m OD		36.13			13.43	13.13		12.13	12.23	10.23	10.83		8.03		18.13	10.13	13.83	11.03	10.13	

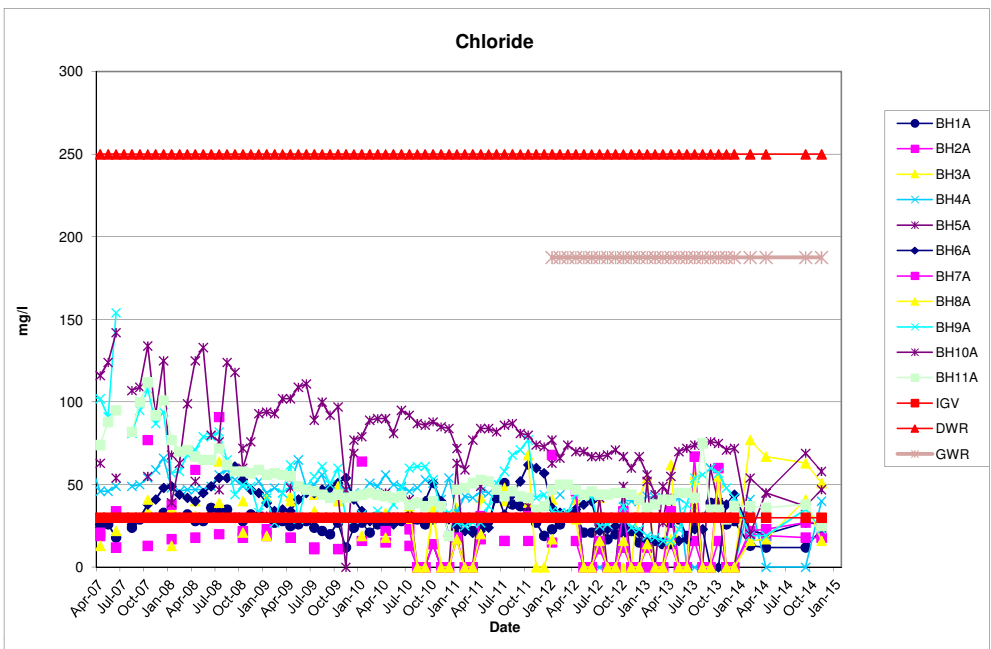
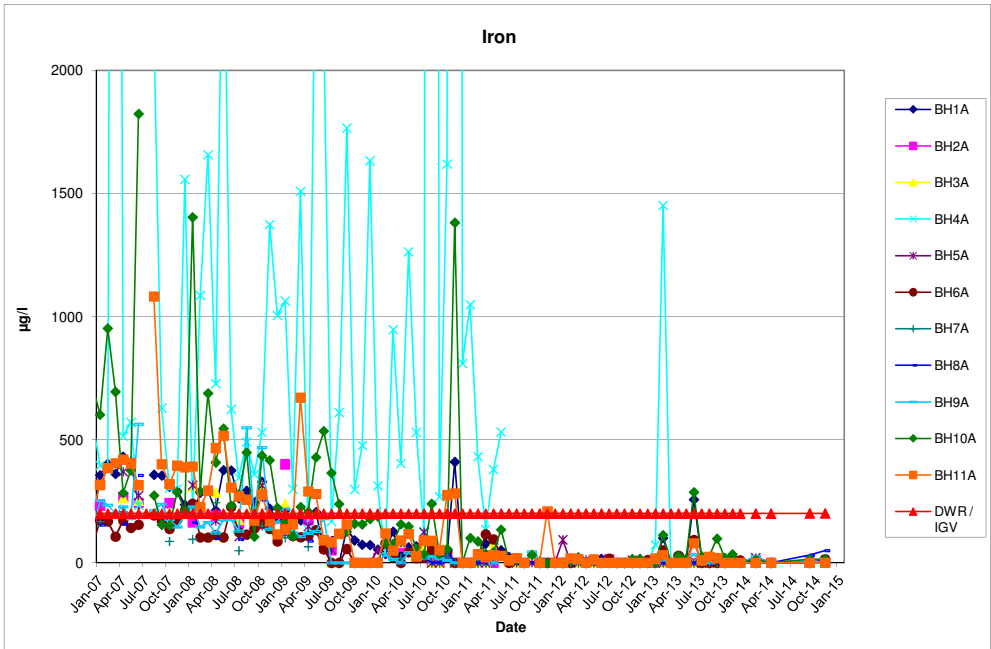
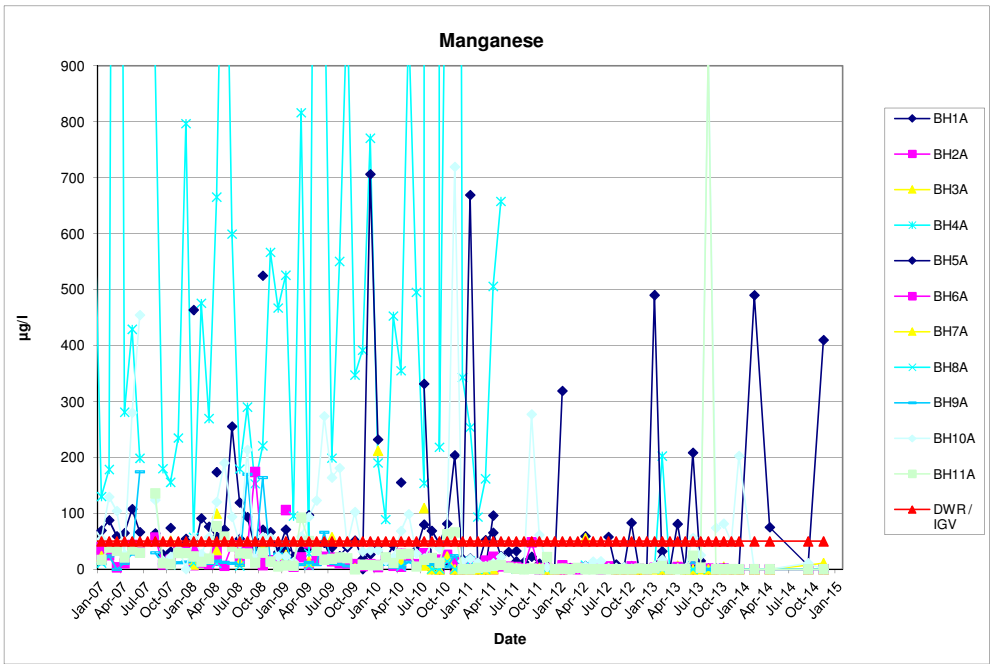
Drogheda Landfill Site Groundwater Quality

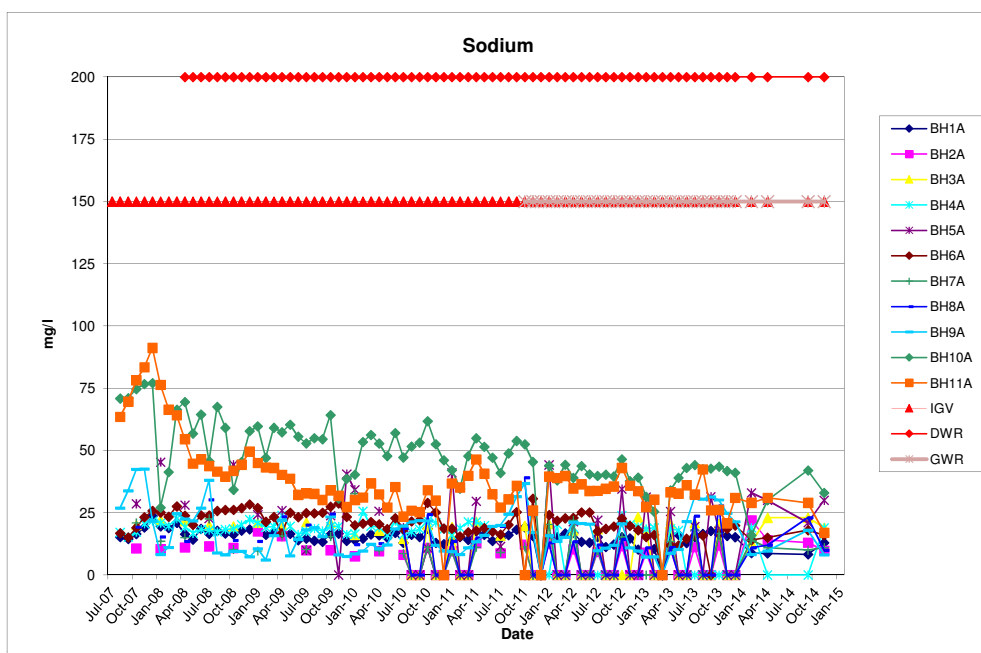
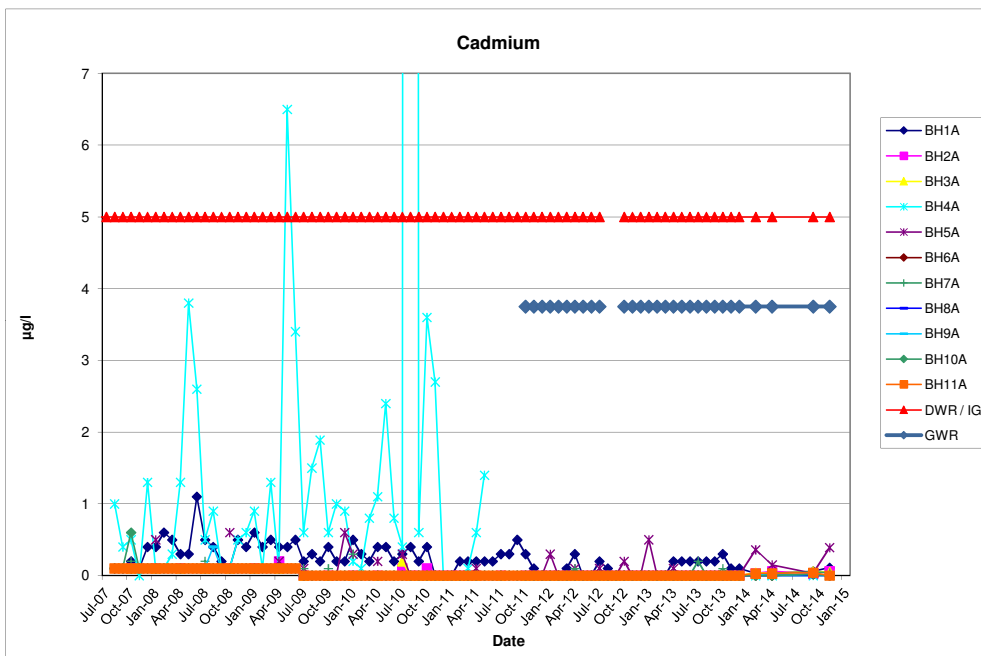
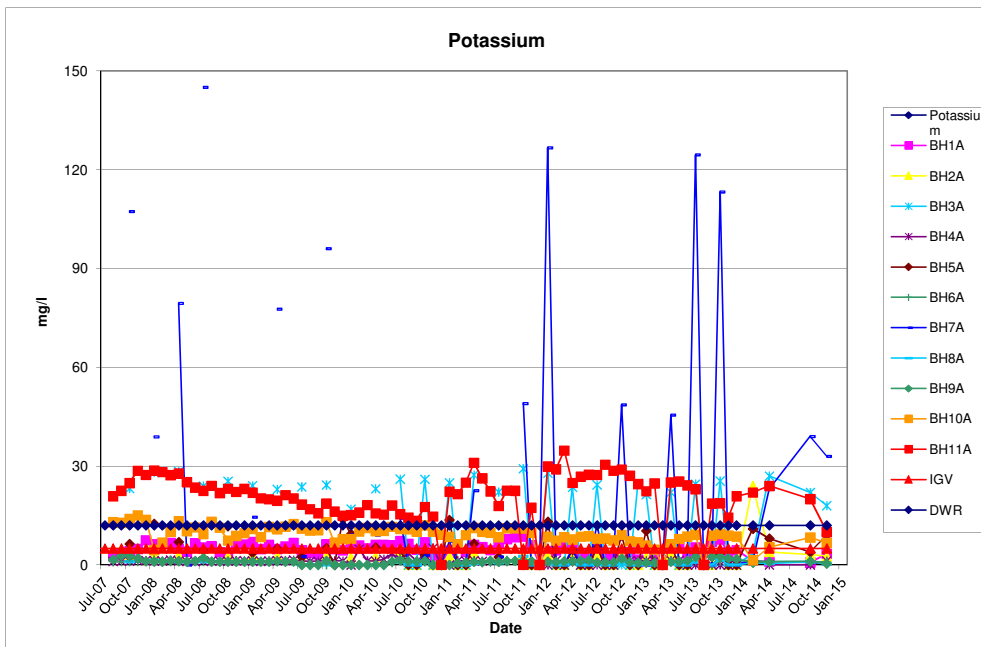
Monitoring Point:		BH7A																			
Date Collected		DWR	IGV	2010 GW Regs	31-Jan-13	12-Feb-13	26-Mar-13	16-Apr-13	08-May-13	11-Jun-13	23-Jul-13	07-Aug-13	17-Sep-13	08-Oct-13	19-Nov-13	03-Dec-13	18-Feb-14	08-Apr-14	09-Sep-14	18-Nov-14	
Alkalinity	mg/l CaCO3							140										158			
Aluminium	ug/l	200	200	150	nm			14.6			29.4			59.5			<10.0	<10.0	11	<10.0	
Ammonia	mg/l N	0.23 mg/l N	0.11 mg/l N	0.175	nm	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.06	<0.020	<0.020	<0.020	<0.020	0.026	0.024	
Antimony	ug/l	5			nm			0.58			0.95			1.16			<1.0	<1.0	1.2	<1.0	
Arsenic	ug/l		10	7.5	nm			8.74			44.61			47.05			<1.0	8.2	15	15	
Barium	ug/l		100		nm			32.6			10.3			8.4			41	30	24	28	
Beryllium	ug/l				nm			<0.5			<0.5			<0.5			<1.0	<1.0	<1.0	<1.0	
B.O.D.	mg/l O2																				
Boron	ug/l	1000	1000	750	nm			38.8			26.2			33.6			37	53	60	55	
Cadmium	ug/l	5	5	3.75	nm			<0.1			0.2			0.1			<0.020	0.03	0.05	0.04	
Calcium	mg/l Ca		200		nm			58.95			13.39			12.16			68	75	46	56	
C.O.D.	mg/l O2																				
Chloride	mg/l Cl	250	30		nm			34			67			60			22	23	27	27	
Chromium	ug/l	50	30	37.5	nm			11.7			24.7			24.6			1.5	6.7	12	8.7	
Cobalt	ug/l				nm			<0.5			<0.5			<0.5			<1.0	<1.0	<1.0	<1.0	
Coliform Bacteria	(No/100 ml)	0						41										236			
Conductivity	µS/cm @ 25	2500	1000	1875	nm	578	577	571	561	565	627	621	606	595	451	454	424	539	471	540	
Copper	ug/l	2000	30	1500	nm			1.9			1			1.4			6.6	2.9	2.3	3.8	
Cyanide	mg/l	0.05	10					<0.05										<0.05			
D.O.	% Saturation				nm			90			50			57			73	85	82	91	
E Coli	No/100 ml	0						0										1			
Fluoride	mg/l	0.8	1000					0.2										0.22			
Iron	ug/l	200	200		nm			20.7			<10			<10			<10.0	<10.0	<10.0	<10.0	
Lead	ug/l	25	10	18.75	nm			<0.5			<0.5			<0.5			<1.0	<1.0	<1.0	<1.0	
Magnesium	mg/l Mg		50		nm			7.53			1.59			2.1			2.6	9.6	7.6	8.6	
Manganese	ug/l	50	50		nm			1.4			<1			<1			<5.0	<5.0	<5.0	<5.0	
Mercury	ug/l	1	1	0.75	nm			0.1			nm			nm			<0.050				
Molybdenum	ug/l		35		nm			18.8			63.9			70			<1.0	7.6	22	16	
Nickel	ug/l	20	20	15	nm			2.6			1.3			1			<1.0	<1.0	<1.0	<1.0	
Nitrite	mg/l N	0.5	0.1	0.375	nm			<0.002			<0.002			<0.002			<0.004	<0.004	<0.004	<0.004	
o-Phosphate	mg/l P		30					<0.02										<0.010			
pH		6.5 - 9.5			nm	7.5	7.6	7.9	8	7.9	9.1	9.5	9.7	9.5	7.8	7.6	7.8	7.9	8	8.1	
Phenol	mg/l		0.0005		nm			<0.002			<0.002			<0.002			<0.002	<0.002	<0.002	<0.002	
Potassium	mg/l		5		nm			45.55			124.56			113.3			1.3	23	39	33	
Sampling Depth	m				nm	6	5.4	6.8	8.7	9.2	9.3	10.2	13.1	9.8	10.3	9.1	28.1	9.4	12.3	11.7	
Selenium	ug/l	10			nm			71.8			109			100			<1.0	86	100	110	
Silver	ug/l				nm			nm													
Sodium	mg/l	200	150	150	nm			13.55			18.09			16.66			14	11	10	11	
Strontium	ug/l				nm			218.29			267.75			47.14			91	230	150	210	
Sulphate	mg/l SO4	250	200	187.5				82.2										89.8			
Suspended Solids	mg/l																				
Temp	°C				nm	7.2	6	11	nm	11.4	19.5	14.6	10.6	14	9.6	nm	10.1	10.7	10.8	15.8	
Thallium	ug/l				nm			<0.1			<0.1			<0.1			<1.0	<1.0	<1.0	<1.0	
Time sampled						13:05	12:10	12:20	12:35	12:10	11:50	12:35	12:00	12:30	12:35	14:25	12:30	9:45	12:30	11:45	12:40
Tin (ug/l)	ug/l				nm			nm													
T.O.C.	mg/l	NAC			nm			2			1.8			2.3			<1.5	2.3	4.5	4.1	
T.O.N	mg/l N		NAC		nm			0.32			0.9			0.79			0.72	<0.20	0.36	0.36	
Total S Solids	mg/l																				
Uranium	ug/l				nm			1.23			0.36			0.3			<1.0	1.5	<1.0	1.3	
Vanadium	ug/l				nm			2.23			41			44.47			<1.0	2	7.4	5	
Zinc	ug/l		100		nm			10.8			1.3			5.8			16	4.4	2.6	13	
Water Level m OD		25.172				19.172	19.772	18.372	16.472	15.972	15.872		12.072		14.872	16.072		15.772	12.872		

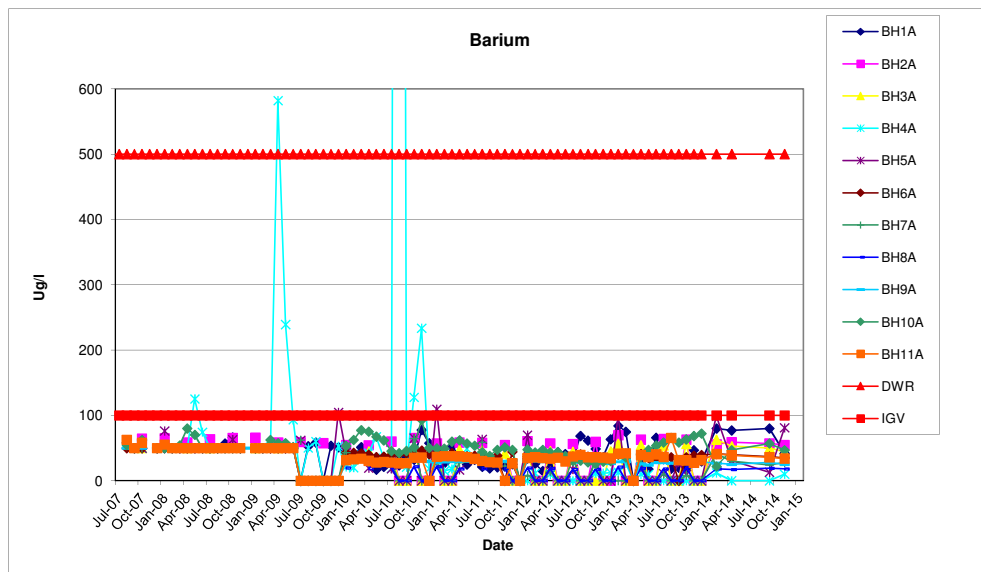
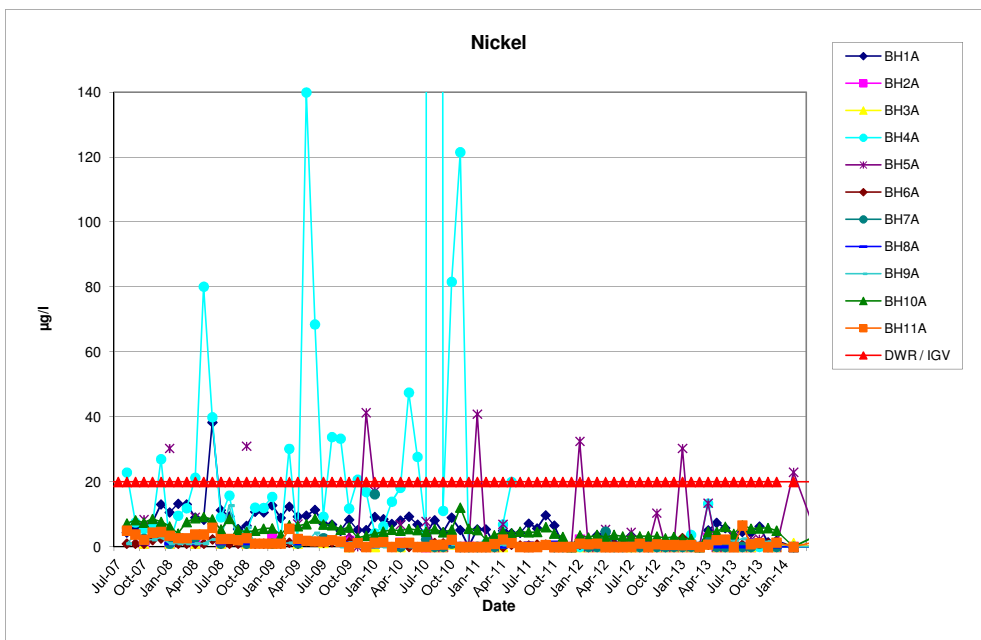
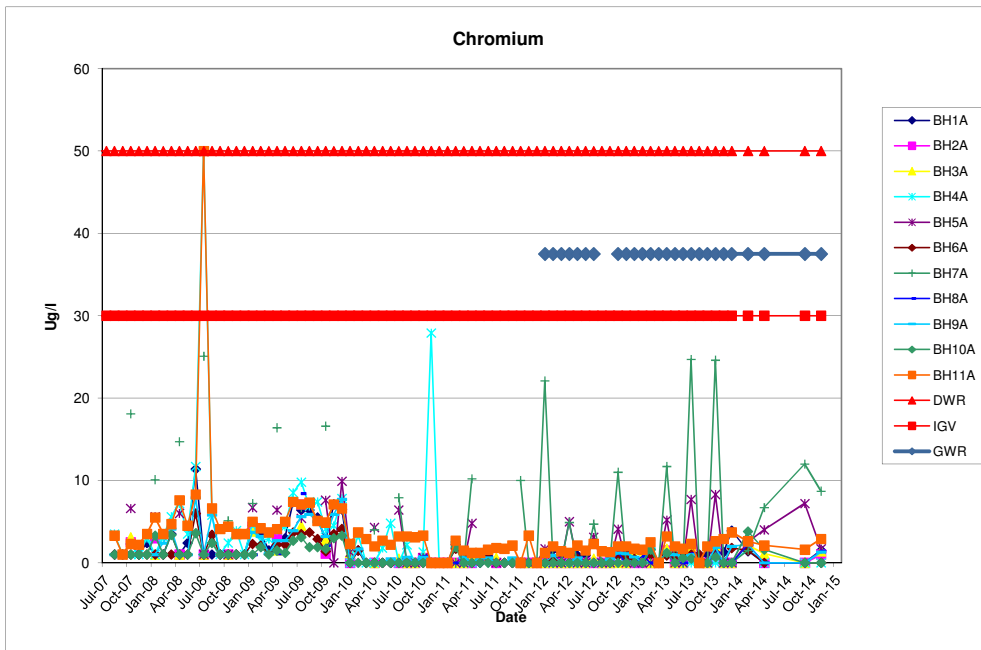
Drogheda Landfill Site Groundwater Quality

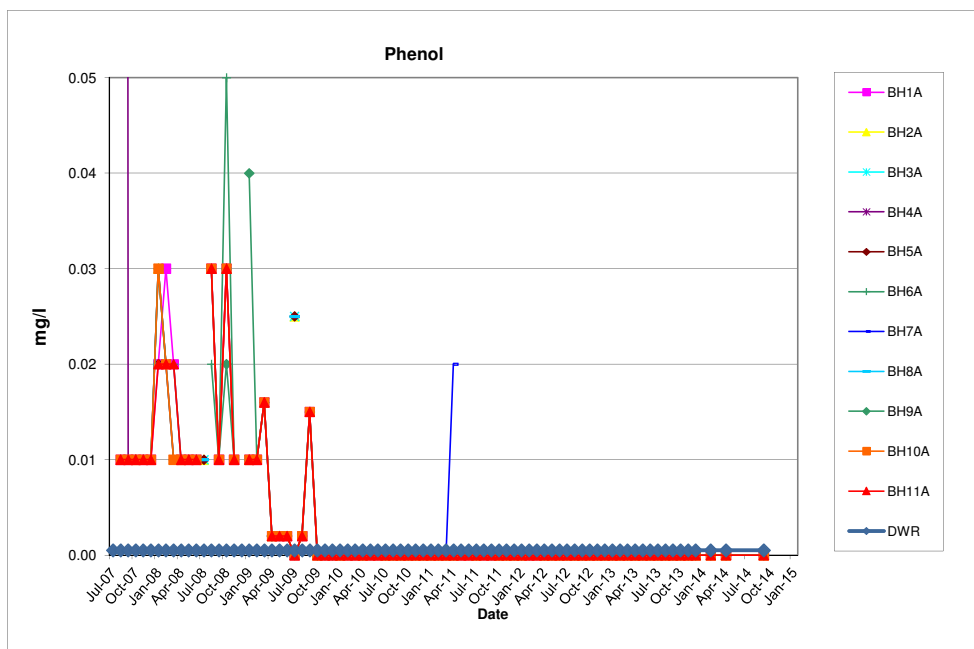
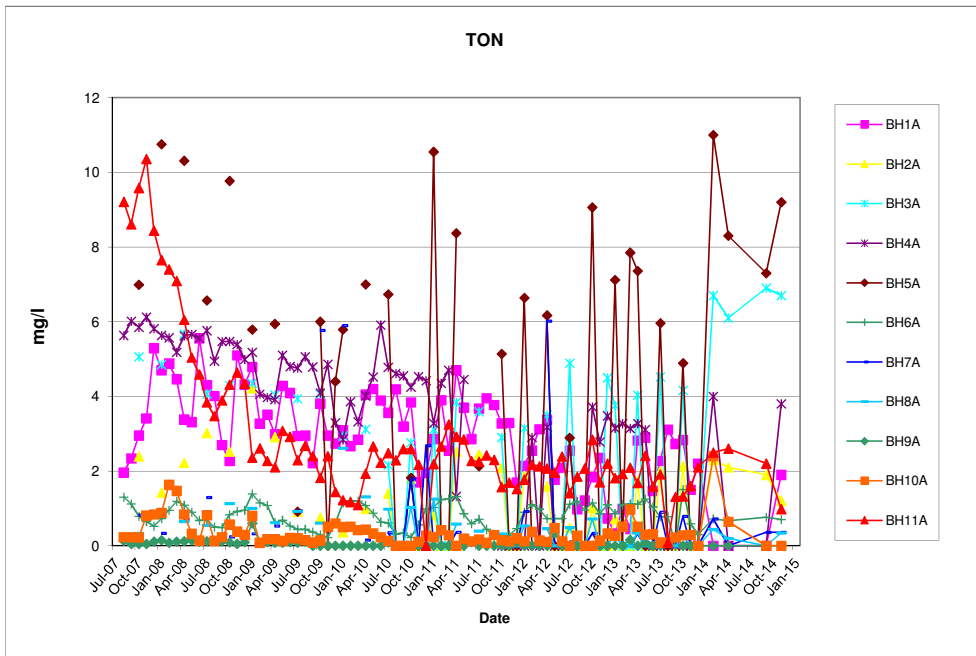
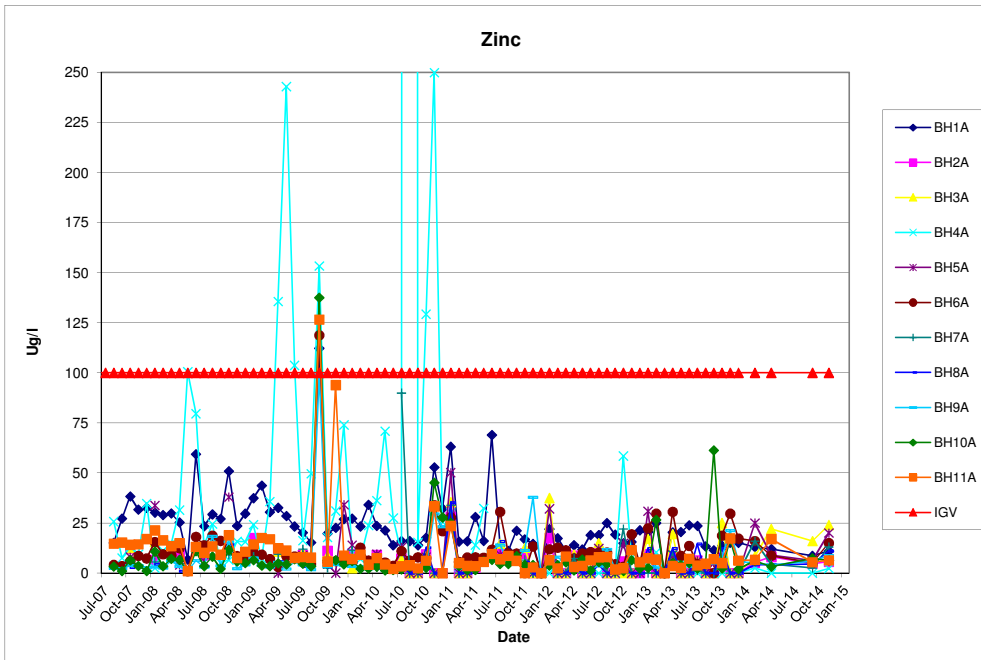
Monitoring Point:		BH8A																		
Date Collected		DWR	IGV	2010 GW Regs	31-Jan-13	12-Feb-13	26-Mar-13	16-Apr-13	08-May-13	11-Jun-13	23-Jul-13	07-Aug-13	17-Sep-13	08-Oct-13	19-Nov-13	03-Dec-13	18-Feb-14	08-Apr-14	09-Sep-14	18-Nov-14
Alkalinity	mg/l CaCO3							210										202		
Aluminium	ug/l	200	200	150	<5			<5			<5			<5			<10.0	<10.0	<10.0	<10.0
Ammonia	mg/l N	0.23 mg/l N	0.11 mg/l N	0.175	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Antimony	ug/l	5			<0.5			<0.5			<0.5			<0.5			<1.0	<1.0	<1.0	<1.0
Arsenic	ug/l		10	7.5	<0.5			0.61			<0.5			<0.5			<1.0	<1.0	<1.0	<1.0
Barium	ug/l		100		21.1			19.3			18.4			20.9			18	17	19	18
Beryllium	ug/l				<0.5			<0.5			<0.5			<0.5			<1.0	<1.0	<1.0	<1.0
B.O.D.	mg/l O2																			
Boron	ug/l	1000	1000	750	20.7			20.6			55.1			78.7			23	26	41	27
Cadmium	ug/l	5	5	3.75	<0.1			<0.1			<0.1			<0.1			<0.020	<0.020	<0.020	<0.020
Calcium	mg/l Ca		200		85.4			81.62			77.41			76.42			84	85	78	84
C.O.D.	mg/l O2																			
Chloride	mg/l Cl	250	30		14			17			53			55			16	17	41	16
Chromium	ug/l	50	30	37.5	0.8			1.3			1.1			1.2			2.2	<1.0	<1.0	1.4
Cobalt	ug/l				<0.5			<0.5			<0.5			<0.5			<1.0	<1.0	<1.0	<1.0
Coliform Bacteria	(No/100 ml)	0						16										9		
Conductivity	µS/cm @ 25	2500	1000	1875	496	505	500	484	491	510	524	528	539	549	492	497	471	464	507	488
Copper	ug/l	2000	30	1500	0.7			<0.5			<0.5			0.5			<1.0	<1.0	<1.0	<1.0
Cyanide	mg/l	0.05	10					<0.05										<0.05		
D.O.	% Saturation				86			90			56			49			90	84	74	93
E Coli	No/100 ml	0						0										0		
Fluoride	mg/l	0.8	1000					<0.150										<0.150		
Iron	ug/l	200	200		<10			<10			<10			17.1			22	<10.0	32	50
Lead	ug/l	25	10	18.75	<0.5			<0.5			<0.5			<0.5			<1.0	<1.0	<1.0	<1.0
Magnesium	mg/l Mg		50		3.95			3.77			3.2			3.72			4	4.1	4.1	4.1
Manganese	ug/l	50	50		1.7			2			1.4			1.9			<5.0	<5.0	<5.0	<5.0
Mercury	ug/l	1	1	0.75	nm			<0.05			nm			nm			<0.050			
Molybdenum	ug/l		35		<0.5			<0.5			2			0.9			<1.0	<1.0	<1.0	<1.0
Nickel	ug/l	20	20	15	<0.5			<0.5			<0.5			2.2			<1.0	<1.0	<1.0	<1.0
Nitrite	mg/l N	0.5	0.1	0.375	<0.002			<0.002			<0.002			<0.002			0.005	<0.004	<0.004	<0.004
o-Phosphate	mg/l P		30					<0.02										<0.010		
pH		6.5 - 9.5			7.5	7.4	7.4	7.5	7.4	7.5	7.5	7.6	7.5	7.5	7.4	7.5	7.3	7.5	7.5	7.4
Phenol	mg/l		0.0005		<0.002			<0.002			<0.002			<0.002				<0.002	<0.002	<0.002
Potassium	mg/l		5		0.5			0.71			0.87			1.73			0.65	0.41	0.93	0.32
Sampling Depth	m				26.2	27.5	26.7	28.2	28.7	29.1	29.7	29.3	29.6	28.2	28.9	29.2	26.9	28.7	29.1	24.6
Selenium	ug/l	10			1.5			2.1			<0.5			<0.5			1	<1.0	<1.0	1.2
Silver	ug/l				nm			nm												
Sodium	mg/l	200	150	150	10.93			11.09			23.65			27.8			11	12	23	9.9
Strontium	ug/l				94.44			89.39			85.5			91.66			91	88	90	95
Sulphate	mg/l SO4	250	200	187.5				10.3										8.7		
Suspended Solids	mg/l																			
Temp	°C				9.4	10.1	9.7	10.5	10.5	10.4	12.4	11.9	10.4	11	9.9	8.4	10.3	10.7	10.8	10.8
Thallium	ug/l				<0.1			<0.1			<0.1			0.1			<1.0	<1.0	<1.0	<1.0
Time sampled					11:05	10:55	11:05	10:25	11:10	10:40	11:50	10:55	11:20	11:40	12:40	11:10	10:10	10:45	10:20	11:15
Tin (µg/l)	ug/l				nm			nm												
T.O.C.	mg/l	NAC			61.5			<1.5			1.8			2.4			<1.5	<1.5	3.4	2.2
T.O.N	mg/l N		NAC		0.33			0.35			0.12			0.27			0.44	0.2	<0.20	0.34
Total S Solids	mg/l																			
Uranium	ug/l				0.36			0.33			0.25			0.27			<1.0	<1.0	<1.0	<1.0
Vanadium	ug/l				<0.5			<0.5			<0.5			<0.5			<1.0	<1.0	<1.0	<1.0
Zinc	ug/l		100		12.3			12.3			14.6			12.3			4.2	4.2	4.5	11
Water Level m OD		36.151			9.951	8.651	9.451	7.951	7.451	7.051	6.451		6.551		7.251	6.951	9.251	7.451	7.051	

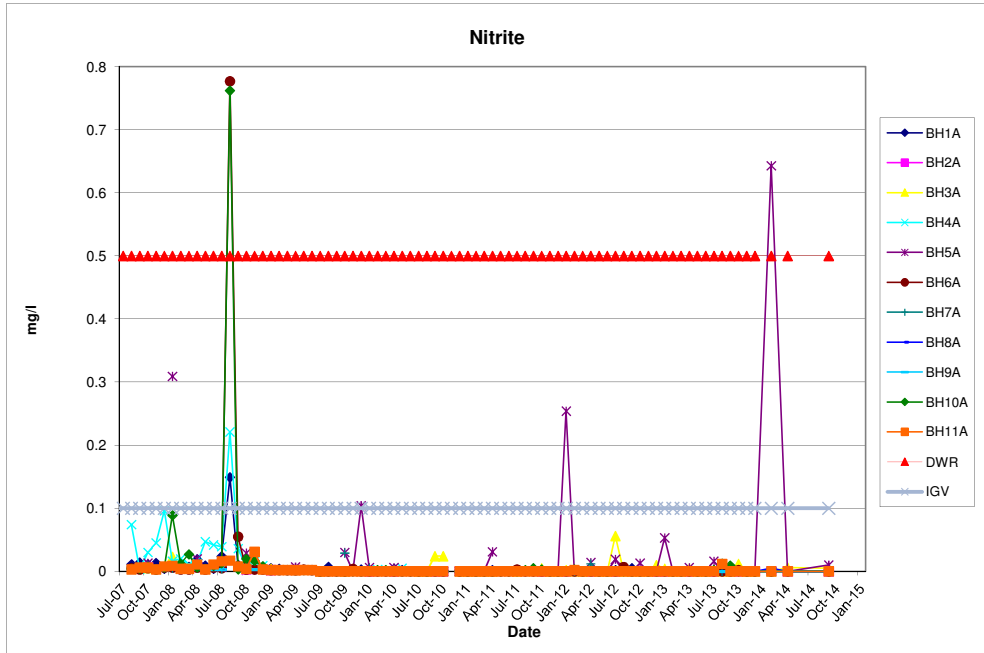
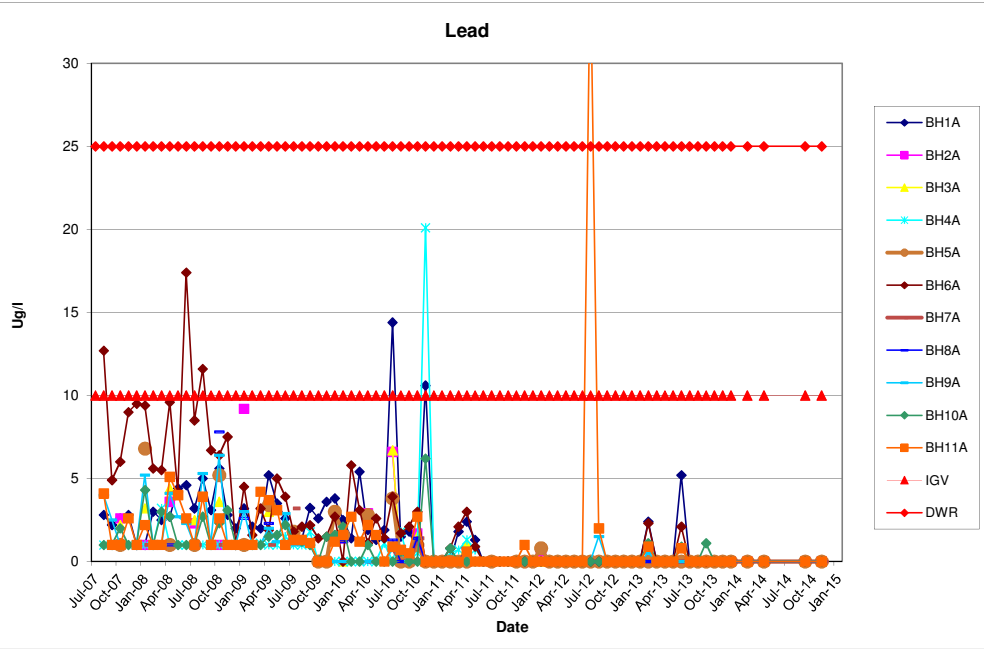


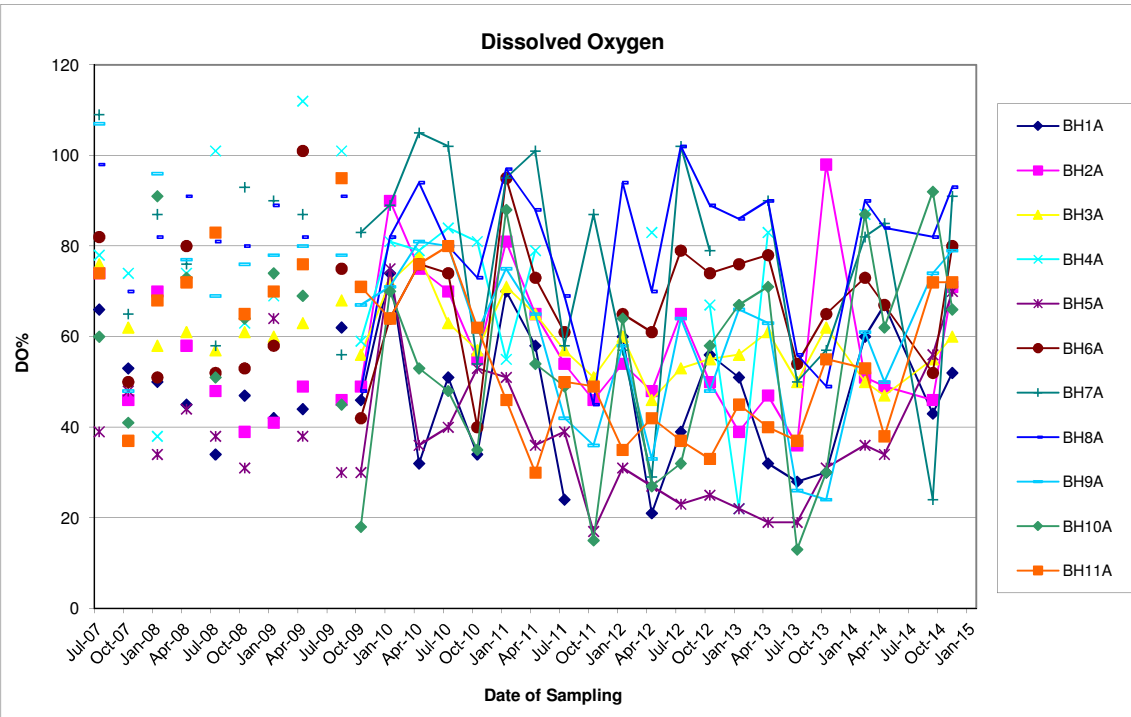
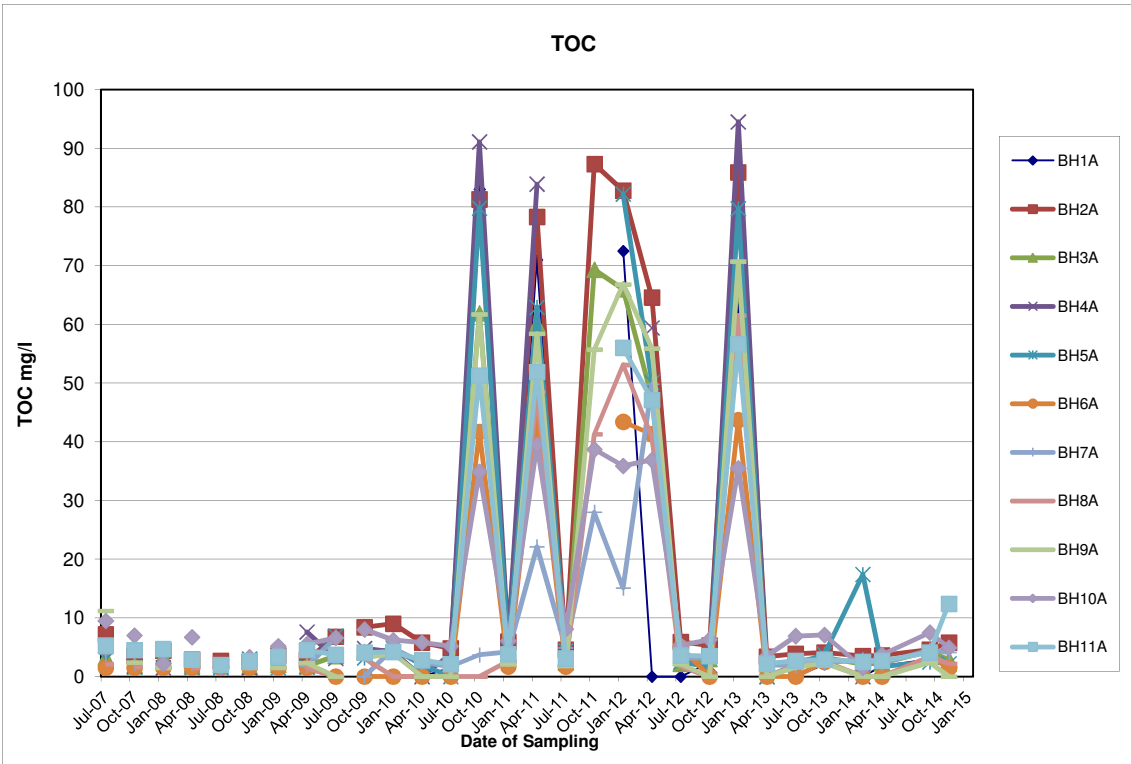












APPENDIX E

SURFACE WATER RESULTS



Drogheda Landfill Site Surfacewater Quality

Monitoring Point:

SW1

Date Collected		DWR	IGV	2010 GW Regs	24-Apr-12	25-Jul-12	09-Oct-12	31-Jan-13	16-Apr-13	23-Jul-13	08-Oct-13	18-Feb-14	08-Apr-14	09-Sep-14	18-Nov-14
Alkalinity	mg/l CaCO3				85				140				142		
Aluminium	ug/l	200	200	150	12.9	10	9.3	<5	<5	7.2	<5	<10.0	12	<10.0	<10.0
Ammonia	mg/l N	0.23 mg/l N	0.15	0.175	<0.03	<0.03	<0.03	0.08	0.08	0.04	0.21	0.039	0.095	<0.020	<0.020
Antimony	ug/l	5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0
Arsenic	ug/l		10	7.5	0.66	1.8	1.97	0.82	0.74	2.09	1.99	<1.0	<1.0	1.1	<1.0
Barium	ug/l		100		30.5	23.9	24.1	51.6	53.8	64.8	68.5	77	75	58	52
Beryllium	ug/l				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0
B.O.D.	mg/l O2				<1.5	2.2	2.2	<1.5	<1.5	1.7	1.5	<1.0	<1.0	1.2	<1.0
Boron	ug/l	1000	1000	750	186.3	186.6	212.9	158	169.1	198.9	198.8	180	190	190	170
Cadmium	ug/l	5	5	3.75	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.02	<0.020	<0.020	<0.020
Calcium	mg/l Ca		200		25.15	20.76	21.47	39.04	42.92	39.31	38.88	49	52	39	37
C.O.D.	mg/l O2				13	17	22	<10	12	24	36	<20	<20	<20	<20
Chloride	mg/l Cl	250	30	187.5	74	66	68	64	66	74	74	66	65	67	61
Chromium	ug/l	50	30	37.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	0.6	<1.0	<1.0	<1.0	<1.0
Cobalt	ug/l				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0
Coliform Bacteria	(No/100 ml)	0													
Conductivity	uS/cm @ 25	2500	1000	1875	448	409	422	481	525	521	526	516	534	490	471
Copper	ug/l	2000	30	1500	1.5	1.8	1.9	0.9	1.6	9.6	<0.5	1.1	1.3	<1.0	<1.0
Cyanide	mg/l	0.05	10												
D.O.	% Saturation				97	110	99	92	100		103	98	91	103	96
E. Coli	No/100 ml	0													
Fluoride	mg/l	0.8	1000												
Iron	ug/l	200	200		<10	<10	25.7	<10	10.3	26.1	19.3	16	18	<10.0	<10.0
Lead	ug/l	25	10	18.75	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0
Magnesium	mg/l Mg		50		9.6	8.87	9.44	8.59	9.42	10.56	10.06	9.8	10	10	9
Manganese	ug/l	50	50		2.9	4.8	5.5	1.2	7.4	37.5	56.6	8	19	<5.0	5.5
Mercury	ug/l	1	1	0.75	<0.05	nm	nm	nm	<0.05	nm	nm		<0.050		
Molybdenum	ug/l		35		0.8	0.7	0.6	<0.5	0.5	0.8	<0.5	<1.0	<1.0	1	<1.0
Nickel	ug/l	20	20	15	3.4	3.4	3.5	3.6	7.9	5.3	5.2	4.6	4.7	4.3	3.9
Nitrite	mg/l N	0.5	0.1	0.375	<0.002	<0.002	<0.002	0.004	0.005	<0.002	0.028	<0.004	<0.004	<0.004	<0.004
o-Phosphate	mg/l P		30		<0.02				<0.02			0.01	<0.010		
pH		6.5 - 9.5			8.8	8.7	8.5	7.9	8.2	8.2	8.4	8.2	8.2	8.5	8
Phenol	mg/l		0.0005		<0.025	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Potassium	mg/l		5		8.56	7.74	9.08	7.09	7.75	9.25	9.25	8.2	8.7	8.1	6.9
Sampling Depth	mg/l														
Selenium	ug/l	10			<0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0
Silver	ug/l				<0.5	nm	nm	nm	nm						
Sodium	mg/l	200	150	150	43.94	39.36	46.47	35.32	38.71	44.37	43.08	40	41	41	35
Strontium	ug/l				88.23	84.15	75.29	101.03	111.85	113.83	123.44	120	120	120	110
Sulphate	mg/l SO4	250	200	187.5	23.4				20.2				27.6		
Suspended Solids											6	<4	<4	4	<4
Temp	°C				14	20.4	14.5	6.2	9.3	22	15.6	5.5	10.5	17.4	8.7
Thallium	ug/l				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1.0	<1.0	<1.0	<1.0
Time sampled					12:10	13:40	12:00	12:05	11:40	0.53125	12:50	13:15	0.51041667	13:20	12:20
Tin (ug/l)	ug/l				<1	<1	<1	nm	nm						
T.O.C.	mg/l	NAC													
T.O.N	mg/l N		NAC		<0.08	<0.08	<0.08	0.09	0.22	<0.08	0.11	<0.20	0.2	<0.20	<0.20
Total Suspended Solids	mg/l				6	<5	<5	<5	<5	<5					
Uranium	ug/l				0.52	0.42	0.38	0.45	0.52	0.34	0.24	<1.0	<1.0	<1.0	<1.0
Vanadium	ug/l				<0.5	<0.5	0.63	<0.5	<0.5	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0
Zinc	ug/l		100		2.2	4.4	1.5	10.9	5.2	1.8	2	12	8.3	1.8	8.4



Drogheda Landfill Site Surfacewater Quality

Monitoring Point:

SW2

Date Collected		DWR	IGV	2010 GW Regs	24-Apr-12	25-Jul-12	09-Oct-12	31-Jan-13	16-Apr-13	23-Jul-13	08-Oct-13	18-Feb-14	08-Apr-14	09-Sep-14	18-Nov-14
Alkalinity	mg/l CaCO3				148				138				142		
Aluminium	ug/l	200	200	150	<5	5.5	<5	15	<5	<5	5.7	<10.0	<10.0	<10.0	<10.0
Ammonia	mg/l N	0.23 mg/l N	0.15	0.175	<0.03	<0.03	<0.03	<0.03	0.1	<0.03	<0.03	<0.020	<0.020	<0.020	0.11
Antimony	ug/l	5			1.1	1.09	1	1.02	1.25	1.22	1.24	1.2	1.2	1.4	1.1
Arsenic	ug/l		10	7.5	0.79	0.78	1.07	3.24	1.16	0.8	1.01	<1.0	<1.0	<1.0	1.2
Barium	ug/l		100		40.5	39.1	41.5	19.3	38.8	40.5	41.8	43	40	38	39
Beryllium	ug/l				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0
B.O.D.	mg/l O2				<1.5	2.6	2.4	<1.5	1.7	<1.5	<1.0	1.8	1.4	<1.0	1.1
Boron	ug/l	1000	1000	750	179.5	181	212.4	83	158.9	169.2	173.4	170	170	180	170
Cadmium	ug/l	5	5	3.75	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020	<0.020	<0.020	<0.020
Calcium	mg/l Ca		200		37.94	36.46	37.34	30.37	36.37	36.42	36.25	36	38	35	37
C.O.D.	mg/l O2				13	27	20	<10	14	16	18	<20	26	<20	<20
Chloride	mg/l Cl	250	30	187.5	61	59	58	27	54	59	56	57	54	54	52
Chromium	ug/l	50	30	37.5	<0.5	<0.5	0.6	2.1	0.5	0.9	1.1	<1.0	<1.0	<1.0	<1.0
Cobalt	ug/l				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0
Coliform Bacteria	(No/100 ml)	0													
Conductivity	uS/cm @ 25	2500	1000	1875	568	554	578	359	550	546	547	531	531	525	529
Copper	ug/l	2000	30	1500	0.7	12.1	1.2	2.2	0.9	1.2	1.2	<1.0	1.1	1.2	1
Cyanide	mg/l	0.05	10												
D.O.	% Saturation				87	101	90	97	101	81	98	108	97	104	71
E. Coli	No/100 ml	0													
Fluoride	mg/l	0.8	1000												
Iron	ug/l	200	200		<10	<10	<10	15.3	<10	<10	<10	<10.0	<10.0	<10.0	<10.0
Lead	ug/l	25	10	18.75	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0
Magnesium	mg/l Mg		50		20.97	21.55	22.25	11.93	19.11	20.16	20.27	20	20	21	19
Manganese	ug/l	50	50		2.7	1.3	2	1	2.1	1.6	2.6	<5.0	5.6	<5.0	<5.0
Mercury	ug/l	1	1	0.75	<0.05	nm	nm	nm	0.4	nm	nm		<0.050		
Molybdenum	ug/l		35		1.7	1.8	<0.5	2.2	0.6	2.1	2	2	1.4	2.2	2
Nickel	ug/l	20	20	15	1.1	1.5	1.7	0.9	1.8	2.5	2	1.7	1.9	1.3	1.4
Nitrite	mg/l N	0.5	0.1	0.375	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.004	<0.004	<0.004	<0.004
o-Phosphate	mg/l P		30		<0.02				<0.02			<0.010	<0.010		
pH		6.5 - 9.5			8.5	8.7	8.3	8.1	8.4	8.6	8.5	8.5	8.6	8.6	8.1
Phenol	mg/l		0.0005		<0.025	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	nm
Potassium	mg/l		5		30.8	28.48	30.43	11.01	25.62	28.07	27.5	27	30	26	24
Sampling Depth	mg/l														
Selenium	ug/l	10			<0.5	0.6	0.9	33.6	1.8	1.1	1.1	1.4	1.2	<1.0	1.1
Silver	ug/l				<0.5	nm	nm	nm	nm						
Sodium	mg/l	200	150	150	25.67	24.58	29.33	10.5	22.49	23.68	23.4	24	24	23	22
Strontium	ug/l				204.16	84.15	188.67	85.82	187.69	184.61	191.76	190	180	180	180
Sulphate	mg/l SO4	250	200	187.5	49.3				46.8				44.3		
Suspended Solids											4	7	<4	<4	8
Temp	°C				13.1	19.7	16.2	6.9	10.4	24.1	15.2	6.1	10.4	18	12.4
Thallium	ug/l				<0.1	<0.1	<0.1	0.73	<0.1	<0.1	<0.1	<1.0	<1.0	<1.0	<1.0
Time sampled					13:00	13:20	12:45	13:15	13:10	12:20	10:55	11:40	13:00	11:55	12:10
Tin (ug/l)	ug/l				<1	<1	<1	nm	nm						
T.O.C.	mg/l	NAC													
T.O.N	mg/l N		NAC		<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.20	<0.20	<0.20	<0.20
Total Suspended Solids	mg/l				7	<5	<5	11	10	<5					
Uranium	ug/l				0.25	0.26	0.23	0.23	0.25	0.27	0.28	<1.0	<1.0	<1.0	<1.0
Vanadium	ug/l				<0.5	0.71	0.84	10.11	<0.5	0.79	0.73	<1.0	<1.0	<1.0	<1.0
Zinc	ug/l		100		5.2	2.5	2.8	17.6	3.6	1.4	2.5	2.2	3.4	3.1	5.1



Drogheda Landfill Site Surfacewater Quality

Monitoring Point:		SW3													
Date Collected		DWR	IGV	2010 GW Regs	24-Apr-12	25-Jul-12	09-Oct-12	31-Jan-13	16-Apr-13	23-Jul-13	08-Oct-13	18-Feb-14	08-Apr-14	09-Sep-14	18-Nov-14
Alkalinity	mg/l CaCO3				87				135				144		
Aluminium	ug/l	200	200	150	55.7	14.6	7.4	<5	<5	6.9	<5	<10.0	<10.0	<10.0	<10.0
Ammonia	mg/l N	0.23 mg/l N	0.15	0.175	<0.03	<0.03	<0.03	0.06	0.07	0.04	0.22	0.038	0.094	<0.020	<0.020
Antimony	ug/l	5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0
Arsenic	ug/l		10	7.5	0.61	1.52	1.79	0.81	0.91	2.13	1.86	<1.0	<1.0	<1.0	<1.0
Barium	ug/l		100		29.2	22.7	23.3	50.6	53.3	64.7	67.1	77	76	58	52
Beryllium	ug/l				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0
B.O.D.	mg/l O2				<1.5	1.9	<1.5	<1.5	<1.5	2	2.1	<1.0	<1.0	1	<1.0
Boron	ug/l	1000	1000	750	181.6	185.4	229.2	152.7	167.8	197.5	205	170	180	200	180
Cadmium	ug/l	5	5	3.75	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.020	<0.020	<0.020	<0.020
Calcium	mg/l Ca		200		25.08	20.82	21.14	38.41	43.26	38.41	38.62	48	52	38	38
C.O.D.	mg/l O2				23	24	35	<10	12	21	39	<20	<20	<20	<20
Chloride	mg/l Cl	250	30	187.5	75	66	67	63	67	73	75	67	65	69	61
Chromium	ug/l	50	30	37.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<1.0	<1.0	<1.0	<1.0
Cobalt	ug/l				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0
Coliform Bacteria	(No/100 ml)	0													
Conductivity	uS/cm @ 25	2500	1000	1875	448	407	429	480	525	525	526	516	530	490	469
Copper	ug/l	2000	30	1500	1.5	1.5	0.9	1.1	1	0.7	<0.5	<1.0	1.1	<1.0	<1.0
Cyanide	mg/l	0.05	10												
D.O.	% Saturation				102	110	99	90	99	68	104	97	89	103	94
E_Coli	No/100 ml	0													
Fluoride	mg/l	0.8	1000												
Iron	ug/l	200	200		<10	15.3	15.5	12.9	<10	16.4	25.7	11	<10.0	<10.0	11
Lead	ug/l	25	10	18.75	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0
Magnesium	mg/l Mg		50		9.42	8.76	9.36	8.39	9.29	10.44	9.98	9.4	10	10	8.8
Manganese	ug/l	50	50		3.3	3.2	4.5	1.2	6.7	35.6	65.8	6.7	19	<5.0	7.3
Mercury	ug/l	1	1	0.75	<0.05	nm	nm	nm	<0.05	nm	nm		<0.050		
Molybdenum	ug/l		35		0.7	0.9	0.6	0.7	<0.5	0.6	0.6	<1.0	<1.0	1.1	<1.0
Nickel	ug/l	20	20	15	3.4	3.2	3.4	3.5	4.1	5.4	5.5	4.5	4.9	4.1	3.9
Nitrite	mg/l N	0.5	0.1	0.375	<0.002	<0.002	<0.002	0.004	0.012	<0.002	0.026	<0.004	<0.004	<0.004	<0.004
o-Phosphate	mg/l P		30		<0.02				<0.02			<0.010	<0.010		
pH		6.5 - 9.5			8.9	9	8.7	8.1	8.3	8.3	8.4	8.2	8.3	8.5	8.2
Phenol	mg/l		0.0005		<0.025	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Potassium	mg/l		5		8.34	7.85	9.17	6.89	7.56	9.07	9.05	8.3	8.6	8.2	6.9
Sampling Depth	mg/l														
Selenium	ug/l	10			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0
Silver	ug/l				<0.5	nm	nm	nm	nm						
Sodium	mg/l	200	150	150	42.65	39.05	47.65	34.35	38.11	43.43	42.68	40	41	42	35
Strontium	ug/l				86.27	84.15	75.17	96.41	107.85	114.73	122.05	120	120	120	110
Sulphate	mg/l SO4	250	200	187.5	23.3				20.4				27.6		
Suspended Solids											6	<4	<4	<4	<4
Temp	°C				13.7	20.1	14.2	6.2	8.9	23	15.7	5.5	11.3	17.2	8.8
Thallium	ug/l				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1.0	<1.0	<1.0	<1.0
Time sampled					13:10	14:15	12:10	13:50	12:45	12:55	13:00	13:55	13:15	14:10	12:15
Tin (ug/l)	ug/l				<1	<1	<1	nm	nm						
T.O.C.	mg/l	NAC													
T.O.N	mg/l N		NAC		<0.08	<0.08	<0.08	0.12	0.21	<0.08	<0.08	<0.20	<0.20	<0.20	<0.20
Total Suspended Solids	mg/l				<5	<5	<5	<5	<5	<5					
Uranium	ug/l				0.47	0.43	0.38	0.44	0.53	0.32	0.25	<1.0	<1.0	<1.0	<1.0
Vanadium	ug/l				<0.5	<0.5	0.61	<0.5	<0.5	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0
Zinc	ug/l		100		2	2.1	<0.5	5.8	1.6	1.5	1.6	5.7	2	2.4	4.2

APPENDIX F

LANDFILL GAS RESULTS

LANDFILL GAS MONITORING FORM

Facility Name: Drogheda Landfill		Facility Address: Mell Drogheda	
Waste Licence no.:			
Licensee: Drogheda Borough Council			
Date of licensing:		Date of sampling: 26-02-14	Time of sampling: 08:45
Instrument used: Geotechnical Instruments GA2000		Date Next Full Calibration: December 2013	
		Last Field Calibration: (include date and gases)	
Monitoring Personnel: Shane Boylan		Weather: Dry/cold	Barometric pressure: (e.g. 1001-1003 mbar rising) 1010mb Mean temperature:

Results

Sample Station Number	CH ₄ (%v/v)	CO ₂ (% v/v)	O ₂ (% v/v)	CO ppm	H ₂ S ppm	Comments
GW 1	31.4	19.6	7.6	2	0	Manifold 1
GW 2	28.5	17.3	8.8	3	0	Manifold 1
GW 3	30.1	18.2	8.6	2	0	Manifold 1
GW 4	0.3	0.5	18.3	2	0	Manifold 1
GW 5	25.1	15.1	10.8	3	0	Manifold 1
GW 6	23.8	14.3	11.2	0	0	Manifold 1
GW 7	0.2	2.1	19.4	5	0	Manifold 1
GW 8	0.2	4.4	18.5	3	0	Manifold 1
GW 9	0.3	3.3	18.9	0	0	Manifold 1
GW 10	0.2	2.6	18.8	1	0	Manifold 1
GW 11	50.4	31.9	0.1	0	0	Manifold 1
GW 12	35.1	20.2	6.1	1	0	Manifold 1
GW 13	0.2	2.3	19.0	3	0	Manifold 2
GW 14	0.3	2.1	19.2	3	0	Manifold 2
GW 15	7.3	5.2	16.7	0	0	Manifold 2
GW 16	7.0	5.0	16.8	1	0	Manifold 2
GW 17	13.1	8.3	15.6	1	1	Manifold 2
GW 18	8.2	5.8	16.2	3	0	Manifold 2
GW 19	5.6	20.1	2.0	3	0	Manifold 2
GW 20	15.7	10.9	13.9	2	0	Manifold 2
GW 21	15.0	10.4	12.5	0	0	Manifold 2
GW 22	19.5	23.1	0.0	0	0	Manifold 2
GW 23	0.2	0.1	19.6	0	0	Manifold 2
GW 24	2.4	3.3	18.1	4	0	Manifold 2

General Comments

Note:

Results						
Sample Station Number	CH ₄ (%v/v)	CO ₂ (% v/v)	O ₂ (% v/v)	CO ppm	H ₂ S ppm	Comments
GW 25	33.6	20.4	7.6	3	0	Manifold 3
GW 26	1.9	1.1	19.2	0	0	Manifold 3
GW 27	3.8	2.2	17.2	0	0	Manifold 3
GW 28	23.6	16.6	9.2	4	0	Manifold 3
GW 29	4.5	6.5	14.2	2	0	Manifold 3
GW 30	12.3	8.9	13.3	5	0	Manifold 3
GW 31	8.8	4.8	15.2	33	0	Manifold 3
GW 32	0.2	2.2	18.8	0	0	Manifold 3
GW 33	0.2	0.9	17.4	5	0	Manifold 3
GW 34	22.0	14.2	6.4	0	0	Manifold 3
GW 35	0.1	2.5	18.8	1	0	Manifold 4
GW 36	9.4	6.6	16.5	0	0	Manifold 4
GW 37	0.1	0.1	19.5	0	0	Manifold 4
GW 38	10.1	6.8	16.3	0	0	Manifold 4
GW 39	0.5	0.6	18.3	2	0	Manifold 4
GW 40	9.6	6.4	16.3	0	0	Manifold 4
GW 41	10.4	7.0	16.4	0	0	Manifold 4
GW 42	9.3	6.3	16.9	0	0	Manifold 4
GW 43	3.4	3.4	19.0	0	0	Manifold 4
GW 44						Manifold 4 FULL OF WATER
GW 45	17.4	11.4	13.3	0	0	Manifold 5
GW 46	16.9	11.2	13.8	3	0	Manifold 5
GW 47	17.3	11.3	13.0	1	0	Manifold 5
GW 48	16.4	10.8	13.4	0	0	Manifold 5
GW 49	17.3	11.4	13.1	0	0	Manifold 5
GW 50	17.0	11.4	13.2	0	0	Manifold 5
GW 51	16.1	10.5	15.3	0	0	Manifold 5
GW 52	0.3	0.4	17.8	0	0	Manifold 5

Results						
Sample Station Number	CH ₄ (%v/v)	CO ₂ (% v/v)	O ₂ (% v/v)	CO ppm	H ₂ S ppm	Comments
GW 53	16.6	10.8	13.4	0	0	Manifold 5
GW 54	17.2	11.5	13.0	0	0	Manifold 5
BH1A	0.3	0.1	20.0	1	0	31.953m A.O.D Top of Cover
BH2A	0.3	0.0	20.0	2	0	32.362m A.O.D Top of Cover
BH3A	0.2	1.3	18.8	4	0	33.664m A.O.D Top of Cover
BH4A	0.3	0.0	20.1	3	0	33.570m A.O.D Top of Cover
BH5A	0.2	0.2	19.6	0	0	36.130m A.O.D Top of Cover
BH6A	0.2	0.1	20.9	3	0	35.951m A.O.D Top of Cover
BH7A	0.2	0.0	20.3	2	0	25.172m A.O.D Top of Cover
BH8A	0.2	0.0	20.9	1	0	36.151m A.O.D Top of Cover
BH9A	0.2	0.6	20.1	4	0	34.345m A.O.D Top of Cover
BH10A	0.2	0.0	20.9	0	0	32.776m A.O.D Top of Cover
BH11A	0.2	0.1	20.8	0	0	21.715m A.O.D Top of Cover
LG1	0.3	0.1	20.0	0	0	
LG2	0.3	0.1	19.7	0	0	
LG3	0.2	5.2	10.1	3	0	
LG4	0.2	1.5	19.6	2	0	
LG5	0.2	0.1	20.8	2	0	
LG6	0.2	0.2	20.3	1	0	
LG7	0.1	0.2	20.5	0	0	
PZ8	0.2	0.0	20.7	3	0	Constructed 26/02/12
PZ9	0.2	0.0	20.7	3	0	Constructed 26/02/12
PZ10						Constructed 26/02/12 FULL OF WATER & OTHER

LANDFILL GAS MONITORING FORM						
Facility Name: Drogheda Landfill			Facility Address: Mell Drogheda			
Waste Licence no.:						
Licensee: Drogheda Borough Council						
Date of licensing:			Date of sampling:		Time of sampling: 08:30	
			31/03/14			
Instrument used: Geotechnical Instruments GA2000			Date Next Full Calibration: 05/09/14			
			Last Field Calibration: (include date and gases)			
Monitoring Personnel:			Weather:		Barometric pressure: (e.g. 1001-1003 mbar rising) 1019mb	
Shane Boylan			Overcast/dry		Mean temperature:	
Results						
Sample Station Number	CH ₄ (%v/v)	CO ₂ (% v/v)	O ₂ (% v/v)	CO ppm	H ₂ S ppm	Comments
GW 1	16.2	22.1	2.3	1	5	Manifold 1
GW 2	15.6	21.9	3.2	0	12	Manifold 1
GW 3	32.6	19.2	2.3	0	0	Manifold 1
GW 4	0.9	1.2	14.8	0	2	Manifold 1
GW 5	43.6	27.4	1.1	0	14	Manifold 1
GW 6	34.8	26.7	2.3	0	1	Manifold 1
GW 7	0.2	0.7	20.1	0	0	Manifold 1
GW 8	0.2	0.6	20.1	0	0	Manifold 1
GW 9	0.2	0.6	20.1	0	0	Manifold 1
GW 10	0.2	1.0	18.4	0	1	Manifold 1
GW 11	24.1	17.8	0.7	0	15	Manifold 1
GW 12	29.1	26.0	1.7	0	6	Manifold 1
GW 13	0.1	0.7	20.1	0	0	Manifold 2
GW 14	0.1	0.7	19.0	1	0	Manifold 2
GW 15	18.9	25.3	0.8	2	1	Manifold 2
GW 16	37.5	29.4	0.0	0	3	Manifold 2
GW 17	20.4	19.9	6.2	0	10	Manifold 2
GW 18	43.2	29.7	0.1	0	7	Manifold 2
GW 19	0.2	14.5	6.7	0	0	Manifold 2
GW 20	31.3	26.6	1.5	0	0	Manifold 2
GW 21	31.6	27.0	2.8	0	0	Manifold 2
GW 22	0.0	1.8	19.7	0	0	Manifold 2
GW 23	0.2	0.1	19.2	0	0	Manifold 2
GW 24	25.0	17.8	11.0	0	7	Manifold 2

General Comments

Note:

Results						
Sample Station Number	CH ₄ (%v/v)	CO ₂ (% v/v)	O ₂ (% v/v)	CO ppm	H ₂ S ppm	Comments
GW 25	37.3	22.2	6.1	0	0	Manifold 3
GW 26	1.3	0.7	20.0	0	0	Manifold 3
GW 27	2.7	1.6	19.0	0	0	Manifold 3
GW 28	15.9	12.1	11.5	2	0	Manifold 3
GW 29	19.6	10.4	13.7	0	0	Manifold 3
GW 30	10.0	9.5	10.8	0	0	Manifold 3
GW 31	8.2	4.7	15.0	33	0	Manifold 3
GW 32	0.1	2.1	19.0	0	0	Manifold 3
GW 33	0.1	0.1	19.2	0	0	Manifold 3
GW 34	27.1	16.8	4.4	0	0	Manifold 3
GW 35	0.1	0.7	18.9	0	0	Manifold 4
GW 36	24.7	16.2	10.8	0	0	Manifold 4
GW 37	0.2	0.2	17.1	0	0	Manifold 4
GW 38	20.5	12.5	9.8	0	0	Manifold 4
GW 39	0.6	0.7	15.0	0	0	Manifold 4
GW 40	53.3	34.1	0.0	1	3	Manifold 4
GW 41	37.3	28.0	0.3	0	3	Manifold 4
GW 42	29.0	26.9	1.5	0	7	Manifold 4
GW 43	0.1	0.8	20.0	0	0	Manifold 4
GW 44	0.1	0.8	20.0	0	0	Manifold 4
GW 45	20.3	22.0	0.7	0	9	Manifold 5
GW 46	33.4	24.6	5.7	0	2	Manifold 5
GW 47	35.9	31.6	0.0	0	17	Manifold 5
GW 48	34.4	30.5	0.0	0	16	Manifold 5
GW 49	40.1	29.3	0.0	0	12	Manifold 5
GW 50	28.4	26.2	0.0	0	14	Manifold 5
GW 51	32.5	27.6	1.0	0	11	Manifold 5
GW 52	0.1	0.5	17.7	0	0	Manifold 5

Results						
Sample Station Number	CH ₄ (%v/v)	CO ₂ (% v/v)	O ₂ (% v/v)	CO ppm	H ₂ S ppm	Comments
GW 53	31.3	26.5	0.5	0	7	Manifold 5
GW 54	31.4	27.1	0.3	0	10	Manifold 5
BH1A	0.2	0.1	20.3	0	0	31.953m A.O.D Top of Cover
BH2A	0.2	0.0	20.4	1	0	32.362m A.O.D Top of Cover
BH3A	0.2	1.5	18.8	0	0	33.664m A.O.D Top of Cover
BH4A	0.2	0.1	20.2	0	0	33.570m A.O.D Top of Cover
BH5A	0.2	0.9	18.8	0	0	36.130m A.O.D Top of Cover
BH6A	0.3	0.1	21.1	0	0	35.951m A.O.D Top of Cover
BH7A	0.2	0.1	21.0	0	0	25.172m A.O.D Top of Cover
BH8A	0.3	0.0	21.1	0	0	36.151m A.O.D Top of Cover
BH9A	0.2	0.4	20.5	0	0	34.345m A.O.D Top of Cover
BH10A	0.3	0.0	21.1	0	0	32.776m A.O.D Top of Cover
BH11A	0.2	0.1	21.0	0	0	21.715m A.O.D Top of Cover
LG1	0.3	0.1	20.3	0	0	
LG2	0.3	0.2	21.4	0	0	
LG3	0.2	0.1	20.3	0	0	
LG4	0.1	2.2	15.7	0	0	
LG5	0.1	0.0	21.0	0	0	
LG6	0.2	0.0	20.1	0	0	
LG7	0.2	0.1	20.1	0	0	
PZ8	0.1	0.0	20.9	0	0	Constructed 26/02/12
PZ9	0.1	0.0	20.8	0	0	Constructed 26/02/12
PZ10						Constructed 26/02/12 FULL OF WATER

LANDFILL GAS MONITORING FORM						
Facility Name: Drogheda Landfill			Facility Address: Mell Drogheda			
Waste Licence no.:						
Licensee: Drogheda Borough Council						
Date of licensing:			Date of sampling:		Time of sampling: 08:40	
			29-04-14			
Instrument used: Geotechnical Instruments GA2000			Date Next Full Calibration: 05-09-14			
			Last Field Calibration: (include date and gases)			
Monitoring Personnel:			Weather:		Barometric pressure: (e.g. 1001-1003 mbar rising) 1014mb	
Shane Boylan			Sunny		Mean temperature:	
Results						
Sample Station Number	CH ₄ (%v/v)	CO ₂ (% v/v)	O ₂ (% v/v)	CO ppm	H ₂ S ppm	Comments
GW 1	22.6	15.9	5.9	4	1	Manifold 1
GW 2	24.2	16.9	4.9	0	1	Manifold 1
GW 3	27.1	18.5	3.3	3	0	Manifold 1
GW 4	0.5	1.2	18.5	1	1	Manifold 1
GW 5	35.4	24.5	1.3	1	9	Manifold 1
GW 6	31.7	25.8	0.6	3	3	Manifold 1
GW 7	0.3	0.9	20.1	2	0	Manifold 1
GW 8	0.2	0.7	20.3	0	0	Manifold 1
GW 9	0.2	0.5	20.3	1	0	Manifold 1
GW 10	0.3	1.5	18.7	1	2	Manifold 1
GW 11	24.8	26.5	1.0	5	13	Manifold 1
GW 12	26.8	24.6	1.7	0	9	Manifold 1
GW 13	0.3	1.0	19.9	0	0	Manifold 2
GW 14	0.3	0.9	19.4	2	0	Manifold 2
GW 15	19.4	24.6	0.7	3	3	Manifold 2
GW 16	35.5	28.9	0.0	1	8	Manifold 2
GW 17	24.0	21.0	5.3	2	13	Manifold 2
GW 18	43.8	29.3	0.0	1	8	Manifold 2
GW 19	3.3	18.9	0.2	0	0	Manifold 2
GW 20	30.6	25.8	1.7	0	0	Manifold 2
GW 21	12.8	11.9	11.4	0	1	Manifold 2
GW 22	9.8	18.2	0.0	0	0	Manifold 2
GW 23	0.2	0.1	20.4	0	0	Manifold 2
GW 24	26.6	17.2	10.7	0	8	Manifold 2

General Comments

Note:

Results						
Sample Station Number	CH ₄ (%v/v)	CO ₂ (% v/v)	O ₂ (% v/v)	CO ppm	H ₂ S ppm	Comments
GW 25	38.7	21.1	6.7	0	0	Manifold 3
GW 26	5.2	2.2	19.0	2	0	Manifold 3
GW 27	5.3	2.8	18.2	1	0	Manifold 3
GW 28	14.1	9.8	12.5	7	0	Manifold 3
GW 29	58.4	21.0	2.9	0	0	Manifold 3
GW 30	9.4	9.7	9.2	0	0	Manifold 3
GW 31	8.5	4.3	15.2	40	0	Manifold 3
GW 32	0.2	3.6	18.6	3	0	Manifold 3
GW 33	0.2	0.1	19.8	0	0	Manifold 3
GW 34	30.4	16.6	5.2	0	0	Manifold 3
GW 35	0.1	0.7	20.2	0	0	Manifold 4
GW 36	27.6	17.0	10.2	0	3	Manifold 4
GW 37	0.1	0.1	20.3	0	0	Manifold 4
GW 38	32.5	18.6	3.8	0	0	Manifold 4
GW 39	0.5	0.5	19.8	2	0	Manifold 4
GW 40	53.1	34.1	0.0	0	5	Manifold 4
GW 41	28.8	28.4	0.0	0	4	Manifold 4
GW 42	32.2	27.0	0.0	1	8	Manifold 4
GW 43	0.1	0.8	20.1	0	0	Manifold 4
GW 44	0.2	0.9	20.0	0	0	Manifold 4
GW 45	25.6	22.4	0.5	0	13	Manifold 5
GW 46	0.1	0.1	20.4	1	0	Manifold 5
GW 47	38.7	30.9	0.0	0	20	Manifold 5
GW 48	37.5	30.9	0.0	3	15	Manifold 5
GW 49	42.2	28.7	0.6	0	15	Manifold 5
GW 50	31.0	26.2	0.0	0	17	Manifold 5
GW 51	37.1	28.5	0.2	0	15	Manifold 5
GW 52	0.3	0.6	19.7	0	0	Manifold 5

Results						
Sample Station Number	CH ₄ (%v/v)	CO ₂ (% v/v)	O ₂ (% v/v)	CO ppm	H ₂ S ppm	Comments
GW 53	36.4	27.9	1.0	2	10	Manifold 5
GW 54	35.1	27.7	0.5	0	12	Manifold 5
BH1A	0.1	0.0	20.7	2	0	31.953m A.O.D Top of Cover
BH2A	0.1	0.0	20.7	2	0	32.362m A.O.D Top of Cover
BH3A	0.0	0.2	20.9	0	0	33.664m A.O.D Top of Cover
BH4A	0.1	0.1	20.3	3	0	33.570m A.O.D Top of Cover
BH5A	0.1	1.1	18.3	0	0	36.130m A.O.D Top of Cover
BH6A	0.0	0.0	21.2	0	0	35.951m A.O.D Top of Cover
BH7A	0.1	0.0	21.0	1	0	25.172m A.O.D Top of Cover
BH8A	0.1	0.5	20.9	1	0	36.151m A.O.D Top of Cover
BH9A	0.1	0.0	21.3	0	0	34.345m A.O.D Top of Cover
BH10A	0.1	0.0	21.3	0	0	32.776m A.O.D Top of Cover
BH11A	0.1	0.0	21.4	0	0	21.715m A.O.D Top of Cover
LG1	0.2	0.0	20.6	2	0	
LG2	0.1	0.0	20.5	0	0	
LG3	0.2	0.1	20.3	0	0	
LG4	0.1	0.6	20.3	0	0	
LG5	0.0	0.0	21.2	0	0	
LG6	0.1	0.0	20.2	0	0	
LG7	0.1	0.1	20.1	0	0	
PZ8	0.0	0.0	21.2	0	0	Constructed 26/02/12
PZ9	0.1	0.0	21.2	0	0	Constructed 26/02/12
PZ10						Constructed 26/02/12 Full of water

LANDFILL GAS MONITORING FORM						
Facility Name: Drogheda Landfill			Facility Address: Mell Drogheda			
Waste Licence no.:						
Licensee: Drogheda Borough Council						
Date of licensing:			Date of sampling:		Time of sampling: 08:45	
			21/05/14			
Instrument used: Geotechnical Instruments GA2000			Date Next Full Calibration: 05/09/14			
			Last Field Calibration: (include date and gases)			
Monitoring Personnel:			Weather:		Barometric pressure: (e.g. 1001-1003 mbar rising) 1004	
Shane Boylan			Dry/sunny		Mean temperature:	
Results						
Sample Station Number	CH ₄ (%v/v)	CO ₂ (% v/v)	O ₂ (% v/v)	CO ppm	H ₂ S ppm	Comments
GW 1	29.9	22.7	3.0	2	0	Manifold 1
GW 2	32.2	24.8	1.6	5	0	Manifold 1
GW 3	31.1	24.2	2.0	5	0	Manifold 1
GW 4	28.8	23.2	2.9	1	1	Manifold 1
GW 5	37.1	27.4	0.0	0	0	Manifold 1
GW 6	36.7	27.6	0.0	2	1	Manifold 1
GW 7	25.7	26.7	0.4	0	0	Manifold 1
GW 8	35.9	27.2	0.0	1	0	Manifold 1
GW 9	28.2	25.8	0.3	1	0	Manifold 1
GW 10	18.2	23.5	2.7	4	0	Manifold 1
GW 11	33.2	26.0	0.9	3	0	Manifold 1
GW 12	29.2	26.2	0.0	5	1	Manifold 1
GW 13	37.1	28.2	0.0	5	1	Manifold 2
GW 14	42.3	29.8	0.0	0	1	Manifold 2
GW 15	33.1	27.3	0.0	6	3	Manifold 2
GW 16	38.4	29.3	0.0	6	2	Manifold 2
GW 17	47.9	32.8	0.0	0	23	Manifold 2
GW 18	50.1	31.0	0.0	4	13	Manifold 2
GW 19	2.8	17.8	0.1	1	0	Manifold 2
GW 20	39.6	27.9	0.7	3	1	Manifold 2
GW 21	41.2	29.2	0.0	4	1	Manifold 2
GW 22	0.8	16.3	0.0	0	0	Manifold 2
GW 23	41.6	29.1	0.0	3	3	Manifold 2
GW 24	39.8	29.4	0.0	2	0	Manifold 2

General Comments

Note:

Results						
Sample Station Number	CH ₄ (%v/v)	CO ₂ (% v/v)	O ₂ (% v/v)	CO ppm	H ₂ S ppm	Comments
GW 25	39.9	21.2	6.1	6	0	Manifold 3
GW 26	4.2	1.8	19.8	2	0	Manifold 3
GW 27	4.9	2.5	19.0	7	0	Manifold 3
GW 28	12.4	8.5	13.5	8	0	Manifold 3
GW 29	64.2	24.5	0.9	2	0	Manifold 3
GW 30	7.1	8.4	10.4	1	0	Manifold 3
GW 31	8.6	4.3	15.4	40	1	Manifold 3
GW 32	31.1	21.5	5.6	0	0	Manifold 3
GW 33	59.0	38.1	0.0	0	2	Manifold 3
GW 34	30.1	15.2	5.1	1	1	Manifold 3
GW 35	47.4	31.8	0.0	5	13	Manifold 4
GW 36	48.1	31.7	0.0	6	11	Manifold 4
GW 37	46.5	30.7	0.2	7	11	Manifold 4
GW 38	47.7	31.6	0.0	7	10	Manifold 4
GW 39	0.6	0.5	20.1	3	0	Manifold 4
GW 40	54.5	34.0	0.0	3	6	Manifold 4
GW 41	43.3	29.4	0.0	1	2	Manifold 4
GW 42	46.1	31.3	0.0	2	14	Manifold 4
GW 43	45.7	30.9	0.0	3	4	Manifold 4
GW 44	46.2	31.6	0.0	8	11	Manifold 4
GW 45	52.3	31.8	0.0	0	13	Manifold 5
GW 46	54.5	35.0	0.0	3	9	Manifold 5
GW 47	49.9	32.4	0.0	3	24	Manifold 5
GW 48	52.1	32.3	0.0	3	14	Manifold 5
GW 49	50.7	29.7	0.0	4	13	Manifold 5
GW 50	51.3	32.6	0.0	3	12	Manifold 5
GW 51	50.3	31.7	0.0	4	4	Manifold 5
GW 52	0.4	0.7	19.8	0	0	Manifold 5

Results						
Sample Station Number	CH ₄ (%v/v)	CO ₂ (% v/v)	O ₂ (% v/v)	CO ppm	H ₂ S ppm	Comments
GW 53	50.0	31.7	0.0	4	3	Manifold 5
GW 54	49.6	31.8	0.1	2	3	Manifold 5
BH1A	0.1	0.1	20.9	0	0	31.953m A.O.D Top of Cover
BH2A	0.0	0.0	21.1	0	0	32.362m A.O.D Top of Cover
BH3A	0.0	0.1	20.9	0	0	33.664m A.O.D Top of Cover
BH4A	0.1	0.0	21.2	1	0	33.570m A.O.D Top of Cover
BH5A	0.0	1.9	16.8	0	0	36.130m A.O.D Top of Cover
BH6A	0.0	0.0	21.0	0	0	35.951m A.O.D Top of Cover
BH7A	0.1	0.0	21.3	1	0	25.172m A.O.D Top of Cover
BH8A	0.0	0.3	20.7	1	0	36.151m A.O.D Top of Cover
BH9A	0.1	0.2	20.9	0	0	34.345m A.O.D Top of Cover
BH10A	0.1	0.0	21.2	1	0	32.776m A.O.D Top of Cover
BH11A	0.1	0.0	21.2	0	0	21.715m A.O.D Top of Cover
LG1	0.1	0.2	20.8	3	0	
LG2	0.1	0.1	20.5	0	0	
LG3	0.1	0.0	20.8	2	0	
LG4	0.0	0.9	19.6	0	0	
LG5	0.1	0.3	20.9	0	0	
LG6	0.1	0.0	20.3	0	0	
LG7	0.0	0.1	20.1	0	0	
PZ8	0.0	0.5	20.3	0	0	Constructed 26/02/12
PZ9	0.0	0.0	21.2	1	0	Constructed 26/02/12
PZ10						Constructed 26/02/12 FULL OF WATER

LANDFILL GAS MONITORING FORM

Facility Name: Drogheda Landfill		Facility Address: Mell Drogheda	
Waste Licence no.: W0033-01			
Licensee: Drogheda Borough Council			
Date of licensing:		Date of sampling: 10/07/14	Time of sampling: 12.00hrs
Instrument used: Geotechnical Instruments GA2000		Date Next Full Calibration: August 2014	
		Last Field Calibration: (include date and gases)	
Monitoring Personnel: Damien Holmes		Weather: Dry	Barometric pressure 1006mb

Results						
Sample Station Number	CH ₄ (%v/v)	CO ₂ (% v/v)	O ₂ (% v/v)	CO ppm	H ₂ S ppm	Comments
BH1A	0	0.1	20.1	1	0	31.953m A.O.D Top of Cover
BH2A	0.1	0.2	20.1	0	0	32.362m A.O.D Top of Cover
BH3A	0.2	1.2	19.2	0	0	33.664m A.O.D Top of Cover
BH4A	0.1	0.0	20.0	2	0	33.570m A.O.D Top of Cover
BH5A	0.1	0.3	20.0	3	0	36.130m A.O.D Top of Cover
BH6A	0.1	0.1	20.6	0	0	35.951m A.O.D Top of Cover
BH7A	0.0	0.0	20.2	0	0	25.172m A.O.D Top of Cover
BH8A	0.1	0.1	20.2	0	0	36.151m A.O.D Top of Cover
BH9A	0.1	0.4	20.5	0	0	34.345m A.O.D Top of Cover
BH10A	0.0	0.0	21.1	0	0	32.776m A.O.D Top of Cover
BH11A	0.3	0.1	20.6	0	0	21.715m A.O.D Top of Cover
LG1	0.1	0.1	20.1	0	0	
LG2	0.1	0.2	21.2	1	0	
LG3	0.1	1.3	18.2	0	0	
LG4	0.1	2.1	16.8	0	0	
LG5	0.2	0.1	21.2	2	0	
LG6	0.2	0.2	20.1	0	0	
LG7	0.2	0.1	21.2	0	0	
PZ8	0.1	0.0	20.9	0	0	Constructed 26/02/12
PZ9	0.0	0.0	20.8	0	0	Constructed 26/02/12
PZ10	0.1	0.0	20.8	0	0	Constructed 26/02/12

LANDFILL GAS MONITORING FORM

Facility Name: Drogheda Landfill		Facility Address: Mell Drogheda	
Waste Licence no.: W0033-01			
Licensee: Drogheda Borough Council			
Date of licensing:		Date of sampling: 14/08/14	Time of sampling: 12.00hrs
Instrument used: Geotechnical Instruments GA2000		Date Next Full Calibration: August 2014	
		Last Field Calibration: (include date and gases)	
Monitoring Personnel: Damien Holmes		Weather: Showers	Barometric pressure 1006mb

Results						
Sample Station Number	CH ₄ (%v/v)	CO ₂ (% v/v)	O ₂ (% v/v)	CO ppm	H ₂ S ppm	Comments
BH1A	0.0	0.1	21.1	1	0	31.953m A.O.D Top of Cover
BH2A	0.0	0.1	21.1	0	0	32.362m A.O.D Top of Cover
BH3A	0.4	1.1	19.6	1	0	33.664m A.O.D Top of Cover
BH4A	0.1	0.0	21.2	0	0	33.570m A.O.D Top of Cover
BH5A	0.0	0.4	19.8	1	0	36.130m A.O.D Top of Cover
BH6A	0.2	0.1	20.6	0	0	35.951m A.O.D Top of Cover
BH7A	0.2	0.0	20.4	0	0	25.172m A.O.D Top of Cover
BH8A	0.0	0.1	20.2	1	0	36.151m A.O.D Top of Cover
BH9A	0.2	0.4	20.5	2	0	34.345m A.O.D Top of Cover
BH10A	0.0	0.2	21.1	0	0	32.776m A.O.D Top of Cover
BH11A	0.2	0.1	21.0	0	0	21.715m A.O.D Top of Cover
LG1	0.0	0.2	20.1	2	0	
LG2	0.1	0.2	21.2	0	0	
LG3	0.0	1.1	18.6	0	0	
LG4	0.1	1.2	19.1	0	0	
LG5	0.2	0.2	20.6	2	0	
LG6	0.0	0.2	20.1	0	0	
LG7	0.2	0.1	21.2	0	0	
PZ8	0.1	0.0	20.1	0	0	Constructed 26/02/12
PZ9	0.1	0.0	21.0	0	0	Constructed 26/02/12
PZ10	0.1	0.0	21.0	0	0	Constructed 26/02/12

LANDFILL GAS MONITORING FORM

Facility Name: Drogheda Landfill		Facility Address: Mell Drogheda	
Waste Licence no.: W0033-01			
Licensee: Drogheda Borough Council			
Date of licensing:		Date of sampling: 30/09/14	Time of sampling: 09.00hrs
Instrument used: Geotechnical Instruments GA2000		Date Next Full Calibration: July 2015	
		Last Field Calibration: (include date and gases)	
Monitoring Personnel: Damien Holmes		Weather: Showers	Barometric pressure 1014mb

Results						
Sample Station Number	CH ₄ (%v/v)	CO ₂ (% v/v)	O ₂ (% v/v)	CO ppm	H ₂ S ppm	Comments
BH1A	0.0	0.1	20.1	0	0	31.953m A.O.D Top of Cover
BH2A	0.1	0.2	20.1	0	0	32.362m A.O.D Top of Cover
BH3A	0.2	1.1	19.2	0	0	33.664m A.O.D Top of Cover
BH4A	0.1	0.0	21.2	0	0	33.570m A.O.D Top of Cover
BH5A	0.1	0.6	19.0	1	0	36.130m A.O.D Top of Cover
BH6A	0.1	0.1	20.6	0	0	35.951m A.O.D Top of Cover
BH7A	0.2	0.0	20.4	0	0	25.172m A.O.D Top of Cover
BH8A	0.1	0.1	20.2	0	0	36.151m A.O.D Top of Cover
BH9A	0.2	0.4	20.4	0	0	34.345m A.O.D Top of Cover
BH10A	0.0	0.0	21.1	0	0	32.776m A.O.D Top of Cover
BH11A	0.2	0.1	21.0	0	0	21.715m A.O.D Top of Cover
LG1	0.2	0.2	20.0	0	0	
LG2	0.0	0.2	21.1	0	0	
LG3	0.1	1.1	18.3	0	0	
LG4	0.1	2.2	17.2	0	0	
LG5	0.2	0.1	21.0	2	0	
LG6	0.0	0.2	20.1	0	0	
LG7	0.2	0.1	21.2	0	0	
PZ8	0.1	0.0	21.0	0	0	Constructed 26/02/12
PZ9	0.1	0.0	20.9	0	0	Constructed 26/02/12
PZ10	0.1	0.0	21.0	0	0	Constructed 26/02/12

LANDFILL GAS MONITORING FORM

Facility Name: Drogheda Landfill		Facility Address: Mell Drogheda	
Waste Licence no.: W0033-01			
Licensee: Drogheda Borough Council			
Date of licensing:		Date of sampling: 23-10-14	Time of sampling: 14:00hrs
Instrument used: Geotechnical Instruments GA2000		Date Next Full Calibration: July 2015	
		Last Field Calibration: (include date and gases)	
Monitoring Personnel: Damien Holmes		Weather: Showers	Barometric pressure 1012mb

Results						
Sample Station Number	CH ₄ (%v/v)	CO ₂ (% v/v)	O ₂ (% v/v)	CO ppm	H ₂ S ppm	Comments
BH1A	0.0	0.2	20.1	0	0	31.953m A.O.D Top of Cover
BH2A	0.0	0.1	20.6	0	0	32.362m A.O.D Top of Cover
BH3A	0.1	1.2	19.6	0	0	33.664m A.O.D Top of Cover
BH4A	0.1	0.0	21.2	0	0	33.570m A.O.D Top of Cover
BH5A	0.0	0.6	19.5	1	0	36.130m A.O.D Top of Cover
BH6A	0.1	0.1	20.6	0	0	35.951m A.O.D Top of Cover
BH7A	0.2	0.0	20.4	0	0	25.172m A.O.D Top of Cover
BH8A	0.1	0.1	20.2	0	0	36.151m A.O.D Top of Cover
BH9A	0.2	0.4	20.4	0	0	34.345m A.O.D Top of Cover
BH10A	0.0	0.0	21.1	0	0	32.776m A.O.D Top of Cover
BH11A	0.1	0.0	21.0	0	0	21.715m A.O.D Top of Cover
LG1	0.2	0.2	20.0	0	0	
LG2	0.0	0.1	20.8	0	0	
LG3	0.1	1.2	19.1	0	0	
LG4	0.1	2.2	17.2	0	0	
LG5	0.0	0.1	20.6	2	0	
LG6	0.0	0.2	20.1	0	0	
LG7	0.2	0.1	21.2	0	0	
PZ8	0.1	0.0	21.0	0	0	Constructed 26/02/12
PZ9	0.1	0.0	20.9	0	0	Constructed 26/02/12
PZ10	0.1	0.0	21.0	0	0	Constructed 26/02/12

LANDFILL GAS MONITORING FORM

Facility Name: Drogheda Landfill		Facility Address: Mell Drogheda	
Waste Licence no.: W0033-01			
Licensee: Drogheda Borough Council			
Date of licensing:		Date of sampling: 17-11-14	Time of sampling: 10.00hrs
Instrument used: Geotechnical Instruments GA2000		Date Next Full Calibration: July 2015	
		Last Field Calibration: (include date and gases)	
Monitoring Personnel: Damien Holmes		Weather: Showers	Barometric pressure 1010mb

Results						
Sample Station Number	CH ₄ (%v/v)	CO ₂ (% v/v)	O ₂ (% v/v)	CO ppm	H ₂ S ppm	Comments
BH1A	0.0	0.1	21.1	1	0	31.953m A.O.D Top of Cover
BH2A	0.0	0.1	20.6	0	0	32.362m A.O.D Top of Cover
BH3A	0.3	1.0	19.4	1	0	33.664m A.O.D Top of Cover
BH4A	0.1	0.0	21.2	0	0	33.570m A.O.D Top of Cover
BH5A	0.0	0.4	19.8	1	0	36.130m A.O.D Top of Cover
BH6A	0.2	0.1	20.6	0	0	35.951m A.O.D Top of Cover
BH7A	0.2	0.0	20.4	0	0	25.172m A.O.D Top of Cover
BH8A	0.0	0.2	20.0	1	0	36.151m A.O.D Top of Cover
BH9A	0.1	0.4	20.4	2	0	34.345m A.O.D Top of Cover
BH10A	0.0	0.2	20.9	0	0	32.776m A.O.D Top of Cover
BH11A	0.0	0.1	21.0	0	0	21.715m A.O.D Top of Cover
LG1	0.0	0.2	20.1	2	0	
LG2	0.1	0.2	21.2	0	0	
LG3	0.0	1.1	19.0	0	0	
LG4	0.1	1.2	19.1	0	0	
LG5	0.1	0.2	20.4	2	0	
LG6	0.0	0.2	20.1	0	0	
LG7	0.2	0.1	21.2	0	0	
PZ8	0.1	0.0	20.1	0	0	Constructed 26/02/12
PZ9	0.1	0.0	21.0	0	0	Constructed 26/02/12
PZ10	0.0	0.0	21.0	0	0	Constructed 26/02/12

LANDFILL GAS MONITORING FORM

Facility Name: Drogheda Landfill		Facility Address: Mell Drogheda	
Waste Licence no.: W0033-01			
Licensee: Drogheda Borough Council			
Date of licensing:		Date of sampling: 09-12-14	Time of sampling: 10.00hrs
Instrument used: Geotechnical Instruments GA2000		Date Next Full Calibration: July 2015	
		Last Field Calibration: (include date and gases)	
Monitoring Personnel: Damien Holmes		Weather: Dry	Barometric pressure 1008mb

Results						
Sample Station Number	CH ₄ (%v/v)	CO ₂ (% v/v)	O ₂ (% v/v)	CO ppm	H ₂ S ppm	Comments
BH1A	0	0.1	20.1	1	0	31.953m A.O.D Top of Cover
BH2A	0.1	0.2	20.1	0	0	32.362m A.O.D Top of Cover
BH3A	0.1	1.3	19.4	0	0	33.664m A.O.D Top of Cover
BH4A	0.1	0.0	20.1	2	0	33.570m A.O.D Top of Cover
BH5A	0.1	0.3	20.0	3	0	36.130m A.O.D Top of Cover
BH6A	0.0	0.1	20.6	0	0	35.951m A.O.D Top of Cover
BH7A	0.0	0.0	20.2	0	0	25.172m A.O.D Top of Cover
BH8A	0.1	0.1	20.2	0	0	36.151m A.O.D Top of Cover
BH9A	0.0	0.3	20.2	0	0	34.345m A.O.D Top of Cover
BH10A	0.0	0.0	21.1	0	0	32.776m A.O.D Top of Cover
BH11A	0.0	0.1	20.6	0	0	21.715m A.O.D Top of Cover
LG1	0.1	0.1	20.1	0	0	
LG2	0.1	0.2	21.2	1	0	
LG3	0.1	1.3	18.2	0	0	
LG4	0.1	2.1	16.8	0	0	
LG5	0.2	0.1	21.2	2	0	
LG6	0.2	0.2	20.1	0	0	
LG7	0.1	0.0	21.2	0	0	
PZ8	0.1	0.0	20.9	0	0	Constructed 26/02/12
PZ9	0.0	0.0	21.0	0	0	Constructed 26/02/12
PZ10	0.1	0.0	21.0	0	0	Constructed 26/02/12