ANNUAL ENVIRONMENTAL REPORT

By

Drogheda Borough Council

To

Environmental Protection Agency

For

Waste licence Reference (W0033-01)

Reporting Period January – December 2012

DROGHEDA LANDFILL SITE COUNTY LOUTH

DROGHEDA LANDFILL SITE

ANNUAL ENVIRONMENTAL REPORT

JANUARY – DECEMBER 2012

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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.

1.1 SITE GEOLOGY

1.1.1 Solid Geology

The limestone rocks exposed at the quarry faces form part of a limb of a broad synclinal basin, which covers an area of approximately 140 km^2. The rocks are shallow water sedimentary rocks of Lower Carboniferous limestone. The exposed limestone is dominated by thickly bedded pale, bioclastic calcarenites with minor shales and occasional micrites. Depositional bedding planes within the limestone are inclined in a south easterly direction at lower angle towards the River Boyne. The bedding is cross cut by numerous, well developed, widely spaced joints, which are largely uniformly oriented. The rocks which are pure calcium carbonate deposits are prone to long term dissolution by weakly acidic percolating groundwater. Dissolution of the rock over many years often forms underground conduits known as Karsts.

1.1.2 Drift Geology

Much of the overburden within the site was stripped and stockpiled in perimeter bunds at the eastern and western site margins to facilitate quarrying activities. The overburden stockpiles comprise of moderate to slow permeability gravely sandy silt material of glacial origin. These deposits are extensive over the area. Glacial till was encountered in exploratory boreholes put down around the periphery of the site. Till thickness encountered above the rockhead ranged from 2.5m to 36m below ground surface with the greatest thickness encountered outside the north west boundary of the site.

1.1.3 Groundwater Resources

The aquifer has an estimated resource potential of 1.6 x10^6 m^3/annum and is classified as a regionally important groundwater resource by the Geological Survey of Ireland. Due to the crystalline nature of the intact rock groundwater movement is principally confined to fissure flow. Conduit flow via karstic features also predominates. The water table beneath the facility is situated at depth and groundwater movement through the fractured rock is inclined towards the main quarry lake. The lake appears to be the principle receptor, which receives stores and dilutes contaminated groundwater from landfill areas on the Northern and eastern upper quarry benches. The groundwater outflow from the lake is via the south western boundary.

1.1.4 Hydrogeology

A site investigation undertaken in 1998 determined the following;

- The unsaturated zone beneath the facility is very thick and extends to depths of up to 49m below present ground levels
- Karstic features were encountered at depth within the boreholes located in the south eastern part of the site. These features represent significant potential conduits for groundwater flow
- Mass permeability values for the limestone were determined by borehole rising head tests to range from 2.2x10-5 m/s to 2.1x10-7 m/s
- The hydraulic gradient within the northern and eastern sites is inclined toward the quarry lake and there is a net groundwater movement towards the quarry lake at this facility
- The hydraulic gradient in the southern site is inclined towards the River Boyne and there is a net groundwater movement from the quarry lake at this location.

1.1.5 Local Meteorology

The meteorology of Drogheda is typical of areas on the eastern seaboard of Ireland. The climate is predominately temperate, characterised by mild conditions with no extremes of wind, rain or temperature.

1.2 RESTORATION WORKS UNDERTAKEN

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

- Installation of 55 No. gas extraction wells
- Installation and commissioning of an active gas extraction flare and methane stripper
- Installation of capping layers consisting of Gas Drainage Layer, LLDPE capping and Surface Water Drainage Layer (A total area of approximately 101,650m^2).
- Reinforcement of the capping system using georgic 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 2012.

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 2012. 390 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)

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

Table 3.2 Waste Quantities Accepted for Recycling at Drogheda Civic Waste Facility in 2012[3]

Material Type	EWC Codes	Tonnage	Name of Destination Facility(ies), or Collector(s) if Directly Exported
Mixed residual waste	20 03 01	390	Whiteriver Landfill W0060-03
Organic waste (garden)	20 02 01	1304.78	Dundalk Landfill & CA / V& W Recycling No. W0034-02
cardboard packaging	15 01 01	262	Dundalk Landfill & CA / V& W Recycling No. W0034-02
newspaper and magazines	20 01 01	105	Dundalk Landfill & CA / V& W Recycling No. W0034-02
glass packaging	15 01 07	133	Glassdon NI Licence No. LN/06/08
plastic packaging	15 01 02	144	Shabra Monaghan Licence No. 15/5
wood packaging	15 01 03	145	Dundalk Landfill & CA / V& W Recycling No. W0034-02
wood non-packaging	20 01 38	370	Dundalk Landfill & CA / V& W Recycling No. W0034-02
lead acid batteries and accumulators	16 06 01*	11.73	Rilta Environmental Licence No. WO192-02
Other (e.g. alkaline) batteries and accumulators	16 06 04	1	Rilta Environmental Licence No. WO192-02
Clothes	20 01 10	33.52	Cookstown NI Licence no. WMEX01/11

[1] Figures based on estimates.
[2] Capping material under the Capping and Restoration Contract.
[3] Figures taken from EPA waste survey 2012

Material Type	EWC Codes	Tonnage	Name of Destination Facility(ies), or Collector(s) if Directly Exported
Mixed Metals	20 01 40	185.6	Tinleys NI Licence No. WMEX20/01
Total		**3,085.63**	

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;

- Paper/magazines
- Cardboard
- glass
- plastics
- clothing/footwear
- green/garden waste
- wood
- aluminium cans
- steel cans
- domestic appliances
- batteries
- electrical appliances
- scrap metal.

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 deposited into each container.

5.0 SUMMARY REPORT ON EMISSIONS

5.1 EMISSIONS TO AIR

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

There is a 750m^3/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 113,178 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)	372,948
Methane flared	259,770
Methane utilised in engine/s	0.0
Net Methane Emission	113,178

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). These results are provided in Appendix B.

NOx as NO2, CO, TOC and HCL/HF results were within the typical emission limit values used for such installations in Ireland

5.1.1 Emissions to Groundwater

There are no direct emissions to groundwater or surface water. A water balance calculation has been completed for Drogheda landfill site and is presented in Appendix C. The site is unlined and an area of approximately 101,650m^2 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 2,253 m^3 to 9,217 m^3 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.

5.2 EMISSIONS TO WASTE WATER TREATMENT WORKS

Condensate from the landfill gas extraction system is currently transported off site to Drogheda wastewater treatment plant via tanker. An estimated 33 m^3 was sent for disposal.

The estimated volume discharged from Civic Waste Facility (area 13,500 m^2) is approximately 11,500 m^3 for 2012. This is within the 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;

- **Groundwater**: the European communities (Drinking Water) (No. 2) Regulations 2007 parametric value (DWR) and Interim Guideline Value (IGV) Towards Setting Guideline Values for the Protection of Ground Water in Ireland and SI. No. 9/2010 European Communities Environmental Objectives (Groundwater) Regulations 2010 (GWR 2010). A table showing the DWR, IGV and GWR 2010 from applicable regulations is to be found in Appendix C.

- **Total pesticides** means the sum of all individual pesticides detected and quantified in the course of the monitoring procedure. The DWR is 0.50ug/l. (Only those pesticides which are likely to be present in a given supply require to be monitored- organic insecticides, organic herbicides, organic fungicides, organic nematocides, organic acaricides, organic algicides, organic rodenticides, organic slimicides , related products (*inter alia*, growth regulators and their relevant metabolites, degradation and reaction products.)

- **Polycyclic aromatic hydrocarbons** are the sum of concentrations of specified compounds. The DWR is 0.10ug/l. The specified compounds are benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(ghi)perylene and indeno (1,2,3-cd)pyrene.

- **Total trihalomethanes** are the sum of concentrations of specified compounds. The DWR is 100ug/l. The specified compounds are: chloroform, bromoform, dibrom-ochloromethane and bromodichloromethane

- **Surface Water**: Assessed against 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.

Boreholes BH4A and BH10A where installed in March 2000. Boreholes BH1A, BH2A, BH3A, BH5A, BH6A, BH7, BH8A, BH9A and BH11A where 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. IBR0378/100 Monitoring Locations in Appendix D.

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
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	TBS
LG9	TBS	TBS
LG10	TBS	TBS
Leachate		
L1A	307021	276228

Monitoring Points	Easting	Northing
L2A	307028	276337
L3A	307216	276378
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

TBS To be surveyed

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 monthly, 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
Monthly	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	Groundwater Level, Ammoniacal Nitrogen, Electrical Conductivity, pH, Temperature
Quarterly	Dissolved Oxygen, Total Suspended Solids, TON, TOC, Zinc	Visual Inspection and Odour, Chloride, Dissolved Oxygen, Cadmium, Chromium, Iron, Lead, Manganese, Potassium, Sodium, TON, TOC, Barium, Nickel, Nitrate,

Monitoring Frequency	BH1A, BH4A, BH6A, BH9A, BH10A, BH11A	BH2A, BH3A, BH5A, BH7A, BH8A
		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 monitored biannually from BH10, annually from other boreholes	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 E.

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

The boreholes BH1A – BH4A and BH7 provide an indication of the up-gradient baseline groundwater characteristics whilst 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 karstic void 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 2012 from groundwater monitoring boreholes throughout the monitoring period.

Table 6.3 Summary of 2012 Results from Groundwater Monitoring Boreholes

	Units	No. of Samples	Minimum	Maximum	Mean	Standard Deviation
Alkalinity	**mg/l CaCO3**	11	122	348	254.91	67.63
Aluminium	**ug/l**	74	<5	20.6	7.73	3.90
Ammonia	**mg/l N**	125	<0.03	9.76	1.63	2.50
Antimony	**ug/l**	74	<0.5	0.59	0.57	0.03
Arsenic	**ug/l**	74	<0.6	8.74	1.71	1.93
Barium	**ug/l**	95	8.2	69.8	34.48	12.31
Beryllium	**ug/l**	74	<0.5	<0.5		

	Units	No. of Samples	Minimum	Maximum	Mean	Standard Deviation
B.O.D.	**mg/l O2**					
Boron	**µg/l**	95	15.5	292	94.84	80.41
Cadmium	**µg/l**	95	<0.1	0.3	0.17	0.08
Calcium	**mg/l Ca**	95	14.36	154.27	89.74	33.17
C.O.D.	**mg/l O2**					
Chloride	**mg/l Cl**	95	11	77	38.41	16.33
Chromium	**µg/l**	95	<0.5	22.1	2.25	1.89
Cobalt	**µg/l**	74	<0.5	<0.5		
Coliform Bacteria	**(No/100 ml)**	11	49	>2,420		
Conductivity	**µS/cm @ 25**	125	413	1112	672.06	166.36
Copper	**µg/l**	95	0.5	4.7	1.60	0.89
Cyanide	**mg/l**	11	<0.05	<0.05		
D.O.	**% Saturation**	64	21	102	54.64	22.85
E_ Coli	**No/100 ml**	11	6	345	69.27	116.30
Fluoride	**mg/l**	11	<0.15	0.17	0.16	0.01
Iron	**µg/l**	95	<10.0	93.7	19.07	3.14
Lead	**µg/l**	95	<0.5	36.4	8.26	20.01
Magnesium	**mg/l Mg**	95	1.83	32.05	10.68	7.99
Manganese	**µg/l**	95	1	319.1	14.87	18.16
Mercury	**µg/l**	11	<0.5	<0.5		
Molybdenum	**µg/l**	74	<0.5	14.5	1.50	2.94
Nickel	**µg/l**	95	<0.5	32.5	3.01	2.03
Nitrite	**mg/l N**	95	<0.002	0.254	0.02	0.01
o-Phosphate	**mg/l P**	11	0.02	0.05	0.03	0.01
pH	**0**	125	6.8	9.4	7.38	0.33
Phenol	**mg/l**	95	<0.002	<0.002		
Potassium	**mg/l**	95	0.43	126.67	10.03	10.90
Sampling Depth	**m**	125	7.3	29.9	22.75	6.42
Selenium	**µg/l**	74	<0.5	73.5	11.11	26.26
Silver	**µg/l**	74	<0.5	0.8	0.77	0.06
Sodium	**mg/l**	95	9.27	46.47	23.65	10.91
Strontium	**µg/l**	74	75.96	294.76	144.63	53.14
Sulphate	**mg/l SO4**	44	12.3	163	39.61	45.10
Suspended Solids	**mg/l**					
Temp	**°C**	125	9.8	18.2	12.81	2.10
Thallium	**µg/l**	74	<1	0.82		
Time sampled						
Tin (µg/l)	**µg/l**	74	<1	<1		
T.O.C.	**mg/l**	64	1.6	82.8	30.42	23.19
T.O.N	**mg/l N**	95	0.1	9.06	1.90	1.68
Total S Solids	**mg/l**					
Uranium	**µg/l**	74	0.24	22.53	2.78	5.25
Vanadium	**µg/l**	74	<0.5	3.91	1.54	1.21
Zinc	**µg/l**	95	1	58.5	9.57	8.12

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 recorded Electrical Conductivity levels below the IGV of 1,000µS/cm and DWR of 2,500µS/cm.

Ammonia concentrations are below the GWR 2010 (0.175 mg/l N), IGV (0.15 mg/l) and DWR (0.30 mg/l) throughout the year, except BH3A (1.17 mg/l N) in July and BH7A (2.0 mg/l N) in April.

Chloride levels exceed the IGV of 30 mg/l in BH1A, BH3A, BH4A, and BH7A. All boreholes up-gradient were below the GWR 2010 (187.5 mg/l Cl) and DWR (250 mg/l). The highest chloride level was 68 mg/l in BH7A.

Potassium levels remained elevated at BH3A and BH7A. The IGV of 5mg/l was exceeded for the entire monitoring period in BH3A. Potassium levels were highest in BH7A in January (126.7 mg/l).

Cadmium, Chromium, Iron, Lead, Manganese, Sodium, Barium, Nickel, Nitrite, Zinc concentrations in all the boreholes are below the GWR 2010, DWR and IGV.

All boreholes show an increase in Total Organic Carbons (TOC) concentrations in January and April.

TON shows no abnormal change. TON levels are general highest in up gradient boreholes.

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 0.5µg/l.

Trends for remaining parameters are presented in Appendix E.

6.4 ANNUAL MONITORING RESULTS

Annual monitoring was undertaken on 23rd April 2012 as per licence requirement.

Aluminium, Arsenic Boron, Calcium, Copper, Cyanide, Fluoride, Magnesium, Mercury Selenium and Sulphate concentrations in all the boreholes are below IGV and/or DWR in this monitoring period.

Orthophosphate exceeds the IGV in all up gradient boreholes except BH3A.

Total Alkalinity was monitored in April and results range from 284 mg/l (BH7) to 348 mg/l (BH2A). Coliform Bacteria ranged from 49 to >2,420 (No/100 ml) in the up gradient boreholes.

E coli ranged from 6 to 345 (No/100 ml) in the up gradient boreholes.
Annual analysis for List I and II substances was not undertaken in any up-gradient

6.5 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 below the IGV of 1,000 µS/cm and DWR of 2,500µS/cm.

Ammonia concentrations for the reporting period down gradient have all been below the GWR 2010 (0.175 mg/l N), IGV of 0.15mg/l and the DWR of 0.3mg/l

Chloride levels do not exceed the GWR 2010 (187.5 mg/l Cl) and DWR of 250 mg/l, however all boreholes exceed the IGV of 30 mg/l throughout the monitoring.

Potassium levels are below the IGV in all boreholes except BH10A and BH11A throughout the monitoring period.

Cadmium, Chromium, Iron, Manganese, Sodium, Barium, Nickel, Nitrite, Zinc concentrations in all the boreholes are below the GWR 2010, DWR and IGV. .

Lead exceeds IGV and DWR in BH11A in July. ,

All down gradient boreholes show an increase in TOC concentrations in January and April.

TON levels are highest downstream in BH11A (2.86 mg/l) in October and the concentrations in each 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 0.5µg/l.

Trends for the parameters are presented in Appendix E.

6.6 ANNUAL MONITORING RESULTS

Annual monitoring was undertaken on 23rd April 2012 as per licence requirement.

Aluminium, Arsenic Boron, Calcium, Copper, Cyanide, Fluoride, Magnesium, Mercury Orthophosphate, Selenium and Sulphate concentrations in all the boreholes are below IGV and/or DWR in this monitoring period.

Total Alkalinity was monitored in April and results range from 122 mg/l (BH10A) to 250 mg/l (BH9A).

Coliform Bacteria ranged from 51 to >2420 (No/100 ml) in the down gradient boreholes. E coli ranged from 11 to 72 (No/100 ml) in the up gradient boreholes.

Annual analysis for List I and II substances were undertaken at BH6A, BH9A, BH10A and BH11A down-gradient of the site.

Analysis for Polycyclic Aromatic Hydrocarbons (total 16 EPA PAHs) was <0.247 µg/l. This concentration is the limit of detection for the methodology used and as a result could be below the DWR of 0.1µg/l for PAH.

Pesticides and herbicide analysis was carried out in BH6A, BH9A, BH10A and BH11A in April and May the readings were all < LOD for all parameters measured. This is the lowest limit of detection for the methodology used for and as a result could be below the IGV for Total pesticides (0.5µg/l).

Semi Volatiles Organic Compounds were below the limit of detection for the analytical methodology used.

6.7 OTHER PARAMETERS MEASURED

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

- Molybdenum <0.5 µg/l to 14.5 µg/l.
- Silver <0.5 µg/l to 0.8 µg/l.
- Strontium 169.4 µg/l to 294.76 µg/l
- Thallium <1 to 0.82 µg/l
- Uranium 0.62 to 22.53 µg/l and
- Vanadium concentrations range from <0.5 to 3.91 µg/l in the up gradient boreholes.

There are no guideline values available to compare these parameters to. All other parameters measured were below the lower limits of detection.

6.8 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 are within the recommended lower and upper limits in accordance with the DWR (6.5-9.5) and reading of range from 7.0 to 7.3.

Electrical Conductivity for BH5A was above the IGV for January to March of 1000µS/cm (range 700 to 1,112 µS/cm).

Ammonia concentration ranged from 0.05 to 9.76 mg/l N during the monitoring period. BH5A exceed 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 are above the IGV of 30 mg/l but are below the the GWR 2010 of 187.5 mg/l C (range 42-63 mg/l).

Potassium concentrations were generally above the IGV during the monitoring period.

Cadmium, Chromium, Iron, Manganese, Sodium, Barium, Zinc concentrations in all the boreholes are below the GWR 2010, DWR and IGV. .

A nickel concentration was above the IGV and/or DWR in January (32.5 ug/l). A nitrite concentration was above the IGV in January (0.254 ug/l).

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 0.5µg/l.

BH5A recorded the highest TOC concentration (82.25 mg/l) and TON (9.06 mg/l) during the monitoring period.

6.9 ANNUAL MONITORING RESULTS

Annual monitoring was undertaken on 23rd April 2012 as per licence requirement.

Aluminium, Arsenic Boron, Calcium, Copper, Cyanide, Fluoride, Magnesium, Mercury Orthophosphate, Selenium and Sulphate concentrations in all the boreholes are below IGV and/or DWR in this monitoring period.

Orthophosphate exceeds the IGV of 0.03 mg/l. Total Alkalinity was 284 mg/l.

Coliform Bacteria of 206 (No/100 ml) and E coli of 6 (No/100 ml) was detected.

6.10 SURFACE WATER

SW1 and SW3 are samples from the lake on site. Water within the former quarry void is considered to be groundwater and will be assessed against the DWR, IGV and GWR 2010. Monitoring point SW2 is located in the cement works pond, which is adjacent and 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.

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

Surface water results are presented in Appendix F.

Table 6.5 provides a summary of results in 2012 from surface water locations throughout the monitoring period.

Table 6.5 Summary of 2012 Results from surface water Monitoring locations

	Units	No. of Samples	Minimum	Maximum	Mean	Standard Deviation
Alkalinity	**mg/l CaCO3**	3	85	148	106.67	35.81
Aluminium	**ug/l**	8	5.5	55.7	16.49	16.86
Ammonia	**mg/l N**	11	<0.03	0.03		
Antimony	**ug/l**	8	<0.5	1.1	1.06	0.53
Arsenic	**ug/l**	8	0.61	1.97	1.22	0.55

	Units	No. of Samples	Minimum	Maximum	Mean	Standard Deviation
Barium	**ug/l**	11	22.7	44.6	33.48	8.61
Beryllium	**ug/l**	8	<0.5	<0.5		
B.O.D.	**mg/l O2**	11	<1.5	2.6	2.26	1.17
Boron	**µg/l**	11	167.8	229.2	188.97	19.09
Cadmium	**µg/l**	11	<0.1	<0.1		
Calcium	**mg/l Ca**	11	20.76	37.94	29.40	7.51
C.O.D.	**mg/l O2**	11	13	35	21.10	10.22
Chloride	**mg/l Cl**	11	58	75	66.00	5.91
Chromium	**µg/l**	11	<0.5	0.6		
Cobalt	**µg/l**	8	<0.5	<0.5		
Coliform Bacteria	**(No/100 ml)**					
Conductivity	**µS/cm @ 25**	11	407	603	499.17	79.05
Copper	**µg/l**	11	0.7	12.1	2.23	3.13
Cyanide	**mg/l**					
D.O.	**% Saturation**	11	87	110	98.33	6.96
E_ Coli	**No/100 ml**					
Fluoride	**mg/l**					
Iron	**µg/l**	11	<10	25.7	18.83	8.89
Lead	**µg/l**	11	<0.5	<0.5		
Magnesium	**mg/l Mg**	11	8.76	22.25	14.09	6.01
Manganese	**µg/l**	11	1.3	5.5	2.93	1.39
Mercury	**µg/l**	11	<0.05	<0.05		
Molybdenum	**µg/l**	8	<0.5	1.8		
Nickel	**µg/l**	11	1.1	4.3	2.71	1.05
Nitrite	**mg/l N**	11	<0.002	0.005		
o-Phosphate	**mg/l P**	3	<0.02	<0.02		
pH	**0**	11	8.2	9	8.56	0.28
Phenol	**mg/l**	11	<0.002	<0.002		
Potassium	**mg/l**	11	7.74	30.8	17.28	10.88
Sampling Depth	**m**					
Selenium	**µg/l**	8	<0.5	0.9	0.70	0.36
Silver	**µg/l**	8	<0.5	<0.5		
Sodium	**mg/l**	11	24.58	47.65	35.93	9.33
Strontium	**µg/l**	8	75.17	204.16	107.80	50.59
Sulphate	**mg/l SO4**	5	23.3	49.3	32.00	19.92
Suspended Solids	**mg/l**					
Temp	**°C**	11	6.8	20.4	14.08	4.65
Thallium	**µg/l**	8	<0.1	<0.1		
Time sampled						
Tin (µg/l)	**µg/l**	8	<1	<1		
T.O.C.	**mg/l**					
T.O.N	**mg/l N**	11	<0.08	<0.08		
Total S Solids	**mg/l**	11	<5	7	6.50	2.54
Uranium	**µg/l**	8	0.23	0.52	0.37	0.10
Vanadium	**µg/l**	8	<0.5	0.84	0.70	0.37
Zinc	**µg/l**	11	1.5	7.6	3.61	2.06

6.11 QUARRY LAKE

Monitoring points SW1 and SW3 are within the Quarry Lake. Ammonia, Electrical Conductivity, pH, Cadmium, Chromium, Iron, Lead, ortho phosphate, Barium, Nickel, Nitrite, and Phenol are below the DWR, IGV and GWR 2010.

Chloride concentrations are above the IGV of 30 mg/l but are below the the GWR 2010 of 187.5 mg/l C (range 58-75 mg/l).

Total Suspended Solids (TSS) are below the SWQS classification of 50 mg/l.

Potassium levels are above the IGV throughout the monitoring period.

BOD is an indicator of the deoxygenating potential of waste in water. BOD ranged from <1.5 mg/l to 2.2 in the Quarry Lake. COD was less than the SWQS of 40 mg/l, ranging from 13 mg/l to 35 mg/l.

Dissolved Oxygen levels show over saturation in SW1 and SW3 on a number of occasions during the year.

6.11.1 Annual

Annual analysis for List I and II substances were undertaken at SW1.

Aluminium, Arsenic Beryllium Boron, Calcium, Cobalt, Copper, Magnesium, Manganese, Mercury, Selenium, Silver, Sodium, Sulphate, Thallium, Tin Vanadium and Zinc concentrations in surface water location are below IGV and/or DWR or limit of detection in this monitoring period.

Total Alkalinity was monitored in April and results range from 85 mg/l to 148 mg/l.

Analysis for Polycyclic Aromatic Hydrocarbons (total 16 EPA PAHs) was <0.247 µg/l. This concentration is the limit of detection for the methodology used and as a result could be below the DWR of 0.1µg/l for PAH.

SW1, SW2 and SW3 recorded a measurement of <0.025 mg/l for Phenol. This value is lower than the limit of detection for the methodology used and as a result could be higher the SWQS A1 Classification of 0.0005mg/l and the SWQS A2 Classification of 0.005mg/l.

Pesticides and herbicide analysis was carried out in BH6A, BH9A, BH10A and BH11A in April and May the readings were all < LOD for all parameters measured. This is the lowest limit of

detection for the methodology used for and as a result could be below the IGV for Total pesticides (0.5µg/l).

Semi Volatiles Organic Compounds were below the limit of detection for the analytical methodology used except for bis (2 ethyl hexyl) phthalate with a concentration of 4.02 µg/l. This is below IGV of 8.0 µg/.

6.11.2 Other Parameters

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

- Molybdenum <0.5 µg/l to 1.8 µg/l.
- Strontium 75.17 µg/l to 204.16 µg/l and
- Uranium 0.23 µg/l to 0.52µg/l.

6.12 CAPPED AREA

Table 6.6 provides a summary of results in 2012 from surface water locations throughout the monitoring period.

Table 6.6 Summary of 2012 Results from Capped Area

	Units	No. of Samples	Minimum	Maximum	Mean	Standard Deviation
Alkalinity	**mg/l CaCO3**	2	216	316	266.00	70.71
Aluminium	**ug/l**	6	16.2	32.5	25.55	14.24
Ammonia	**mg/l N**	8	<0.03	0.08		
Antimony	**ug/l**	6	<0.5	<0.5		
Arsenic	**ug/l**	6	0.55	0.82	0.71	0.38
Barium	**ug/l**	8	34.8	57.8	44.42	21.57
Beryllium	**ug/l**	6	<0.5	<0.5		
B.O.D.	**mg/l O2**	8	<1.5	<1.5		
Boron	**µg/l**	8	24.8	45.3	34.83	17.62
Cadmium	**µg/l**	8	<0.1	<0.1		
Calcium	**mg/l Ca**	8	87.75	144.59	113.57	54.87
C.O.D.	**mg/l O2**	8	11	36	20.83	12.50
Chloride	**mg/l Cl**	8	9	22	14.33	7.81
Chromium	**µg/l**	8	<0.5	<0.5		
Cobalt	**µg/l**	6	<0.5	<0.5		
Coliform Bacteria	**(No/100 ml)**					
Conductivity	**µS/cm @ 25**	8	541	752	649.50	305.94
Copper	**µg/l**	8	2.2	213.7	38.17	74.80
Cyanide	**mg/l**					
D.O.	**% Saturation**	8	36	106	73.17	42.89
E_ Coli	**No/100 ml**					
Fluoride	**mg/l**					
Iron	**µg/l**	8	<10	37.8	20.23	13.27
Lead	**µg/l**	8	<0.5	<0.5		

	Units	No. of Samples	Minimum	Maximum	Mean	Standard Deviation
Magnesium	**mg/l Mg**	8	6.93	11.49	9.22	4.53
Manganese	**µg/l**	8	1.2	2.6	1.72	1.00
Mercury	**µg/l**	8	<0.05	<0.05		
Molybdenum	**µg/l**	6	0.9	1.8	1.28	0.73
Nickel	**µg/l**	8	<0.5	1.4	1.25	0.58
Nitrite	**mg/l N**	8	0.002	0.051	0.02	0.02
o-Phosphate	**mg/l P**	2	0.02	0.08	0.05	0.04
pH	**0**	8	7.8	8.1	7.98	3.70
Phenol	**mg/l**	8	<0.025	<0.025		
Potassium	**mg/l**	8	1.46	6.92	4.19	2.51
Sampling Depth	**m**					
Selenium	**µg/l**	6	<0.5	<0.5		
Silver	**µg/l**	6	<0.5	<0.5		
Sodium	**mg/l**	8	11.21	13.95	12.08	5.65
Strontium	**µg/l**	6	221.81	291.91	255.48	134.61
Sulphate	**mg/l SO4**	4	30.3	46.3	38.30	23.06
Suspended Solids	**mg/l**					
Temp	**°C**	8	7.7	18	12.07	6.86
Thallium	**µg/l**	6	<0.1	<0.1		
Time sampled						
Tin (µg/l)	**µg/l**	6	<1	<1		
T.O.C.	**mg/l**					
T.O.N	**mg/l N**	8	0.17	1.75	1.06	0.78
Total S Solids	**mg/l**	8	<5	10	10.00	3.54
Uranium	**µg/l**	6	2.18	3.05	2.62	1.38
Vanadium	**µg/l**	6	0.76	1.08	0.92	0.49
Zinc	**µg/l**	8	2.4	7.3	4.25	2.79

SW4 and SW5 monitor the surface water arising from the capped area. The majority of the parameters are below the lower level of detection for the methodology used for analysis or the 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 and European Communities Environmental Objectives (Surface Water) Regulations 2009 Environmental quality standard (EQS) were comparable.

Ammonia, Electrical Conductivity, pH, Cadmium, Chromium, Iron, Lead, ortho phosphate, Barium, Nickel, Nitrite, and Phenol are below the DWR, IGV and GWR 2010.

Chloride concentrations are above the IGV of 30 mg/l but are below the the GWR 2010 of 187.5 mg/l C (range 9-22 mg/l).

Total Suspended Solids (TSS) are below the SWQS classification of 50 mg/l.
Potassium levels are above the IGV throughout the monitoring period.

BOD is an indicator of the deoxygenating potential of waste in water. BOD were <1.5 mg/l. COD was less than the SWQS of 40 mg/l, ranging from 11 mg/l to 36 mg/l.

Dissolved Oxygen levels ranged from 36-106 %.

6.12.1 Annually

Aluminium, Antimony, Arsenic Barium, Beryllium Boron, Cadmium Calcium, Cobalt, Copper, Magnesium, Manganese, Mercury, Selenium, Silver, Sodium, Sulphate, Thallium, Tin Vanadium and Zinc concentrations in surface water location are below IGV and/or DWR or limit of detection in this monitoring period.

TON results ranged from 0.17 mg/l to 1.75 mg/l during the monitoring period.

Total Alkalinity was monitored in April and results range from 216 mg/l to 316 mg/l.

6.12.2 Other Parameters

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

- Molybdenum 0.9 µg/l to 1.8 µg/l.
- Strontium 221.81 µg/l to 291.91 µg/l.
- Uranium 2.18 µg/l to 3.05 µg/l.
- Vanadium 0.76 µg/l to 1.08 µg/l.

SW4 and SW5 recorded a measurement of <0.025 mg/l for Phenol. This value is lower than the limit of detection for the methodology used and as a result could be higher the SWQS A1 Classification of 0.0005mg/l and the SWQS A2 Classification of 0.005mg/l.

6.13 DISCHARGE TO SEWER

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

Monitoring at S2 during the year showed no exceedances in the emission limits to sewer as shown in Table 6.7. The estimated volume discharged from Civic Waste Facility (area 13,500 m^2) is approximately 11,500 m^3 for 2012. This is within the limit of the licence.

Monitoring at S1 indicated a reduction of pH and increase in sulphate concentrations which exceeded licence requirement. Condensate is being tankered from site following agreement with EPA and Waste Water Treatment Plant Operator. There is no emission to sewer from S1.

Table 6.7 Emission Limit Values for Emissions to Sewer (S2)

Parameter Emission Limit Value	Grab Sample mg/l ELV	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
BOD_5	**335**	<1.5	<1.5	<1.5	<1.5	1.8	3.2	3.5	<1.5	2.3	<1.5	nm	<1.5
COD	**450**	13	<10	21	<10	<10	19	30	26	26	<10	nm	10
Ammoniacal Nitrogen NH4-No	**35**	<0.03	<0.03	<0.03	0.07	0.09	0.1	0.33	0.49	0.13	<0.03	0.2	0.11
Suspended Solids	**294**	5	26	<5	5	<5	10	<5	<5		5	nm	<5
Sulphates (as SO_4)	**240**	26.9	29.2	13.1	10.1	26.1	8.9	14.8	10.2	14.1	13.5	7.4	8.1
pH	**6 – 9**	7.9	7.2	7.8	7.9	7.7	7.9	8	7.6	7.6	7.9	7.5	6.4
Temperature	**32°C**	9.6	9	11.3	12.3	12.1	14.8	18.3	19.1	15.5	16.7	10.7	6.21

Table 6.8 Emission limit values for emissions to sewer (S1)

Parameter Emission Limit Value	Grab Sample mg/l ELV	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
BOD5	1770	NS	NS	NS	<1.5	<1.5	<1.5	<1.5	NS	NS	NS	NS	NS
COD	8000	NS	NS	NS	45	25	33	115	NS	NS	NS	NS	NS
Ammoniacal Nitrogen NH4-N	2040	NS	NS	NS	48.89	50.49	55.36	63.39	NS	NS	NS	NS	NS
Suspended Solids	1500	NS	NS	NS	6	<5	<5	9	NS	NS	NS	NS	NS
Sulphates (as SO_4)	322	NS	NS	NS	828.9	871.8	887.8	913	NS	NS	NS	NS	NS
pH	6 – 9	NS	NS	NS	2.7	2.6	2.6	2.3	NS	NS	NS	NS	NS
Temperature	32°C	NS	NS	NS	11.7	10.9	14.5	18.5	NS	NS	NS	NS	NS

Note: NS No sample

6.14 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 G.

Methane was recorded along the perimeter of the site at location (LG1 – LG7) throughout the monitoring period. Methane levels ranged from 0.1%v/v to 0.8%v/v which is below the trigger level.

Carbon Dioxide levels from LG2, LG3, LG4, LG5 and LG8 were above 1.5% v/v at various stages of the monitoring period.

Methane was recorded in groundwater boreholes around the perimeter of the site (BH1A – BH11A) at times. Methane levels ranged from 0.1%v/v to 0.6%v/v which is below the trigger level.

Carbon Dioxide levels in BH3A and BH5A were above 1.5% v/v at various stages of the monitoring period.

6.15 DUST MONITORING

Dust monitoring was carried out on three occasions during this monitoring period. Table 6.9 details the results of the dust monitors installed on site. The waste licence requires dust deposition limits to be no more than **350** mg/m^2/day. The results are all below the required limit of the licence

Table 6.9 Results from Dust Monitoring Analysis, Drogheda Landfill Site (mg/m^2/day)

Sampling Location	1	2	3	4
Date collected	19/06/2012			
Solids (mg/m2 /day)	124	68.9	88	42.6
Date collected	10/07/2012			
Solids (mg/m2 /day)	251	167.5	117.8	147
Date collected	07/01/2013			
Solids (mg/m2 /day)	198.5	37.5	105.4	25.2

6.16 NOISE

The measurements were completed completed on Wednesday and Thursday 21st – 22nd November 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

NSL 1: Daytime: LAeq (T 30 min) constant at 76dBA;
Evening time: LAeq (T 15 min) 76-75dBA;
Night time: LAeq (T 15 min 68-64dBA

NSL 2: Daytime: LAeq (T 30 min) 77-76dBA;
Evening time: LAeq (T 15 min) 75-74dBA;
Night time: LAeq (T 15 min) 68-67dBA

NSL 3: Daytime: LAeq (T 30 min) 65-63dBA;
Evening time: LAeq (T 15 min) constant at 62dBA;
Night time: LAeq (T 15 mins) 54-41dBA

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.

7.0 RESOURCE AND ENERGY CONSUMPTION SUMMARY

Consumption of resources for the reporting period are shown in Table 7.1 below;

Table 7.1 Consumption of Resources

Parameters	CWF and Landfill	Unit
Water	380	m^3
Electricity	3,590	kWh

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

Development works undertaken;

- Installation of 3 additonal piezometers.

There are no proposed development works to be undertaken in 2013.

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 3,000m^2). 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 33m^3 was sent for disposal.

9.1 MONTHLY WATER BALANCE CALCULATION AND INTERPRETATION

The calculation for monthly water balance is as follows

$$Lo = [ER (A) + LW + IRCA + ER (1)] – [aW]$$

Where;

Lo = leachate produced (m^3)
ER = effective rainfall
A = area of cell (m^3)
LW = liquid waste
IRCA = infiltration through restored areas and capped areas (m)
a = absorptive capacity of waste (m^3/t)
W = weight of waste deposited
l = surface area of lagoons (m^2)

A water balance calculation for 2012 is presented in Appendix C 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 2012 will be in the range of 2,506 m^3 to 9,982 m^3.

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.

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

A 750m^3/hr flare has been installed at the facility. Field balancing is undertaken at the facility as required. The average flow rate from the flare is approximately 323 m^3/hr at 26.99 % methane with total hours run of 4,437. The landfill gas extraction system has shut down during the reporting period due to a low flow and low methane levels.

12.0 ESTIMATED ANNUAL AND CUMULATIVE QUANTITY OF INDIRECT EMISSIONS TO GROUNDWATER

A site investigation undertaken in 1998 determined the following;

- The unsaturated zone beneath the facility is very thick and extends to depths of up to 49m below present ground levels
- Karstic features were encountered at depth within the boreholes located in the south eastern part of the site. These features represent significant potential conduits for groundwater flow
- Mass permeability values for the limestone were determined by borehole rising head tests to range from 2.2x10-5 m/s to 2.1x10-7 m/s
- The hydraulic gradient in the southern site is inclined towards the River Boyne and there is a net groundwater movement from the quarry lake at this location.

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 site was permanently capped during 2007 except for an area along the boundary of the site (approximately 3,000m^2). 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 33 m^3 was sent for disposal

There are no direct discharges to groundwater. A water balance calculation has been undertaken and is included in Appendix C using rainfall data from meteorological station at Dublin Airport. This estimates the leachate production for 2012 will be in the range of 2,506 m^3 to 9,982 m^3.

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 2013 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.

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 four times.

16.0 REPORTED INCIDENTS AND COMPLAINTS SUMMARIES

No complaints or incideets were reported to the EPA during the monitoring period. A scheduled audit was carried out in 2012. A number of observations were noted in the site inspection as shown on Table 16.1

Table 16.1 Summary Audit /Inspection Observations

Summary of Inspection Report/Audit
Date of Audit 18-03-2013 1. Capping 2. Technical Amendment. Groundwater Monitoring 3. Waste outside facility boundary 4. Landfill Gas monitoring and flaring. 5. Condensate control. 6. Submit new management structure

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;

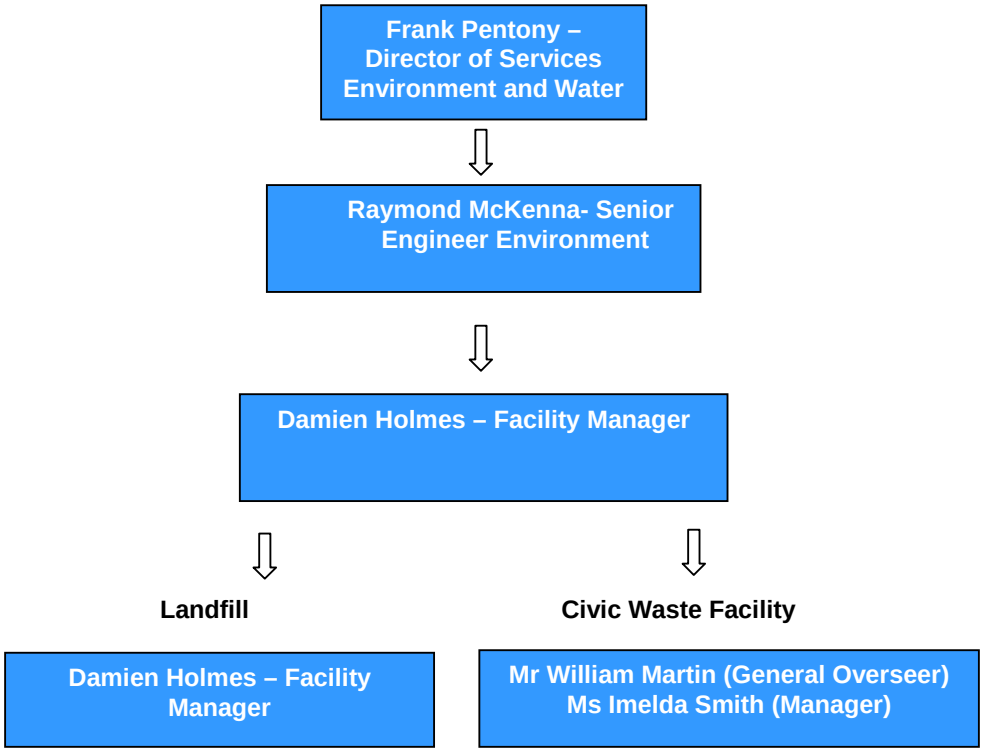

Figure 17.1 Management Structure at Drogheda Landfill Site

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.

APPENDIX A

PRTR REPORTING

| PRTR# : W0033 | Facility Name : Drogheda Landfill | Filename : w0033_2012.xls | Return Year : 2012 |

Environmental Protection Agency

Guidance to completing the PRTR workbook

AER Returns Workbook

Version 1.1.16

REFERENCE YEAR	2012

1. FACILITY IDENTIFICATION

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

Waste or IPPC Classes of Activity

No.	class_name
3.13	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.
4.10	The treatment of any waste on land with a consequential benefit for an agricultural activity or ecological system.
4.11	Use of waste obtained from any activity referred to in a preceding paragraph of this Schedule.
4.13	Storage of waste intended for submission to any activity referred to in a preceding paragraph of this Schedule, other than temporary storage, pending collection, on the premises where such waste is produced.
4.2	Recycling or reclamation of organic substances which are not used as solvents (including composting and other biological transformation processes).
4.3	Recycling or reclamation of metals and metal compounds.
4.4	Recycling or reclamation of other inorganic materials.
Address 1	Collon Road
Address 2	Mell
Address 3	Drogheda
Address 4	Co. Louth
	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	Facility Manager
AER Returns Contact Telephone Number	041 6859019
AER Returns Contact Mobile Phone Number	
AER Returns Contact Fax Number	
Production Volume	10000.0
Production Volume Units	tonnes
Number of Installations	2
Number of Operating Hours in Year	0
Number of Employees	0
User Feedback/Comments	
Web Address	

2. PRTR CLASS ACTIVITIES

4.1 RELEASES TO AIR

Link to previous years emissions data

| PRTR# : W0033 | Facility Name : Drogheda Landfill | Filename : w0033_2012.xls | Return Year : 2012 |

08/05/2013 14:19

SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS

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

RELEASES TO AIR					Please enter all quantities in this section in KGs			
POLLUTANT		METHOD				QUANTITY		
			Method Used		Flare			
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
01	Methane (CH4)	C	OTH	flow rate from gassim, methane from LFG survey 2012	5301.0	113178.0	0.0	107877.0

* 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)

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

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

Additional Data Requested from Landfill operators

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

Landfill: Drogheda Landfill

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

	T (Total) kg/Year	M/C/E	Method Used: Method Code	Method Used: Designation or Description	Facility Total Capacity m3 per hour	
Total estimated methane generation (as per site model)	372948.0	C	OTH	Flow rate from gassim, methane concentration from LFG survey 2012	N/A	
Methane flared	259770.0	C	OTH	as per EPA LFG survey 201	750.0	(Total Flaring Capacity)
Methane utilised in engine/s	0.0				0.0	(Total Utilising Capacity)
Net methane emission (as reported in Section A above)	113178.0	C	OTH	As per EPA guidance	N/A	

4.3 RELEASES TO WASTEWATER OR SEWER

Link to previous years emissions data

| PRTR# : W0033 | Facility Name : Drogheda Landfill | Filename : w0033_2012.xls | Return Year : 20 08/05/2013 14:19

SECTION A : PRTR POLLUTANTS

OFFSITE TRANSFER OF POLLUTANTS DESTINED FOR WASTE-WATER TREATMENT OR SEWER					Please enter all quantities in this section in KGs			
POLLUTANT		METHOD			QUANTITY			
			Method Used		Civic Waste Facility			
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
06 - Ammonia (NH3)		C			93.06	93.06	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 POLLUTANT EMISSIONS (as required in your Licence)

OFFSITE TRANSFER OF POLLUTANTS DESTINED FOR WASTE-WATER TREATMENT OR SEWER					Please enter all quantities in this section in KGs			
POLLUTANT		METHOD			QUANTITY			
			Method Used		Civic Waste Facility			
Pollutant No.	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
303	BOD	C			22.21	22.21	0.0	0.0
306	COD	C			107.54	107.54	0.0	0.0
240	Suspended Solids	C			40.47	40.47	0.0	0.0
343	Sulphate	C			134.7	134.7	0.0	0.0

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

5. ONSITE TREATMENT & OFFSITE TRANSFERS OF WASTE

| PRTR# : W0033 | Facility Name : Drogheda Landfill | Filename : w0033_2012.xls | Return Year : 2012 |

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11

Please enter all quantities on this sheet in Tonnes

Transfer Destination	European Waste Code	Hazardous	Quantity (Tonnes per Year)	Description of Waste	Waste Treatment Operation	Method Used		Location of Treatment	Haz Waste : Name and Licence/Permit No of Next Destination Facility Non Haz Waste: Name and Licence/Permit No of Recover/Disposer	Haz Waste : Address of Next Destination Facility Non Haz Waste: Address of Recover/Disposer	Name and License / Permit No. and Address of Final Recoverer / Disposer (HAZARDOUS WASTE ONLY)	Actual Address of Final Destination i.e. Final Recovery / Disposal Site (HAZARDOUS WASTE ONLY)
						M/C/E	Method Used					
To Other Countries	15 01 01	No	262.0	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	144.0	plastic packaging	R3	M	Weighed	Offsite in Ireland	Shrabra,Licence No 15/5	.,Killycard ind est Bree,Castleblayey,Co Monaghan ,Ireland		
Within the Country	15 01 03	No	145.0	wooden packaging	R3	M	Weighed	Offsite in Ireland	V&W Recycling,W0034-02	Newry Road ,Dundalk,Co Louth,.,Ireland		
To Other Countries	20 01 40	No	185.0	metals	R4	M	Weighed	Abroad	John Tinnelly & Sons,WMEX 20/01	Newtowncloughogue,Newry, Co Down,BT38 8LZ,United Kingdom		
To Other Countries	15 01 07	No	133.0	glass packaging	R5	M	Weighed	Abroad	Glassdon ,NI licenceLN/06/08	52 Creagh Road,Toomebridge,Co Antrim,BT41 3SE,United Kingdom		
Within the Country	16 06 01	Yes	11.73	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	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**	1.0	alkaline batteries (except 16 06 03)	R4	M	Weighed	Offsite in Ireland	Rilta Environmental Ltd,Licence No W0192-02	Block 402,Grants Drive,Greenogue Business Park,Rathcoole Co Dublin,Ireland		
Within the Country	19 07 03	No	33.0	landfill leachate other than those mentioned 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	105.0	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 10	No	33.52	clothes	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	370.0	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		
Within the Country	20 02 01	No	1305.0	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	390.0	mixed municipal waste	D5	M	Weighed	Offsite in Ireland	Whiteriver Landfill Site ,W0060-03	Gunstown Townland,Dunleer,Co Louth,.,Ireland		

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

APPENDIX B

FLUE GAS MONITORING

ODOUR & ENVIRONMENTAL ENGINEERING CONSULTANTS

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E-mail: info@odourireland.com
www.odourireland.com

TITLE: AIR EMISSION TESTING OF ONE LANDFILL FLARE LOCATED IN DROGHEDA LANDFILL, COLLON ROAD, MELL, DROGHEDA, CO. LOUTH

PREFORMED BY ODOUR MONITORING IRELAND ON BEHALF OF LOUTH COUNTY COUNCIL

PREPARED BY:	Dr. John Casey
ATTENTION:	Mr. Damien Holmes
LICENCE NUMBER:	WL033-01
LICENCE HOLDER:	Drogheda Borough Council
FACILITY NAME:	Drogheda Landfill Facility
DATE OF MONITORING VISIT:	23rd Nov. 2012
NAME AND ADDRESS OF CLIENT ORGANISATION:	Drogheda Landfill, Collon Road, Mell, Drogheda, Co. Louth
NAME AND ADDRESS OF MONITORING ORGANISATION:	Odour Monitoring Ireland, Unit 32 DeGranville Court, Dublin Road, Trim, Co. Meath
DATE OF REPORTING:	01st Feb. 2013
NAME AND THE FUNCTION OF THE PERSON APPROVING THE REPORT:	Dr. Brian Sheridan, Managing Partner, Odour Monitoring Ireland
REPORT NUMBER:	2013584(1)
REVIEWERS:	Dr. Brian Sheridan

TABLE OF CONTENTS

Document Amendment Record

Client: Drogheda Borough Council

Project: Air emission testing of an enclosed Landfill flare located in Drogheda Landfill, Collon Road, Mell, Drogheda, Co. Louth.

Project Number: 2013584(1)			**Document Reference:** Air emission testing of an enclosed Landfill flare located in Drogheda Landfill, Collon Road, Mell, Drogheda, Co. Louth.		
2013584(1)	Document for review	B.A.S.	JWC	B.A.S	01/02/2013
Revision	**Purpose/Description**	**Originated**	**Checked**	**Authorised**	**Date**

Signing sheet

Brian Sheridan Ph.D Eng

For and on behalf of Odour Monitoring Ireland

1. Executive Summary

The results of the monitoring exercise are contained in Section 2 of this report.

- NO_x as NO_2, CO, TOC and HCL/HF results were within the typical emission limit values used for such installations in Ireland.

1.1 Monitoring Objectives

This report has been prepared by Odour Monitoring Ireland and contains the results of emission testing carried out on 1 No. Enclosed ground flare at Drogheda Landfill, Collon Road, Mell, Drogheda, Co. Louth. The emission testing was carried out by Odour Monitoring Ireland on behalf of Drogheda Borough Council.

1.2 Special Monitoring Requirements

There were no special monitoring requirements for this campaign.

1.3 The substances to be monitored at each emission point

The parameters listed in *Table 1.1* were monitored using the appropriate instrumentation as illustrated in *Table 1.1*. All monitoring was carried out in accordance with Environmental Protection Agency Office of Environmental Enforcement (OEE) Air Emission Monitoring Guidance Note 2 (AG2).

Table 1.1. Monitored parameters and techniques for Drogheda Landfill 1 No. Enclosed flare

Sample location	Parameter	Analytical method
Landfill Flare outlet	Volumetric airflow rate & Temperature (^{0}C)	Pitot in accordance with EN13284-1 where possible. MGO coated K type thermocouple and PT100 Volumetric airflow rate theoretical calculated for Landfill flare.
Landfill Flare outlet	Oxides of nitrogen (NO_X as NO_2), Carbon monoxide (CO), Carbon dioxide (CO_2), Sulphur dioxide (SO_2), and Oxygen (O_2)	Flue gas analyser, Testo 350/454 MXL
Landfill Flare outlet	Hydrogen chloride and hydrogen fluoride (HCL/HF)	Impinger train containing 0.10 molar sodium hydroxide and deionised water solution in accordance EPA 26A
Landfill Flare outlet	Total Organic Carbon (TOC)	TOC analyser in accordance with EN12619:2002

This report presents details of this monitoring programme. This environmental monitoring was carried out Dr. John Casey, Managing Partner, Odour Monitoring Ireland on the 01st Feb. 2013. Methodology, Results, Discussion and Conclusions are presented herein.

2. Monitoring Results

This section will present the results of the monitoring exercise.

2.1 Operating Information

Emission Point Reference	Date	Process Type	Process Duration	Fuel	Feedstock	Abatement	Load
Flare 1	23/11/2012	Landfill flare	Continuous	Landfill Gas	N/A	None	Landfill Gas

2.2 Monitoring Result Reference Conditions

Emission Point Reference	Temperature (K)	Pressure	Moisture Correction	Oxygen Correction (%)
Flare 3	K	101.3	Yes	3

2.3. Sampling Location Summary

Comment	Yes/No
Recommended 5 hydraulic diameters straight length before sampling plane	Yes
Recommended 2 hydraulic diameters straight length after sampling plane	Yes
Ports number <1.5m - 2 ports >1.5m - 4 ports	1 port on the flares, 2 ports on the engines
Appropriate port size	Yes
Suitable working platform	Yes

Note: Temperature and airflow rate traverse measurements were performed across the stack in one plane only. Only one plane was possible due to access port issues.

2.4. Sampling run times for the monitoring of landfill flare

Parameter	**Approx. Sampling period for landfill flare**
Inlet CH_4	34 minutes
Inlet O_2	34 minutes
Volumetric air flow rate	Theoretically calculated
SO_2	40 minutes
NO_x	40 minutes
CO	40 minutes
O_2	40 minutes
CO_2	40 minutes
Stack gas temp	40 minutes
TVOC	40 minutes
TOC	40 minutes
HCL/HF	35 minutes

2.5. Characteristics of raw inlet gas to enclosed Landfill flare

Parameter	Compound loading Flare1	Units
CH_4	31.5	%
CO_2	31.5	%
O_2	2.8	%
Volumetric flow rate	314	m^3/hr

2.6. Theoretically calculated landfill gas exhaust volume and physical characteristics from the Landfill flare.

Parameter	Flare 1
Total Volumetric methane loading (m^3/hr)	99.2
Total Volumetric Oxygen loading (m^3/hr)	8.7
Ratio to complete combustion of methane assuming no excess Oxygen	9.57
Oxygen concentration level in flue gas (%)	7.59
Flue gas temperature (Kelvin)[2]	1,332
Theoretical calculated Volumetric exhaust airflow rate (m^3/h)	1,970
Normalised average exhaust airflow rate ($Nm^3\ h^{-1}$)[3]	403

Notes: [1] denotes data from 23/11/2012.
[2] denoted converted from degrees Celsius to Kelvin (^{0}C + 273.15);
[3] denotes normalised to 273.15 Kelvin and 101.3 kPa.

Table 2.7. Emission value results for landfill gas Flare 1.

Flare 1	Conc.	Normalised (mgN/m^3)	Oxygen corrected emission concentration to flare (mgN/m^3) 3% ref.	Kg/hr	Expanded uncertainty as percentage of limit value (%)[1]	Typical Emission limit Values[2]	Operating Status
Total NOx [as NO_2] (ppm)	16	32.8	44.11	0.02	16.54	<150 mg/Nm^3	As Normal
CO (ppm)	0.5	0.625	0.84	0.001	20.15	<50 mg/Nm^3	As Normal
Total Organic Carbon (mg/m^3)	1.54	2.46	3.58	0.001	21.44	<10 mg/Nm^3	As Normal
Average Hydrogen Chloride (mg/m^3)	1.24	1.69	2.46	0.001	-	<50 mg/Nm^3 (at mass flow > 0.30 kg/hr)	As Normal
Average Hydrogen Fluoride (mg/m^3)	1.54	2.10	3.06	0.001	-	<5 mg/Nm^3 (at mass flow > 0.050 kg/hr)	As Normal
SO_2 (ppm)	3	8.55	11.50	-	-	-	As Normal
O_2 (%)	7.59	-	-	-	-	-	As Normal
Temperature (degrees)	1059	1332K	-	-	-	>1273K	As Normal
CO_2 (%)	7.46	-	-	59	-	-	As Normal
Volumetric Airflow (m^3/hr)	-	-	277	-	-	<3,000	As Normal
Efficiency (%)	99.99	-	-	-	-	-	As Normal

Notes: [1] denotes that expanded uncertainty is elevated as the equation has not been validated for use with high temperature sources.
[2] denotes typical limit values from other EPA licensed landfill facilities in Ireland

3. Discussion of results

Tables 2.1 to *2.7* present the results of the emission monitoring carried out on the landfill flare located in Drogheda Landfill, Collon Road, Mell, Drogheda, Co. Louth.

There was very little variation at one traverse in oxygen and flue gas temperature profiles across the stack during the monitoring exercise (i.e. less than 15% as recommended by the Environment Agency, UK (Environment Agency, 2002)).

A high temperature Inconel 625 and ceramic probe (Testo, Germany) was used to prevent variations in CO emissions data. Normal stainless steel probes when subjected to temperatures above 600^0C can release CO from within the structure of the material and cause the recording of erroneous results (Environment Agency, 2002).

Correction of data to 3% oxygen was performed. Due to possible inaccuracies in airflow rate measurement, it was not possible to determine the oxygen intake of the flare through the louver system using measurement. Since the volume of intake air required for complete combustion was known and the oxygen concentration in the exhaust flue gas was known, the volume of intake excess fuel air could be theoretically calculated through numerous iterations using the Solver program (i.e. Microsoft Excel). This allows for the calculation of the volume of intake excess air through the louver landfill flare intake system (Environment Agency, 2002).

4. Conclusion

The following conclusions can be drawn from this study:

1. A theoretically exhaust flue gas volume was calculated for the landfill flare.
2. NO_x as NO_2, SO_2, CO, O_2, TOC and HCL/HF monitoring and analysis was carried out in accordance with specified requirements;
3. All data was standardised to 273.15 Kelvin, 101.3 kPa;
4. All data is presented as Oxygen corrected to 3% (v/v) using the appropriate equations;
5. NO_x as NO_2, CO, TOC and HCL/HF results were within the typical emission limit values used for such installations in Ireland.

5. References

1. Environment Agency. (2002). Guidance for Monitoring Enclosed Landfill Gas Flares. www.environment-agency.co.uk
2. Environmental Protection Agency. (2009). Air Emissions Monitoring Guidance Note 2 (AG2).
3. I.S. EN 13284-1:2002. Stationary source emissions. Measurement of velocity and volume flow rate of gas streams in ducts.
4. IS EN13526:2002-Stationary source emissions-Determination of the mass concentration of total gaseous organic carbon in flue gases from solvent using processes-Continuous flame ionisation detector method.
5. IS EN12619:1999-Stationary source emissions-Determination of the mass concentration of total gaseous organic carbon at low concentrations in flue gases-Continuous flame ionisation detector method.
6. I.S. EN 13284-1:2002. Stationary source emissions. Determination of low range mass concentration of dust. Manual gravimetric method.

6. *Appendix I*-Sampling, analysis

6.1.1 Location of Sampling

Drogheda Landfill, Collon Road, Mell, Drogheda, Co. Louth

6.1.2 Date & Time of Sampling

23rd Nov. 2012

6.1.3 Personnel Present During Sampling

Dr. John Casey, Odour Monitoring Ireland, Trim, Co. Meath.

6.1.4 Instrumentation check list

Testo 350 MXL/454 in stack analyser;
Federal Method 2 S type pitot and MGO coated thermocouple;
L type pitot tube
Testo 400 handheld and appropriate probes.
Ceramic and Inconel 625 sampling probes.
Portable Signal 3030PM FID calibrated with Propane with non-methane hydrocarbon cutter.
SKC sample pumps and Bios Primary calibrator

APPENDIX C

WATER BALANCE CALCULATION

WATER BALANCE CALCULATION - Drogheda

Year 2012	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)
2012	Closed	0	0	849.50	0	3,000	637	101000	8580	9217	9217	0	0	9217	9217
Total				**850**											**9217**

Assumptions

1. IRCA =	**Temporary**		25%	% of annual rainfall
	Permanently	**(2-10%)**	10%	% 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 (=			849.5	mm
4.Capping Area			101,000	m^2
Future permanent cap area			3,000	m^2

APPENDIX D

GROUNDWATER RESULTS

		S.I. No. 9/2010 — European Communities Environmental Objectives (Groundwater) Regulations 2010. Groundwater Treshold Values - Overall Threshold Value Range	EPA Interim guideline values (IGV)	EC (Drinking water) Regulations 2007 (SI .no 106 of 2007)	EC (Quality of Surface Water Intended for the Abstraction of Drinking Water) Regulations 1989 S.I. No.294/1989 Surface Water Quality Standards	EUROPEAN COMMUNITIES ENVIRONMENTAL OBJECTIVES (SURFACE WATERS) REGULATIONS 2009 Environmental quality standard (EQS)
PARAMETERS	**UNITS**					
Alkalinity	**mg/l CaCO3**		NAC			
Aluminium	**µg/l**	150	0.2 mg/l	200		
Ammonia	**mg/l N**	65-175 ug/l	0.15 mg/l	0.3 mg/l (0.23 mg/l N)	(A1- 0.2) (A2- 1.5) (A3- 4)	High status ≤ 0.040 (mean) or < 0.090 (95%ile) Good status < 0.065 (mean) or < 0.140 (95%ile) for River or Lake
Antimony	**µg/l**			5		
Arsenic	**µg/l**	7.5				25
Barium	**mg/l**		0.1		(A1- 0.1) (A2- 1)	
Beryllium	**µg/l**					
B.O.D.	**mg/l**				(A1- 5) (A2- 5), (A3- 7)	High status < 1.3 (mean) or < 2.2 (95%ile) Good status <1.5 (mean) or 2.6 (95%ile)
Boron	**µg/l**	750	1000	1000	2000	
Cadmium	**µg/l**	3.75	5	5	5	
Calcium	**mg/l Ca**		200			
C.O.D.	**mg/l**				40	
Chloride	**mg/l Cl**	24-187.5	30	250	250	
Chromium	**µg/l**	37.5	30	50	50	
Colbalt	**µg/l**					
Coliform Bacteria	**No/100 ml**			0		
Conductivity	**µS/cm @20**	800-1875	1000	2500	1000	
Copper	**µg/l**	1500	0.03 mg/l	2000	(A1- 0.05) (A2- 0.1) (A3- 1)	5 or 30
Cyanide	**µg/l**	37.5	0.01 mg/l	0.05	50	
D.O	**% Sat**		NAC		>60% (A1), >50% (A2), >30% (A3)	lower limit 95%ile >80% saturation, upper limit 95%ile <120%
E Coli	**No/100 ml**		0	0	(A1- 1000) (A2- 5000) (A3- 40000)	
Fluoride	**mg/l**		1	0.8	(A1- 1) (A2- 1.7)	
Iron	**µg/l**		200	200	(A1- 200) (A2- 2000)	
Lead	**µg/l**	18.75	10	25	50	
Magnesium	**mg/l Mg**		50			
Manganese	**µg/l**		50	50	(A1- 50) (A2- 300) (A3- 1000)	
Mercury	**µg/l**	0.75	1	1	1	0.05
Molybdenum	**µg/l**	35				
Nickel	**µg/l**	15	20	20		20
o-Phosphate	**mg/l P**		0.03			
pH			6.5 - 9.5	6.5 - 9.5	(A1- 5.5-8.5) (A2- 5.5-9.0)	Soft Water 4.5< pH < 9.0 Water hardness 100 mg/1 CaCO3 Hard Water 6.0< pH < 9.0 Water hardness > 100 mg/1 CaCO3
Phenol	**mg/l**		0.0005		(A1- 0.5) (A2- 5) (A3- 100)	
Potassium	**mg/l**		5			
Selenium	**µg/l**			10		
Silver						
Sodium	**mg/l**	150	150	200	200	
Strontium						
Sulphate	**mg/l SO4**	187.5		250		
Total Dissolved Solids	**mg/l**		1000			
Temperature	**degrees C**		25		25	
Thallium						
Tin						
T.O.C.	**mg/l**		NAC	No abnormal change		
T.O.N	**mg/l N**		NAC			
Nitrate	**mg/l**	37.5	25	50	Nitrates 50	
Nitrite	**mg/l**	375	0.1	0.5		
Nitrites	**mg/l**			0.1		
Total S Solids	**mg/l**				50	
Uranium	**µg/l**					
Vanadium	**µg/l**					
Zinc	**µg/l**		100		(A1- 3000) (A2- 5000)	

Drogheda Landfill Site Groundwater Quality

Monitoring Point:				BH1A												
Date Collected		**DWR**	**IGV**	**2010 GW Regs**	**17-Jan-12**	**07-Feb-12**	**13-Mar-12**	**24-Apr-12**	**15-May-12**	**07-Jun-12**	**24-Jul-12**	**14-Aug-12**	**11-Sep-12**	**09-Oct-12**	**06-Nov-12**	**11-Dec-12**
Alkalinity	**mg/l CaCO3**							320								
Aluminium	**ug/l**	**200**	**200**	**150**				<5	<5	5.6	<5	<5	<5	<5	<5	<5
Ammonia	**mg/l N**	**0.23 mg/l N**	**0.15**	**0.175**	<0.03	<0.03	<0.03	0.12	<0.03	<0.03	<0.03	0.03	<0.03	<0.03	<0.03	<0.03
Antimony	**ug/l**	**5**						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.55	<0.5
Arsenic	**ug/l**		**10**	**7.5**				1.16	2.55	2.4	1.85	1.61	1.52	2.16	2.76	0.89
Barium	**ug/l**		**100**		34.2	26.2	14.9	24.7	43.6	40.8	32.6	68.6	61.4	49	36.2	63.4
Beryllium	**ug/l**							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
B.O.D.	**mg/l O2**															
Boron	**µg/l**	**1000**	**1000**	**750**	21.4	25.8	25.3	21.7	16.4	18	22.1	17.8	16.2	21.8	21.5	15.5
Cadmium	**µg/l**	**5**	**5**	**3.75**	<0.1	<0.1	0.1	0.3	<0.1	<0.1	0.2	0.1	<0.1	<0.1	<0.1	<0.1
Calcium	**mg/l Ca**		**200**		111.28	126.48	132.28	144.66	106.88	113.97	132.43	92.43	96.8	112.86	117.5	78.15
C.O.D.	**mg/l O2**															
Chloride	**mg/l Cl**	**250**	**30**	**187.5**	23	26	30	32	21	21	26	17	20	21	22	15
Chromium	**µg/l**	**50**	**30**	**37.5**	<0.5	1.6	0.7	<0.5	0.9	0.9	<0.5	<0.5	0.5	1.2	1.5	<0.5
Cobalt	**µg/l**							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Coliform Bacteria	**(No/100 ml)**	**0**						248								
Conductivity	**µS/cm @ 25**	**2500**	**1000**	**1875**	736	711	792	808	591	677	787	619	617	676	738	561
Copper	**µg/l**	**2000**	**30**	**1500**	1.2	1	2.6	3.9	1.2	1.3	2.8	2.5	1.2	1	0.9	0.9
Cyanide	**mg/l**	**0.05**	**10**					<0.05								
D.O.	**% Saturation**				60			21			39			56		
E_ Coli	**No/100 ml**	**0**						20								
Fluoride	**mg/l**	**0.8**	**1000**					<0.150								
Iron	**µg/l**	**200**	**200**		<10	<10	15.5	<10	<10	16	<10	<10	<10	<10	<10	<10
Lead	**µg/l**	**25**	**10**	**18.75**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Magnesium	**mg/l Mg**		**50**		9.18	10.23	8.91	9.5	9.62	8.96	10.28	8.74	9.29	10.47	9.7	9.28
Manganese	**µg/l**	**50**	**50**		3.8	2.4	1.8	5.8	2	4	3.8	8.8	3.4	5.6	1.7	1.5
Mercury	**µg/l**	**1**	**1**	**0.75**	nm	nm	nm	<0.05	nm	nm	nm	nm	nm	nm	nm	nm
Molybdenum	**µg/l**		**35**					<0.5	0.9	0.7	<0.5	0.8	0.5	0.8	0.9	<0.5
Nickel	**µg/l**	**20**	**20**	**15**	1.3	0.7	3.5	4.8	1.1	0.5	3.4	1	1	<0.5	<0.5	<0.5
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	0.005	<0.002	<0.002	<0.002
o-Phosphate	**mg/l P**		**30**					0.05								
pH		**6.5 - 9.5**			7.3	7.3	7.2	7	7.2	7.4	7	7.3	7.1	7.4	6.8	7
Phenol	**mg/l**		**0.0005**		<0.002	<0.002	<0.002	<0.025	<0.002	<0.025	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Potassium	**mg/l**		**5**		4.15	4.4	6.05	6.99	3.36	3.43	5.29	2.27	2.21	3.59	3.91	1.62
Sampling Depth	**m**				20	20.7	19.9	20	22.5	20	19.9	20.3	20.3	20.6	20.1	19.9
Selenium	**µg/l**	**10**						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Silver	**µg/l**							0.8	nm	nm	nm	nm	nm	nm	nm	nm
Sodium	**mg/l**	**200**	**150**	**150**	14.7	15.25	16.71	16.98	13.33	13	15.31	11.25	12.24	15.27	14.69	10.2
Strontium	**µg/l**							204.35	194.49	202.79	211.39	193.82	195.48	188.73	202.12	166.96
Sulphate	**mg/l SO4**	**250**	**200**	**187.5**				26.2								
Suspended Solids	**mg/l**															
Temp	**°C**				10.8	11.4	11.7	13.1	13.4	12.6	16.1	16.4	11.7	16.3	9.8	10.1
Thallium	**µg/l**							0.45	0.17	0.17	0.32	0.16	0.14	0.17	0.22	<0.1
Time sampled					12:30	12:45	13:00	11:00	12:15	13:55	12:40	13:30	12:00	10:50	13:15	13:10
Tin (µg/l)	**µg/l**							<1	<1	<1	<1	<1	<1	<1	<1	<1
T.O.C.	**mg/l**	**NAC**			72.5			<1.5			nm			2.3		
T.O.N	**mg/l N**		**NAC**		2.14	2.55	3.12	3.37	1.77	2.09	2.55	0.98	1.21	1.84	2.35	0.73
Total S Solids	**mg/l**															
Uranium	**µg/l**							10.79	18.16	18.24	16.01	10.99	11.64	17.38	22.53	6.74
Vanadium	**µg/l**							1.54	3.83	3.28	2.92	2.13	2.3	3.26	3.91	0.97
Zinc	**µg/l**		**100**		22	17.4	11.2	13.9	11.8	19	19	25	19.2	14.9	15.6	21.4
Water Level m OD	**31.953**				11.953	11.253	12.053	11.953	9.453	11.953	12.053	11.653	11.653	11.353	11.853	12.053

Drogheda Landfill Site Groundwater Quality

Monitoring Point:				BH2A												
Date Collected		**DWR**	**IGV**	**2010 GW Regs**	**17-Jan-12**	**07-Feb-12**	**13-Mar-12**	**24-Apr-12**	**15-May-12**	**07-Jun-12**	**24-Jul-12**	**14-Aug-12**	**11-Sep-12**	**09-Oct-12**	**06-Nov-12**	**11-Dec-12**
Alkalinity	**mg/l CaCO3**							348								
Aluminium	**ug/l**	**200**	**200**	**150**				<5			5.9			<5		
Ammonia	**mg/l N**	**0.23 mg/l N**	**0.15**	**0.175**	<0.03	<0.03	0.03	<0.03	<0.03	0.03	<0.03	0.04	0.03	<0.03	<0.03	<0.03
Antimony	**ug/l**	**5**						<0.5			<0.5			<0.5		
Arsenic	**ug/l**		**10**	**7.5**				0.59			0.51			0.64		
Barium	**ug/l**		**100**		60.9			57.3			56.5			59.6		
Beryllium	**ug/l**							<0.5			<0.5			<0.5		
B.O.D.	**mg/l O2**															
Boron	**µg/l**	**1000**	**1000**	**750**	27.6			22.2			21.6			25.8		
Cadmium	**µg/l**	**5**	**5**	**3.75**	<0.1			<0.1			<0.1			<0.1		
Calcium	**mg/l Ca**		**200**		124.18			109.38			116.31			127.44		
C.O.D.	**mg/l O2**															
Chloride	**mg/l Cl**	**250**	**30**	**187.5**	15			16			11			12		
Chromium	**µg/l**	**50**	**30**	**37.5**	<0.5			<0.5			<0.5			1.5		
Cobalt	**µg/l**							<0.5			<0.5			<0.5		
Coliform Bacteria	**(No/100 ml)**	**0**						>2420								
Conductivity	**µS/cm @ 25**	**2500**	**1000**	**1875**	783	705	698	690	633	702	675	668	689	723	720	671
Copper	**µg/l**	**2000**	**30**	**1500**	2.8			2			3			2.9		
Cyanide	**mg/l**	**0.05**	**10**					<0.05								
D.O.	**% Saturation**				54			48			65			50		
E_ Coli	**No/100 ml**	**0**						345								
Fluoride	**mg/l**	**0.8**	**1000**					<0.150								
Iron	**µg/l**	**200**	**200**		<10			<10			14.7			<10		
Lead	**µg/l**	**25**	**10**	**18.75**	0.6			<0.5			<0.5			<0.5		
Magnesium	**mg/l Mg**		**50**		11.41			10.59			10.96			12.09		
Manganese	**µg/l**	**50**	**50**		7			3.9			5.5			5.6		
Mercury	**µg/l**	**1**	**1**	**0.75**	nm			<0.05			nm			nm		
Molybdenum	**µg/l**		**35**					<0.5			<0.5			<0.5		
Nickel	**µg/l**	**20**	**20**	**15**	2.3			<0.5			1			<0.5		
Nitrite	**mg/l N**	**0.5**	**0.1**	**0.375**	<0.002			<0.002			<0.002			<0.002		
o-Phosphate	**mg/l P**		**30**					0.04								
pH		**6.5 - 9.5**			7.2	7.2	7.2	7.2	7.1	7.2	7.2	7.1	7	7.1	6.9	7.1
Phenol	**mg/l**		**0.0005**		<0.002			<0.025			<0.002			<0.002		
Potassium	**mg/l**		**5**		3.11			2.65			2.4			3.19		
Sampling Depth	**m**				21	20.9	21	21.2	22	21.4	19.8	20.2	20.2	20.1	20	20
Selenium	**µg/l**	**10**						<0.5			<0.5			<0.5		
Silver	**µg/l**							<0.5			nm			nm		
Sodium	**mg/l**	**200**	**150**	**150**	12.6			10.39			9.27			11.6		
Strontium	**µg/l**							202.28			199.86			199.22		
Sulphate	**mg/l SO4**	**250**	**200**	**187.5**				15.6								
Suspended Solids	**mg/l**															
Temp	**°C**				10.4	11.4	11.6	12.9	12.7	12.6	16	17	11.8	16	10.7	10
Thallium	**µg/l**							<0.1			<0.1			<0.1		
Time sampled					12:50	13:00	12:40	0.46875	0.5243056	0.5590278	12:15	13:50	12:15	11:10	13:00	12:55
Tin (µg/l)	**µg/l**							<1			<1			<1		
T.O.C.	**mg/l**	**NAC**			82.8			64.6			5.9			5.3		
T.O.N	**mg/l N**		**NAC**		1.87			1.59			0.48			1.01		
Total S Solids	**mg/l**															
Uranium	**µg/l**							0.98			0.94			0.98		
Vanadium	**µg/l**							<0.5			0.61			0.78		
Zinc	**µg/l**		**100**		17.5			8.8			10.6			5.8		
Water Level m OD	**32.362**				11.362	11.462	11.362	11.162	10.362	10.962	12.562	12.162	12.162	12.262	12.362	12.362

Drogheda Landfill Site Groundwater Quality

Monitoring Point:				BH3A													
Date Collected		**DWR**	**IGV**	**2010 GW Regs**	**21-Dec-10**	**17-Jan-12**	**07-Feb-12**	**13-Mar-12**	**24-Apr-12**	**15-May-12**	**07-Jun-12**	**24-Jul-12**	**14-Aug-12**	**11-Sep-12**	**09-Oct-12**	**06-Nov-12**	**11-Dec-12**
Alkalinity	**mg/l CaCO3**								288								
Aluminium	**ug/l**	**200**	**200**	**150**					<5			<5					<5
Ammonia	**mg/l N**	**0.23 mg/l N**	**0.15**	**0.175**	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.09	1.17	<0.03	0.13	<0.03	0.04	<0.03
Antimony	**ug/l**	**5**							<0.5			<0.5					<0.5
Arsenic	**ug/l**		**10**	**7.5**					<0.5			<0.5					<0.5
Barium	**ug/l**		**100**			47.1			45.7			44.7					45.1
Beryllium	**ug/l**								<0.5			<0.5					<0.5
B.O.D.	**mg/l O2**																
Boron	**µg/l**	**1000**	**1000**	**750**		58.3			56.2			58					69.7
Cadmium	**µg/l**	**5**	**5**	**3.75**		<0.1			<0.1			<0.1					<0.1
Calcium	**mg/l Ca**		**200**			121.68			109.81			122.63					130.33
C.O.D.	**mg/l O2**																
Chloride	**mg/l Cl**	**250**	**30**	**187.5**		41			41			42					42
Chromium	**µg/l**	**50**	**30**	**37.5**		<0.5			<0.5			0.5					1.6
Cobalt	**µg/l**								<0.5			<0.5					<0.5
Coliform Bacteria	**(No/100 ml)**	**0**							108								
Conductivity	**µS/cm @ 25**	**2500**	**1000**	**1875**	742	892	820	807	807	779	873	694	822	851	862	829	847
Copper	**µg/l**	**2000**	**30**	**1500**		0.6			<0.5			0.8					1.4
Cyanide	**mg/l**	**0.05**	**10**						<0.05								
D.O.	**% Saturation**					60			46			53					55
E_ Coli	**No/100 ml**	**0**							7								
Fluoride	**mg/l**	**0.8**	**1000**						<0.150								
Iron	**µg/l**	**200**	**200**			<10			<10			<10					<10
Lead	**µg/l**	**25**	**10**	**18.75**		<0.5			<0.5			<0.5					<0.5
Magnesium	**mg/l Mg**		**50**			8.51			8.25			8.27					9.45
Manganese	**µg/l**	**50**	**50**			<1			2.9			2.2					2.2
Mercury	**µg/l**	**1**	**1**	**0.75**		nm			<0.05			nm					nm
Molybdenum	**µg/l**		**35**						<0.5			<0.5					<0.5
Nickel	**µg/l**	**20**	**20**	**15**		<0.5			<0.5			<0.5					<0.5
Nitrite	**mg/l N**	**0.5**	**0.1**	**0.375**		0.002			0.002			0.056					0.01
o-Phosphate	**mg/l P**		**30**						<0.02								
pH		**6.5 - 9.5**			7.4	7.2	7.2	7.2	7.2	7.2	7.3	7.2	7.2	7.1	7	7.1	7.2
Phenol	**mg/l**		**0.0005**			<0.002			<0.025			<0.002					<0.002
Potassium	**mg/l**		**5**			27.87			23.56			24.31					24.83
Sampling Depth	**m**				28.8	29.9	25.7	26.1	26.5	27	26	27.3	26	27	26.1	25	26
Selenium	**µg/l**	**10**							<0.5			1					<0.5
Silver	**µg/l**								<0.5			nm					nm
Sodium	**mg/l**	**200**	**150**	**150**		20.45			17.97			18.48					23.3
Strontium	**µg/l**								169.4			168.17					161.63
Sulphate	**mg/l SO4**	**250**	**200**	**187.5**					74.8								
Suspended Solids	**mg/l**																
Temp	**°C**				9.6	11.3	11.2	12.2	12.2	13.4	12.5	16.1	14.6	12.2	10.6	10.2	14.2
Thallium	**µg/l**								<0.1			<0.1					<0.1
Time sampled					13:00	10:00	10:45	14:15	0.6006944	0.4375	0.6076389	14:40	09:45	09:50	14:00	14:00	13:15
Tin (µg/l)	**µg/l**								<1			<1					<1
T.O.C.	**mg/l**	**NAC**				66			47.5			2.2					3
T.O.N	**mg/l N**		**NAC**			3.15			3.5			4.89					4.5
Total S Solids	**mg/l**																
Uranium	**µg/l**								0.62			0.62					0.65
Vanadium	**µg/l**								<0.5			<0.5					0.58
Zinc	**µg/l**		**100**			37.5			9.2			15					4.8
Water Level m OD	**33.664**				4.864	3.764	7.964	7.564	7.164	6.664	7.664	6.364	7.664	6.664	7.564	8.664	7.664

Drogheda Landfill Site Groundwater Quality

Monitoring Point:				BH4A												
Date Collected		**DWR**	**IGV**	**2010 GW Regs**	**17-Jan-12**	**07-Feb-12**	**13-Mar-12**	**24-Apr-12**	**15-May-12**	**07-Jun-12**	**24-Jul-12**	**14-Aug-12**	**11-Sep-12**	**09-Oct-12**	**06-Nov-12**	**11-Dec-12**
Alkalinity	**mg/l CaCO3**							320								
Aluminium	**ug/l**	**200**	**200**	**150**				<5						<5	<5	<5
Ammonia	**mg/l N**	**0.23 mg/l N**	**0.15**	**0.175**		0.03		<0.03						<0.03	<0.03	<0.03
Antimony	**ug/l**	**5**						<0.5						<0.5	<0.5	<0.5
Arsenic	**ug/l**		**10**	**7.5**				<0.5						0.53	<0.5	0.54
Barium	**ug/l**		**100**			11.5		9.5						11.4	11.5	12.3
Beryllium	**ug/l**							<0.5						<0.5	<0.5	<0.5
B.O.D.	**mg/l O2**															
Boron	**µg/l**	**1000**	**1000**	**750**		36.3		30						41.3	35	35
Cadmium	**µg/l**	**5**	**5**	**3.75**		<0.1		<0.1						<0.1	<0.1	<0.1
Calcium	**mg/l Ca**		**200**			154.27		137.47						151.13	146.23	143.55
C.O.D.	**mg/l O2**															
Chloride	**mg/l Cl**	**250**	**30**	**187.5**		44		47						41	40	40
Chromium	**µg/l**	**50**	**30**	**37.5**		<0.5		<0.5						1	0.8	<0.5
Cobalt	**µg/l**							<0.5						<0.5	<0.5	<0.5
Coliform Bacteria	**(No/100 ml)**	**0**						49								
Conductivity	**µS/cm @ 25**	**2500**	**1000**	**1875**		929		814						955	949	933
Copper	**µg/l**	**2000**	**30**	**1500**		0.5		0.8						<0.5	0.5	0.8
Cyanide	**mg/l**	**0.05**	**10**					<0.05								
D.O.	**% Saturation**							83						67		
E_ Coli	**No/100 ml**	**0**						6								
Fluoride	**mg/l**	**0.8**	**1000**					<0.150								
Iron	**µg/l**	**200**	**200**			<10		<10						<10	<10	<10
Lead	**µg/l**	**25**	**10**	**18.75**		<0.5		<0.5						<0.5	<0.5	<0.5
Magnesium	**mg/l Mg**		**50**			14.99		13.76						15.05	14.23	13.79
Manganese	**µg/l**	**50**	**50**			1.7		7.3						1.9	1.1	1.1
Mercury	**µg/l**	**1**	**1**	**0.75**				<0.05						nm	nm	nm
Molybdenum	**µg/l**		**35**					1.1						<0.5	<0.5	<0.5
Nickel	**µg/l**	**20**	**20**	**15**		<0.5		<0.5						<0.5	<0.5	1.9
Nitrite	**mg/l N**	**0.5**	**0.1**	**0.375**		<0.002		<0.002						<0.002	<0.002	<0.002
o-Phosphate	**mg/l P**		**30**					0.05								
pH		**6.5 - 9.5**				7.2		7.5						7.1	6.9	6.9
Phenol	**mg/l**		**0.0005**			<0.002		<0.025						<0.002	<0.002	<0.002
Potassium	**mg/l**		**5**			1.42		1.51						1.61	1.28	1.28
Sampling Depth	**m**					23.9		nm						23.9	23	23.7
Selenium	**µg/l**	**10**						<0.5						0.6	<0.5	<0.5
Silver	**µg/l**							<0.5						nm	nm	nm
Sodium	**mg/l**	**200**	**150**	**150**		20.43		19.13						23.86	20.28	19.33
Strontium	**µg/l**							256.17						256.23	259.39	232.57
Sulphate	**mg/l SO4**	**250**	**200**	**187.5**				50.6								
Suspended Solids	**mg/l**															
Temp	**°C**					11.2		13.1						15.1	10.4	10
Thallium	**µg/l**							<0.1						<0.1	<0.1	<0.1
Time sampled						13:20		0.4861111						11:35	12:40	12:40
Tin (µg/l)	**µg/l**							<1						<1	<1	<1
T.O.C.	**mg/l**	**NAC**						59.4						1.9		
T.O.N	**mg/l N**		**NAC**			2.9		3.18						3.72	2.78	3.48
Total S Solids	**mg/l**															
Uranium	**µg/l**							3.84						4.35	4.09	3.94
Vanadium	**µg/l**							<0.5						0.55	<0.5	<0.5
Zinc	**µg/l**		**100**			5		2.7						58.5	7.5	5.9
Water Level m OD	**33.57**					9.67								9.67	10.57	9.87

Drogheda Landfill Site Groundwater Quality

Monitoring Point:				BH5A												
Date Collected		**DWR**	**IGV**	**2010 GW Regs**	**17-Jan-12**	**07-Feb-12**	**13-Mar-12**	**24-Apr-12**	**15-May-12**	**07-Jun-12**	**24-Jul-12**	**14-Aug-12**	**11-Sep-12**	**09-Oct-12**	**06-Nov-12**	**11-Dec-12**
Alkalinity	**mg/l CaCO3**							284								
Aluminium	**ug/l**	**200**	**200**	**150**				20.6			<5			<5		
Ammonia	**mg/l N**	**0.23 mg/l N**	**0.15**	**0.175**	7.82	9.76	8.97	1.97	1.59	1.63	0.05	1.04	3.34	3.63	4.12	4.35
Antimony	**ug/l**	**5**						<0.5			<0.5			<0.5		
Arsenic	**ug/l**		**10**	**7.5**				<0.5			<0.5			0.54		
Barium	**ug/l**		**100**		69.8			15.1			17.3			32.1		
Beryllium	**ug/l**							<0.5			<0.5			<0.5		
B.O.D.	**mg/l O2**															
Boron	**µg/l**	**1000**	**1000**	**750**	237.8			100.3			100.4			162.1		
Cadmium	**µg/l**	**5**	**5**	**3.75**	0.3			0.1			0.1			0.2		
Calcium	**mg/l Ca**		**200**		121.69			83.77			92.61			110.39		
C.O.D.	**mg/l O2**															
Chloride	**mg/l Cl**	**250**	**30**	**187.5**	63			46			42			49		
Chromium	**µg/l**	**50**	**30**	**37.5**	1.7			5			3.1			4.1		
Cobalt	**µg/l**							<0.5			<0.5			<0.5		
Coliform Bacteria	**(No/100 ml)**	**0**						206								
Conductivity	**µS/cm @ 25**	**2500**	**1000**	**1875**	1112	1041	1011	700	657	736	825	696	840	842	881	851
Copper	**µg/l**	**2000**	**30**	**1500**	4.7			0.9			1.3			1.7		
Cyanide	**mg/l**	**0.05**	**10**					<0.05								
D.O.	**% Saturation**				31			27			23			25		
E_ Coli	**No/100 ml**	**0**						6								
Fluoride	**mg/l**	**0.8**	**1000**					0.15								
Iron	**µg/l**	**200**	**200**		93.7			12.5			<10			10.6		
Lead	**µg/l**	**25**	**10**	**18.75**	0.8			<0.5			<0.5			<0.5		
Magnesium	**mg/l Mg**		**50**		17.59			11.9			12.84			15.82		
Manganese	**µg/l**	**50**	**50**		319.1			59			58.1			83.1		
Mercury	**µg/l**	**1**	**1**	**0.75**	nm			<0.05			nm			nm		
Molybdenum	**µg/l**		**35**					<0.5			<0.5			<0.5		
Nickel	**µg/l**	**20**	**20**	**15**	32.5			5.4			4.5			10.4		
Nitrite	**mg/l N**	**0.5**	**0.1**	**0.375**	0.254			0.014			0.019			0.013		
o-Phosphate	**mg/l P**		**30**					0.05								
pH		**6.5 - 9.5**			7.3	7	7.2	7.1	7.3	7.2	7.2	7.2	7	7.2	7	7.1
Phenol	**mg/l**		**0.0005**		<0.002			<0.025			<0.002			<0.002		
Potassium	**mg/l**		**5**		13.13			4.53			5.16			8.89		
Sampling Depth	**m**				25.7	25.5	25.7	25.8	25.7	25.8	25.1	25.2	25.2	25.1	25	24.2
Selenium	**µg/l**	**10**						<0.5			0.7			<0.5		
Silver	**µg/l**							<0.5			nm			nm		
Sodium	**mg/l**	**200**	**150**	**150**	44.23			21.46			22.1			34.57		
Strontium	**µg/l**							138.64			129.35			163.24		
Sulphate	**mg/l SO4**	**250**	**200**	**187.5**				18								
Suspended Solids	**mg/l**															
Temp	**°C**				11.9	10.8	12.3	12.7	13.8	12.6	15.8	17	12.7	16	10.4	10.4
Thallium	**µg/l**							0.38			0.46			0.82		
Time sampled					13:10	13:45	12:15	12:10	13:10	12:50	11:45	12:20	12:50	12:00	12:20	12:25
Tin (µg/l)	**µg/l**							<1			<1			<1		
T.O.C.	**mg/l**	**NAC**			82.2			50.1			2.5			1.6		
T.O.N	**mg/l N**		**NAC**		6.64			6.17			2.89			9.06		
Total S Solids	**mg/l**															
Uranium	**µg/l**							1.1			1.02			1.18		
Vanadium	**µg/l**							<0.5			0.64			0.86		
Zinc	**µg/l**		**100**		32.1			7.9			12.3			14.9		
Water Level m OD	**36.13**				10.43	10.63	10.43	10.33	10.43	10.33	11.03	10.93	10.93	11.03	11.13	11.93

Drogheda Landfill Site Groundwater Quality

Monitoring Point:				BH6A													
Date Collected		**DWR**	**IGV**	**2010 GW Regs**	**17-Jan-12**	**07-Feb-12**	**13-Mar-12**	**24-Apr-12**	**15-May-12**	**07-Jun-12**	**24-Jul-12**	**14-Aug-12**	**11-Sep-12**	**09-Oct-12**	**06-Nov-12**	**11-Dec-12**
Alkalinity	**mg/l CaCO3**							166								
Aluminium	**ug/l**	**200**	**200**	**150**				<5	<5	<5	<5	<5	<5	<5	7.8	<5
Ammonia	**mg/l N**	**0.23 mg/l N**	**0.15**	**0.175**	<0.03	<0.03	<0.03	0.03	<0.03	<0.03	<0.03	0.04	<0.03	<0.03	<0.03	<0.03
Antimony	**ug/l**	**5**						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Arsenic	**ug/l**		**10**	**7.5**				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Barium	**ug/l**		**100**		37	38.2	35.1	35.8	39.4	36.1	37.1	40.4	37	36.3	34.8	32.2
Beryllium	**ug/l**							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
B.O.D.	**mg/l O2**															
Boron	**µg/l**	**1000**	**1000**	**750**	63.4	65.6	63.1	64.3	65.1	69.4	46.9	54	53.8	63.4	53.7	52.1
Cadmium	**µg/l**	**5**	**5**	**3.75**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Calcium	**mg/l Ca**		**200**		66.88	73.27	66.64	68.28	72.05	66.73	71.45	63.68	65.72	72.07	65.77	61.46
C.O.D.	**mg/l O2**															
Chloride	**mg/l Cl**	**250**	**30**	**187.5**	36	33	32	35	38	40	22	23	25	25	22	21
Chromium	**µg/l**	**50**	**30**	**37.5**	<0.5	0.5	<0.5	<0.5	0.5	<0.5	<0.5	<0.5	<0.5	0.9	0.8	0.5
Cobalt	**µg/l**							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Coliform Bacteria	**(No/100 ml)**	**0**						172								
Conductivity	**µS/cm @ 25**	**2500**	**1000**	**1875**	524	472	462	468	460	523	459	525	465	471	453	445
Copper	**µg/l**	**2000**	**30**	**1500**	0.6	0.8	1	<0.5	1.4	1.4	0.5	2	<0.5	0.7	1.3	<0.5
Cyanide	**mg/l**	**0.05**	**10**					<0.05								
D.O.	**% Saturation**				65			61			79			74		
E_ Coli	**No/100 ml**	**0**						15								
Fluoride	**mg/l**	**0.8**	**1000**					0.17								
Iron	**µg/l**	**200**	**200**		<10	<10	15.1	<10	10.9	<10	17.1	<10	<10	<10	<10	11.4
Lead	**µg/l**	**25**	**10**	**18.75**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Magnesium	**mg/l Mg**		**50**		2.5	2.72	2.44	2.55	2.61	2.52	2.56	2.33	2.47	2.7	2.58	2.43
Manganese	**µg/l**	**50**	**50**		<1	1.2	<1	1.6	1.1	<1	1.6	<1	<1	<1	1	<1
Mercury	**µg/l**	**1**	**1**	**0.75**	nm	nm	nm	<0.05	nm	nm	nm	nm	nm	nm	nm	nm
Molybdenum	**µg/l**		**35**					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nickel	**µg/l**	**20**	**20**	**15**	0.7	<0.5	0.8	<0.5	0.6	0.6	<0.5	<0.5	<0.5	<0.5	0.6	0.5
Nitrite	**mg/l N**	**0.5**	**0.1**	**0.375**	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.007	<0.002	<0.002	<0.002	<0.002
o-Phosphate	**mg/l P**		**30**					0.02								
pH		**6.5 - 9.5**			7.6	7.6	7.6	7.6	7.7	7.7	7.5	8.1	7.3	7.6	7.1	7.2
Phenol	**mg/l**		**0.0005**		<0.002	nm	<0.002	<0.025	<0.002	<0.025	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Potassium	**mg/l**		**5**		0.92	0.83	0.97	0.84	0.97	1.02	0.81	0.85	0.88	1.25	0.84	0.75
Sampling Depth	**m**				29.3	29	29	29.1	29.3	29.5	29.3	29	28.8	29.2	27.8	29
Selenium	**µg/l**	**10**						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Silver	**µg/l**							<0.5	nm	nm	nm	nm	nm	nm	nm	nm
Sodium	**mg/l**	**200**	**150**	**150**	24.14	21.83	22.78	22.93	25.19	25.13	17.59	18.54	19.5	22.7	19.74	18
Strontium	**µg/l**							90.71	95.41	95.13	93.2	90.67	92.9	88.25	86.1	75.96
Sulphate	**mg/l SO4**	**250**	**200**	**187.5**				19.5								
Suspended Solids	**mg/l**															
Temp	**°C**				11	11.4	12	12.8	12.7	12.7	15.6	14	12	14.8	10.6	10.4
Thallium	**µg/l**							<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Time sampled					10:35	11:10	10:30	0.4375	0.4479167	0.4444444	09:50	10:15	10:20	10:35	10:15	10:30
Tin (µg/l)	**µg/l**							<1	<1	<1	<1	<1	<1	<1	<1	<1
T.O.C.	**mg/l**	**NAC**			43.4			41.3			5			<1.5		
T.O.N	**mg/l N**		**NAC**		0.9	1.1	0.98	0.73	0.73	0.73	1.11	1.19	0.96	1.15	0.86	1.1
Total S Solids	**mg/l**															
Uranium	**µg/l**							0.38	0.44	0.4	0.47	0.42	0.38	0.41	0.36	0.34
Vanadium	**µg/l**							<0.5	<0.5	<0.5	<0.5	<0.5	0.5	0.54	<0.5	<0.5
Zinc	**µg/l**		**100**		11.9	12.7	11.4	7.3	9.8	10.5	10.2	10.3	4.4	3.2	19.4	4.4
Water Level m OD	**35.951**				6.651	6.951	6.951	6.851	6.651	6.451	6.651	6.951	7.151	6.751	8.151	6.951

Drogheda Landfill Site Groundwater Quality

Monitoring Point:				BH7A													
Date Collected		**DWR**	**IGV**	**2010 GW Regs**	**17-Jan-12**	**07-Feb-12**	**13-Mar-12**	**24-Apr-12**	**15-May-12**	**07-Jun-12**	**24-Jul-12**	**14-Aug-12**	**11-Sep-12**	**09-Oct-12**	**06-Nov-12**	**11-Dec-12**
Alkalinity	**mg/l CaCO3**							284								
Aluminium	**ug/l**	**200**	**200**	**150**				<5			5.3			8		
Ammonia	**mg/l N**	**0.23 mg/l N**	**0.15**	**0.175**	<0.03	<0.03	0.03	2	<0.03	<0.03	<0.03	0.03	<0.03	<0.03	<0.03	<0.03
Antimony	**ug/l**	**5**						<0.5			<0.5			0.59		
Arsenic	**ug/l**		**10**	**7.5**				<0.5			6.86			8.74		
Barium	**ug/l**		**100**		8.2			14.7			37.2			31		
Beryllium	**ug/l**							<0.5			<0.5			<0.5		
B.O.D.	**mg/l O2**															
Boron	**µg/l**	**1000**	**1000**	**750**	28.7			95.2			66.1			66.7		
Cadmium	**µg/l**	**5**	**5**	**3.75**	<0.1			0.1			<0.1			<0.1		
Calcium	**mg/l Ca**		**200**		14.36			85.16			79.24			56.18		
C.O.D.	**mg/l O2**															
Chloride	**mg/l Cl**	**250**	**30**	**187.5**	68			46			16			34		
Chromium	**µg/l**	**50**	**30**	**37.5**	22.1			4.9			4.7			11		
Cobalt	**µg/l**							<0.5			<0.5			<0.5		
Coliform Bacteria	**(No/100 ml)**	**0**						>2420								
Conductivity	**µS/cm @ 25**	**2500**	**1000**	**1875**	725	500	621	700	532	476	553	491	465	592	537	551
Copper	**µg/l**	**2000**	**30**	**1500**	1.4			0.7			1.6			2		
Cyanide	**mg/l**	**0.05**	**10**					<0.05								
D.O.	**% Saturation**				57			29			102			79		
E_ Coli	**No/100 ml**	**0**						250								
Fluoride	**mg/l**	**0.8**	**1000**					<0.150								
Iron	**µg/l**	**200**	**200**		<10			<10			<10			<10		
Lead	**µg/l**	**25**	**10**	**18.75**	<0.5			<0.5			<0.5			<0.5		
Magnesium	**mg/l Mg**		**50**		1.83			12.19			11.29			9.47		
Manganese	**µg/l**	**50**	**50**		1.3			55.9			1.8			<1		
Mercury	**µg/l**	**1**	**1**	**0.75**	nm			<0.05			nm			nm		
Molybdenum	**µg/l**		**35**					<0.5			2.7			14.5		
Nickel	**µg/l**	**20**	**20**	**15**	0.9			4.7			<0.5			<0.5		
Nitrite	**mg/l N**	**0.5**	**0.1**	**0.375**	<0.002			0.012			<0.002			<0.002		
o-Phosphate	**mg/l P**		**30**					0.04								
pH		**6.5 - 9.5**			9.4	7.4	8.9	7.2	8.6	8.1	7.6	7.7	7.6	7.7	7.4	7.4
Phenol	**mg/l**		**0.0005**		<0.002			<0.025			<0.002			<0.002		
Potassium	**mg/l**		**5**		126.67			4.8			12.14			48.65		
Sampling Depth	**m**				7.5	7.6	7.3	7.4	9.1	8.2	7.9	9.2	9.2	9.2	9	9.7
Selenium	**µg/l**	**10**						<0.5			73.5			72.7		
Silver	**µg/l**							<0.5			nm			nm		
Sodium	**mg/l**	**200**	**150**	**150**	20.29			22.02			9.89			15.39		
Strontium	**µg/l**							128.15			294.76			163.61		
Sulphate	**mg/l SO4**	**250**	**200**	**187.5**				17.6								
Suspended Solids	**mg/l**															
Temp	**°C**				10.6	11.4	11.7	12.7	13.4	12.6	15.2	18.2	11.5	15.1	10.6	9.8
Thallium	**µg/l**							0.38			0.1			<0.1		
Time sampled					13:30	14:10	13:35	0.527778	0.5625	0.517361	13:10	11:55	13:15	12:30	12:00	12:05
Tin (µg/l)	**µg/l**							<1			<1			<1		
T.O.C.	**mg/l**	**NAC**			15.1			49.8			3.2			3.1		
T.O.N	**mg/l N**		**NAC**		0.92			6.02			0.1			0.33		
Total S Solids	**mg/l**															
Uranium	**µg/l**							1.08			1.69			1.19		
Vanadium	**µg/l**							<0.5			1.15			2.71		
Zinc	**µg/l**		**100**		5.5			7.4			6.8			22		
Water Level m OD	**25.172**				17.672	17.572	17.872	17.772	16.072	16.972	17.272	15.972	15.972	15.972	16.172	15.472

Drogheda Landfill Site Groundwater Quality

Monitoring Point:				BH8A													
Date Collected		**DWR**	**IGV**	**2010 GW Regs**	**17-Jan-12**	**07-Feb-12**	**13-Mar-12**	**24-Apr-12**	**15-May-12**	**07-Jun-12**	**24-Jul-12**	**14-Aug-12**	**11-Sep-12**	**09-Oct-12**	**06-Nov-12**	**11-Dec-12**
Alkalinity	**mg/l CaCO3**							202								
Aluminium	**ug/l**	**200**	**200**	**150**				<5			<5			<5		
Ammonia	**mg/l N**	**0.23 mg/l N**	**0.15**	**0.175**	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Antimony	**ug/l**	**5**						<0.5			<0.5			<0.5		
Arsenic	**ug/l**		**10**	**7.5**				<0.5			<0.5			<0.5		
Barium	**ug/l**		**100**		19.8			18.9			17.3			17.5		
Beryllium	**ug/l**							<0.5			<0.5			<0.5		
B.O.D.	**mg/l O2**															
Boron	**µg/l**	**1000**	**1000**	**750**	26.9			31.8			23.7			28.8		
Cadmium	**µg/l**	**5**	**5**	**3.75**	<0.1			<0.1			<0.1			<0.1		
Calcium	**mg/l Ca**		**200**		81.14			77.59			79.96			85.91		
C.O.D.	**mg/l O2**															
Chloride	**mg/l Cl**	**250**	**30**	**187.5**	17			29			16			16		
Chromium	**µg/l**	**50**	**30**	**37.5**	<0.5			<0.5			<0.5			1.2		
Cobalt	**µg/l**							<0.5			<0.5			<0.5		
Coliform Bacteria	**(No/100 ml)**	**0**						152								
Conductivity	**µS/cm @ 25**	**2500**	**1000**	**1875**	535	413	485	493	472	529	483	476	486	505	504	485
Copper	**µg/l**	**2000**	**30**	**1500**	0.6			<0.5			<0.5			<0.5		
Cyanide	**mg/l**	**0.05**	**10**					<0.05								
D.O.	**% Saturation**				94			70			102			89		
E_ Coli	**No/100 ml**	**0**						18								
Fluoride	**mg/l**	**0.8**	**1000**					<0.150								
Iron	**µg/l**	**200**	**200**		<10			<10			<10			<10		
Lead	**µg/l**	**25**	**10**	**18.75**	<0.5			<0.5			<0.5			<0.5		
Magnesium	**mg/l Mg**		**50**		3.73			3.2			3.84			4.04		
Manganese	**µg/l**	**50**	**50**		<1			<1			<1			<1		
Mercury	**µg/l**	**1**	**1**	**0.75**	nm			<0.05			nm			nm		
Molybdenum	**µg/l**		**35**					<0.5			<0.5			<0.5		
Nickel	**µg/l**	**20**	**20**	**15**	<0.5			<0.5			<0.5			<0.5		
Nitrite	**mg/l N**	**0.5**	**0.1**	**0.375**	<0.002			0.002			<0.002			<0.002		
o-Phosphate	**mg/l P**		**30**					<0.02								
pH		**6.5 - 9.5**			7.4	7.8	7.4	7.4	7.7	7.6	7.5	7.5	7.4	7.4	7.2	7.3
Phenol	**mg/l**		**0.0005**		<0.002			<0.025			<0.002			<0.002		
Potassium	**mg/l**		**5**		0.63			0.73			0.43			0.54		
Sampling Depth	**m**				29	29.1	29	29.1	29.5	29.5	28.5	29.3	28.9	29.4	27	28.9
Selenium	**µg/l**	**10**						<0.5			0.7			1.4		
Silver	**µg/l**							0.8			nm			nm		
Sodium	**mg/l**	**200**	**150**	**150**	12.94			13.37			12.08			14.31		
Strontium	**µg/l**							86.17			93.95			86.57		
Sulphate	**mg/l SO4**	**250**	**200**	**187.5**				14								
Suspended Solids	**mg/l**															
Temp	**°C**				11	11.4	12	13	13.1	12.7	16	14.1	11.7	14.7	10.8	10.1
Thallium	**µg/l**							<0.1			<0.1			<0.1		
Time sampled					11:00	11:35	10:50	0.458333	0.461806	0.458333	10:15	10:40	10:45	10:55	10:35	10:55
Tin (µg/l)	**µg/l**							<1			<1			<1		
T.O.C.	**mg/l**	**NAC**			53.1			40.8			1.7			<1.5		
T.O.N	**mg/l N**		**NAC**		0.53			0.46			0.49			0.72		
Total S Solids	**mg/l**															
Uranium	**µg/l**							0.27			0.31			0.3		
Vanadium	**µg/l**							<0.5			<0.5			0.52		
Zinc	**µg/l**		**100**		6.2			2.6			3.9			1.5		
Water Level m OD	**36.151**				7.151	7.051	7.151	7.051	6.651	6.651	7.651	6.851	7.251	6.751	9.151	7.251

Drogheda Landfill Site Groundwater Quality

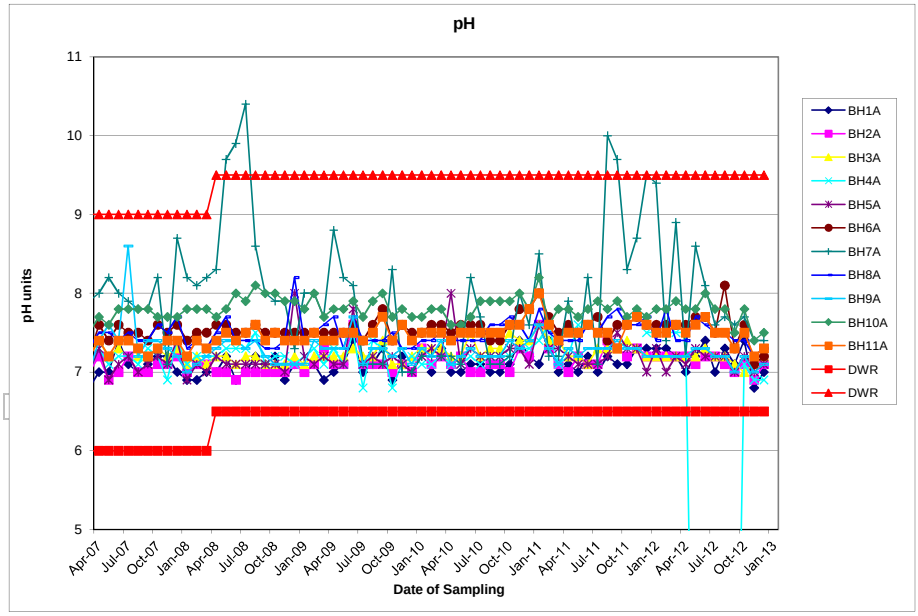
Monitoring Point:				BH9A													
Date Collected		**DWR**	**IGV**	**2010 GW Regs**	**17-Jan-12**	**07-Feb-12**	**13-Mar-12**	**24-Apr-12**	**15-May-12**	**07-Jun-12**	**24-Jul-12**	**14-Aug-12**	**11-Sep-12**	**09-Oct-12**	**06-Nov-12**	**11-Dec-12**
Alkalinity	**mg/l CaCO3**							250								
Aluminium	**ug/l**	**200**	**200**	**150**				<5	<5	<5	<5	<5	<5	<5	<5	<5
Ammonia	**mg/l N**	**0.23 mg/l N**	**0.15**	**0.175**	<0.03	<0.03	0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Antimony	**ug/l**	**5**						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Arsenic	**ug/l**		**10**	**7.5**				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Barium	**ug/l**		**100**		31.3	30.2	29.5	29.8	32.4	29.2	28.7	33.2	30.7	31	28.9	26.3
Beryllium	**ug/l**							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
B.O.D.	**mg/l O2**															
Boron	**µg/l**	**1000**	**1000**	**750**	46.5	47.3	47.1	68.6	61.3	65.8	32.3	34.8	40	73	38.3	31.7
Cadmium	**µg/l**	**5**	**5**	**3.75**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Calcium	**mg/l Ca**		**200**		113.93	121.76	104.5	91.62	111.64	114.34	114.1	107.42	107.57	111.22	110.22	103.72
C.O.D.	**mg/l O2**															
Chloride	**mg/l Cl**	**250**	**30**	**187.5**	34	33	33	44	43	43	25	26	29	37	24	23
Chromium	**µg/l**	**50**	**30**	**37.5**	<0.5	0.9	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	0.5	1.2	1.1	0.7
Cobalt	**µg/l**							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Coliform Bacteria	**(No/100 ml)**	**0**						51								
Conductivity	**µS/cm @ 25**	**2500**	**1000**	**1875**	702	644	630	627	618	690	656	641	634	656	647	611
Copper	**µg/l**	**2000**	**30**	**1500**	0.8	1.1	0.6	<0.5	0.6	3.2	<0.5	4	<0.5	1.2	1	0.5
Cyanide	**mg/l**	**0.05**	**10**					<0.05								
D.O.	**% Saturation**				58			33			64			48		
E_ Coli	**No/100 ml**	**0**						11								
Fluoride	**mg/l**	**0.8**	**1000**					<0.150								
Iron	**µg/l**	**200**	**200**		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Lead	**µg/l**	**25**	**10**	**18.75**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.5	<0.5	<0.5	<0.5	<0.5
Magnesium	**mg/l Mg**		**50**		5.48	5.6	4.89	4.9	5.24	4.91	5.04	4.73	4.92	5.78	5.21	4.87
Manganese	**µg/l**	**50**	**50**		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	2.8	<1
Mercury	**µg/l**	**1**	**1**	**0.75**	nm	nm	nm	<0.05	nm	nm	nm	nm	nm	nm	nm	nm
Molybdenum	**µg/l**		**35**					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nickel	**µg/l**	**20**	**20**	**15**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nitrite	**mg/l N**	**0.5**	**0.1**	**0.375**	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
o-Phosphate	**mg/l P**		**30**					0.02								
pH		**6.5 - 9.5**			7.2	7.2	7.2	7.2	7.3	7.3	7.2	7.2	7	7.2	7	7.1
Phenol	**mg/l**		**0.0005**		<0.002	<0.002	<0.002	<0.025	<0.002	<0.025	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Potassium	**mg/l**		**5**		1.02	0.92	1.09	1.13	1.28	1.52	0.72	0.84	0.83	1.97	0.84	0.71
Sampling Depth	**m**				28.1	27.7	28	28	25.9	28.2	28	28.1	26.4	27.9	26.8	27.8
Selenium	**µg/l**	**10**						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	<0.5
Silver	**µg/l**							<0.5	nm	nm	nm	nm	nm	nm	nm	nm
Sodium	**mg/l**	**200**	**150**	**150**	15.88	13.57	15.23	21.2	20.75	20.49	9.76	10.78	11.94	20.62	10.98	9.7
Strontium	**µg/l**							116.83	123.97	126.59	135.72	123.61	129.38	123.06	124.93	109.51
Sulphate	**mg/l SO4**	**250**	**200**	**187.5**				12.3								
Suspended Solids	**mg/l**															
Temp	**°C**				11.2	11.5	11.8	13	13	12.5	15.8	14	12.2	15	10.2	10.3
Thallium	**µg/l**							<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Time sampled					11:20	11:55	11:15	0.472222	0.479167	0.475694	10:40	11:00	11:05	11:20	11:00	11:15
Tin (µg/l)	**µg/l**							<1	<1	<1	<1	<1	<1	<1	<1	<1
T.O.C.	**mg/l**	**NAC**			66.8			55.9			2.1			<1.5		
T.O.N	**mg/l N**		**NAC**		<0.08	<0.08	<0.08	<0.08	0.34	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
Total S Solids	**mg/l**															
Uranium	**µg/l**							0.25	0.24	0.26	0.29	0.29	0.31	0.28	0.27	0.25
Vanadium	**µg/l**							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Zinc	**µg/l**		**100**		7.1	8	4.7	3	4.9	6.3	3.7	11.9	2	4.1	6	2.8
Water Level m OD	**34.345**				6.245	6.645	6.345	6.345	8.445	6.145	6.345	6.245	7.945	6.445	7.545	6.545

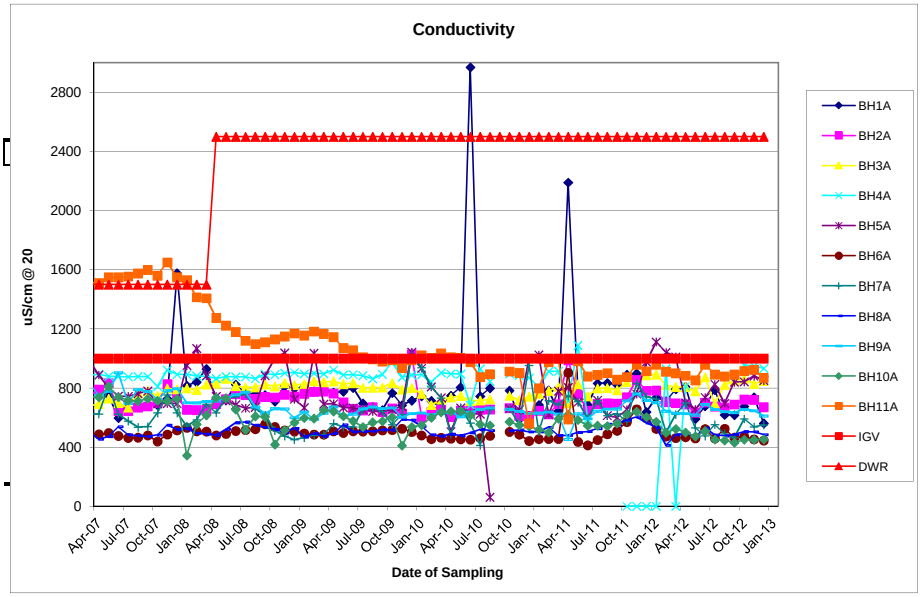
Drogheda Landfill Site Groundwater Quality

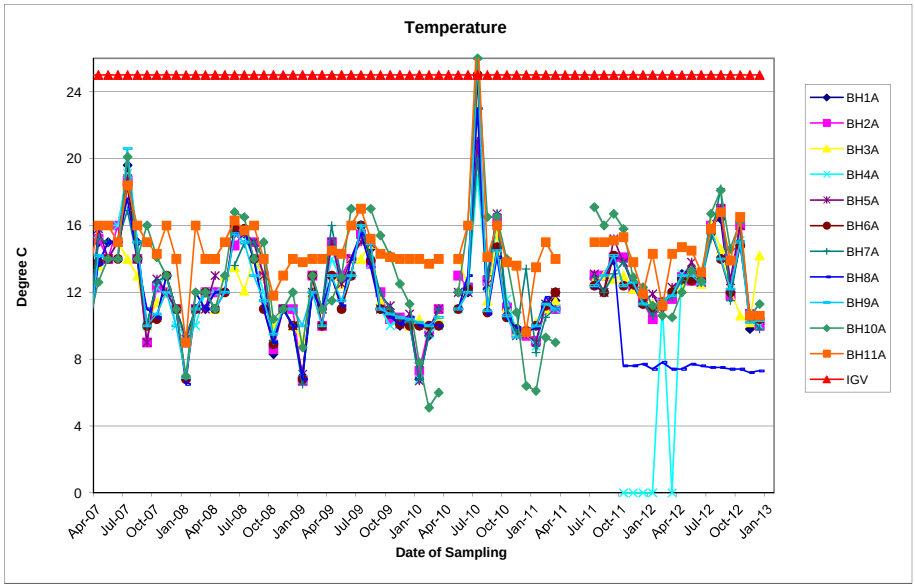
Monitoring Point:				BH10A													
Date Collected		**DWR**	**IGV**	**2010 GW Regs**	**17-Jan-12**	**07-Feb-12**	**13-Mar-12**	**24-Apr-12**	**15-May-12**	**07-Jun-12**	**24-Jul-12**	**14-Aug-12**	**11-Sep-12**	**09-Oct-12**	**06-Nov-12**	**11-Dec-12**
Alkalinity	**mg/l CaCO3**							122								
Aluminium	**ug/l**	**200**	**200**	**150**				5.1	8.8	5.5	6.3	6.5	6.6	9	11.9	5.1
Ammonia	**mg/l N**	**0.23 mg/l N**	**0.15**	**0.175**	<0.03	<0.03	0.03	<0.03	<0.03	<0.03	<0.03	0.03	<0.03	<0.03	<0.03	<0.03
Antimony	**ug/l**	**5**						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Arsenic	**ug/l**		**10**	**7.5**				0.64	0.77	0.86	0.76	1.1	1.37	1.23	1.07	0.91
Barium	**ug/l**		**100**		47.8	43.5	47.1	43.2	44.1	38.1	30.5	31	28.4	26.1	29.1	30.4
Beryllium	**ug/l**							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
B.O.D.	**mg/l O2**															
Boron	**µg/l**	**1000**	**1000**	**750**	176.1	158.5	184.2	174.5	183.9	185.7	175.6	187	183.4	212.4	159.3	179.9
Cadmium	**µg/l**	**5**	**5**	**3.75**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Calcium	**mg/l Ca**		**200**		40.39	42.58	39.62	37.49	37.7	35.55	27.56	23.9	23.18	26.98	30.5	28.99
C.O.D.	**mg/l O2**															
Chloride	**mg/l Cl**	**250**	**30**	**187.5**	77	66	74	70	70	67	67	68	71	67	60	67
Chromium	**µg/l**	**50**	**30**	**37.5**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Cobalt	**µg/l**							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Coliform Bacteria	**(No/100 ml)**	**0**						140								
Conductivity	**µS/cm @ 25**	**2500**	**1000**	**1875**	572	498	523	500	473	509	452	446	430	451	450	453
Copper	**µg/l**	**2000**	**30**	**1500**	2.5	2.4	3.3	1.9	2.8	2.7	2.4	1.6	1.5	2.2	1.7	1.2
Cyanide	**mg/l**	**0.05**	**10**					<0.05								
D.O.	**% Saturation**				64			27			32			58		
E_ Coli	**No/100 ml**	**0**						12								
Fluoride	**mg/l**	**0.8**	**1000**					<0.150								
Iron	**µg/l**	**200**	**200**		<10	10.1	22.4	<10	13.5	<10	<10	<10	<10	15.8	16.9	<10
Lead	**µg/l**	**25**	**10**	**18.75**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Magnesium	**mg/l Mg**		**50**		9.62	9.08	9.55	8.99	9.33	8.11	8.38	8.08	8.41	9.48	8.58	9.22
Manganese	**µg/l**	**50**	**50**		<1	<1	2	5.2	13.9	14.2	2.2	3.2	3.8	1.3	2.5	<1
Mercury	**µg/l**	**1**	**1**	**0.75**	nm	nm	nm	<0.05	nm	nm	nm	nm	nm	nm	nm	nm
Molybdenum	**µg/l**		**35**					0.5	1	0.9	1	1.1	<0.5	0.6	0.8	0.7
Nickel	**µg/l**	**20**	**20**	**15**	3.6	2.9	3.7	2.9	3.7	3.2	3.2	3.3	3.3	3.2	2.7	3.1
Nitrite	**mg/l N**	**0.5**	**0.1**	**0.375**	<0.002	0.003	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
o-Phosphate	**mg/l P**		**30**					0.02								
pH		**6.5 - 9.5**			7.8	7.8	7.9	7.8	7.8	8	7.8	7.8	7.5	7.8	7.4	7.5
Phenol	**mg/l**		**0.0005**		<0.002	<0.002	<0.002	<0.025	<0.002	<0.025	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Potassium	**mg/l**		**5**		8.55	7.42	8.43	7.75	8.58	8.74	7.92	8.02	7.48	9.15	7.21	6.93
Sampling Depth	**m**				26	26.3	26.3	26.4	26	26.1	26	26.9	26.2	26.2	26.1	25.9
Selenium	**µg/l**	**10**						<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Silver	**µg/l**							<0.5	nm	nm	nm	nm	nm	nm	nm	nm
Sodium	**mg/l**	**200**	**150**	**150**	43.94	38	44.31	39.01	43.83	40.45	39.8	40.34	39.6	46.47	37.78	39.15
Strontium	**µg/l**							99.56	101.88	99.1	88.08	81.74	79.53	76.76	81.63	77.77
Sulphate	**mg/l SO4**	**250**	**200**	**187.5**				24.1								
Suspended Solids	**mg/l**															
Temp	**°C**				11.2	10.6	10.5	12	13.3	12.7	16.7	18.1	14.6	16.2	10.5	11.3
Thallium	**µg/l**							<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Time sampled					11:50	12:15	11:45	0.489583	0.489583	0.496528	11:05	11:20	11:25	11:40	11:20	11:40
Tin (µg/l)	**µg/l**							<1	<1	<1	<1	<1	<1	<1	<1	<1
T.O.C.	**mg/l**	**NAC**			35.9			36.9			5.3			6.3		
T.O.N	**mg/l N**		**NAC**		0.12	0.37	0.14	0.1	0.48	0.12	<0.08	0.27	<0.08	<0.08	0.14	0.33
Total S Solids	**mg/l**															
Uranium	**µg/l**							0.46	0.47	0.41	0.38	0.35	0.3	0.38	0.39	0.4
Vanadium	**µg/l**							<0.5	<0.5	<0.5	<0.5	<0.5	0.58	0.62	<0.5	<0.5
Zinc	**µg/l**		**100**		3.7	4	5.3	1.3	6.8	1.3	5.5	4.6	1	1.1	6.5	2.3
Water Level m OD	**32.776**				6.776	6.476	6.476	6.376	6.776	6.676	6.776	5.876	6.576	6.576	6.676	6.876

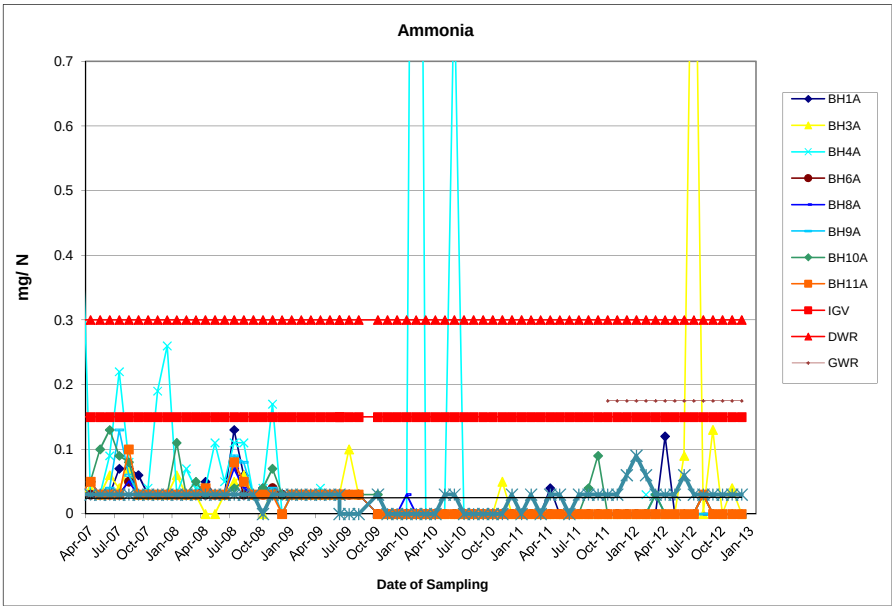
Drogheda Landfill Site Groundwater Quality

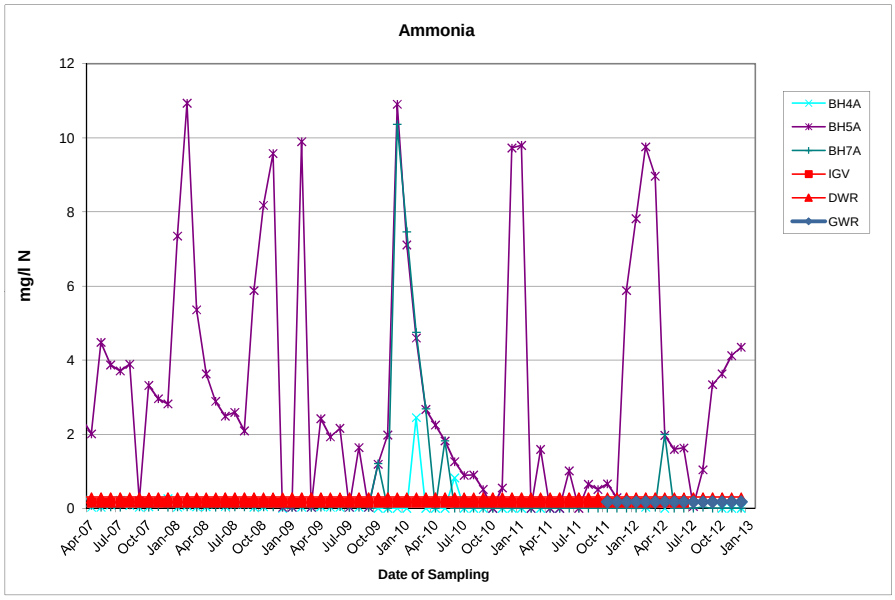
Monitoring Point:				**BH11A**														
Date Collected		**DWR**	**IGV**	**2010 GW Regs**	**21-Dec-10**	**17-Jan-12**	**07-Feb-12**	**13-Mar-12**	**24-Apr-12**	**15-May-12**	**07-Jun-12**	**24-Jul-12**	**14-Aug-12**	**11-Sep-12**	**09-Oct-12**	**06-Nov-12**	**11-Dec-12**
Alkalinity	**mg/l CaCO3**								220								
Aluminium	**ug/1**	**200**	**200**	**150**					<5	<5	<5	<5	<5	<5	<5	5.6	<5
Ammonia	**mg/l N**	**0.23 mg/l N**	**0.15**	**0.175**	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.03	<0.03	<0.03	<0.03	<0.03
Antimony	**ug/1**	**5**							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Arsenic	**ug/0**		**10**	**7.5**					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Barium	**ug/1**		**100**			34.8	36	34.9	33.9	35.3	29.6	37.3	39.7	36.2	36.1	35.5	34.3
Beryllium	**ug/2**								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
B.O.D.	**mg/l O2**																
Boron	**µg/l**	**1000**	**1000**	**750**		226.3	270.9	256.5	227.5	218	216.2	231	232.9	236	292	236.5	226.3
Cadmium	**µg/l**	**5**	**5**	**3.75**		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Calcium	**mg/l Ca**		**200**			84.1	95.38	88.22	92.43	99.23	84.89	92.62	85.17	90.19	94.47	88.24	84.02
C.O.D.	**mg/l O2**																
Chloride	**mg/l Cl**	**250**	**30**	**187.5**	19	47	50	50	47	44	46	44	44	45	45	44	41
Chromium	**µg/l**	**50**	**30**	**37.5**		1.2	2	1.4	1.2	2.1	1.5	2.3	1.4	1.3	2	2	1.7
Cobalt	**µg/l**								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Coliform Bacteria	**(No/100 ml)**	**0**							>2420								
Conductivity	**µS/cm @ 25**	**2500**	**1000**	**1875**	560	958	911	900	884	852	959	892	878	891	916	923	869
Copper	**µg/l**	**2000**	**30**	**1500**		1.2	1	2.6	<0.5	0.9	1.1	1.1	3.3	1	2	1.3	1.2
Cyanide	**mg/l**	**0.05**	**10**						<0.05								
D.O.	**% Saturation**					35			42			37			33		
E_ Coli	**No/100 ml**	**0**							72								
Fluoride	**mg/l**	**0.8**	**1000**						0.15								
Iron	**µg/l**	**200**	**200**			<10	18.3	15.2	<10	13.6	<10	<10	<10	<10	<10	<10	<10
Lead	**µg/l**	**25**	**10**	**18.75**		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	36.4	2	<0.5	<0.5	<0.5	<0.5
Magnesium	**mg/l Mg**		**50**			27.38	27.89	25.42	28.67	32.05	27.37	28.73	27.97	27.96	28.44	26.79	26.82
Manganese	**µg/l**	**50**	**50**			1.3	<1	2.7	<1	<1	<1	<1	<1	<1	<1	1.7	<1
Mercury	**µg/l**	**1**	**1**	**0.75**		nm	nm	nm	<0.05	nm	nm	nm	nm	nm	nm	nm	nm
Molybdenum	**µg/l**		**35**						0.6	0.5	<0.5	1.2	<0.5	<0.5	0.5	0.6	<0.5
Nickel	**µg/l**	**20**	**20**	**15**		1	0.8	1	<0.5	<0.5	<0.5	<0.5	1	<0.5	0.8	0.6	0.6
Nitrite	**mg/l N**	**0.5**	**0.1**	**0.375**	<0.002	<0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
o-Phosphate	**mg/l P**		**30**						0.02								
pH		**6.5 - 9.5**			7.8	7.5	7.5	7.6	7.5	7.6	7.7	7.5	7.5	7.3	7.5	7.2	7.3
Phenol	**mg/l**		**0.0005**			<0.002	<0.002	<0.002	<0.025	<0.002	<0.025	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Potassium	**mg/l**		**5**			29.91	29.05	34.71	24.9	26.82	27.39	27.33	30.45	28.58	28.97	27.08	24.55
Sampling Depth	**m**				9.1	14.8	14.5	14.1	14.2	14.8	15.1	14.3	10	14.8	14.8	14.5	14.5
Selenium	**µg/l**	**10**							<0.5	0.6	0.7	0.8	0.6	<0.5	1.1	<0.5	0.7
Silver	**µg/l**								0.7	nm	nm	nm	nm	nm	nm	nm	nm
Sodium	**mg/l**	**200**	**150**	**150**		39.52	38.97	39.83	34.81	36.49	33.75	33.83	34.63	35.59	43.03	35.87	33.71
Strontium	**µg/l**								155.96	167.48	163.32	158.1	149.07	151.56	150.68	155.75	147.13
Sulphate	**mg/l SO4**	**250**	**200**	**187.5**					163								
Suspended Solids	**mg/l**																
Temp	**°C**				9.6	14.3	11.2	14.3	14.7	14.5	13.2	15.8	16.8	13.9	16.5	10.6	10.6
Thallium	**µg/l**								0.28	0.25	0.35	0.36	0.33	0.35	0.38	0.31	0.26
Time sampled					12:40	14:20	14:40	14:00	12:40	14:00	14:15	13:55	14:15	13:40	12:35	13:40	13:35
Tin (µg/l)	**µg/l**								<1	<1	<1	<1	<1	<1	<1	<1	<1
T.O.C.	**mg/l**	**NAC**				56			47.1			3.6			3.5		
T.O.N	**mg/l N**		**NAC**			1.77	2.17	2.13	2.07	1.96	2.39	1.41	1.85	2.07	2.84	1.7	2.2
Total S Solids	**mg/l**																
Uranium	**µg/l**								0.73	0.71	0.68	0.72	0.79	0.8	0.79	0.72	0.79
Vanadium	**µg/l**								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.54	<0.5	<0.5
Zinc	**µg/l**		**100**			6.5	2.4	8.3	3.1	3.7	6.4	7.9	8.1	1.8	2.5	11.5	5.4
Water Level m OD	**21.715**				12.615	6.915	7.215	7.615	7.515	6.915	6.615	7.415	11.715	6.915	6.915	7.215	7.215

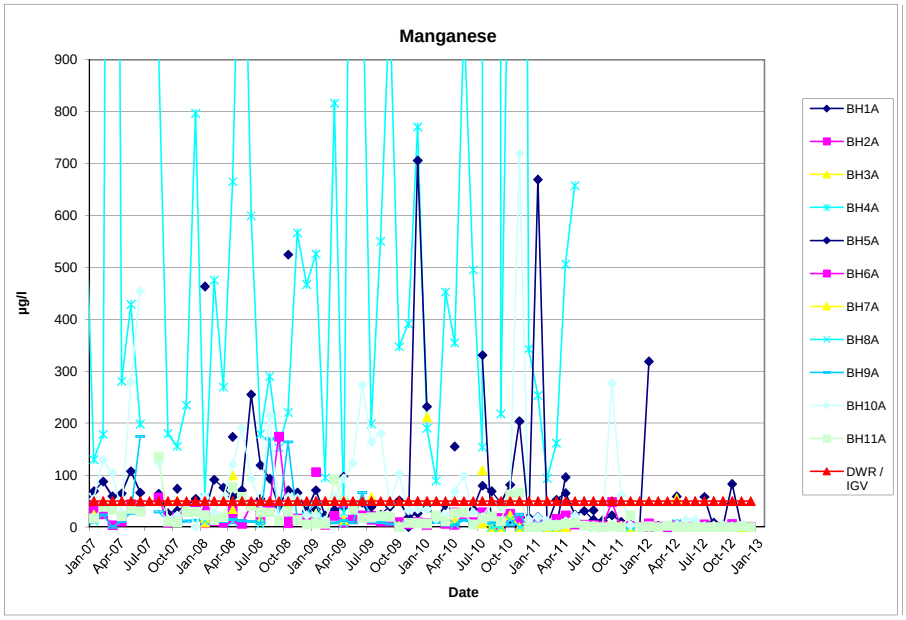

pH
pH units
11
10
9
8
7
6
5
Apr-07
Jul-07
Oct-07
Jan-08
Apr-08
Jul-08
Oct-08
Jan-09
Apr-09
Jul-09
Oct-09
Jan-10
Apr-10
Jul-10
Oct-10
Jan-11
Apr-11
Jul-11
Oct-11
Jan-12
Apr-12
Jul-12
Oct-12
Jan-13
Date of Sampling
BH1A
BH2A
BH3A
BH4A
BH5A
BH6A
BH7A
BH8A
BH9A
BH10A
BH11A
DWR
DWR

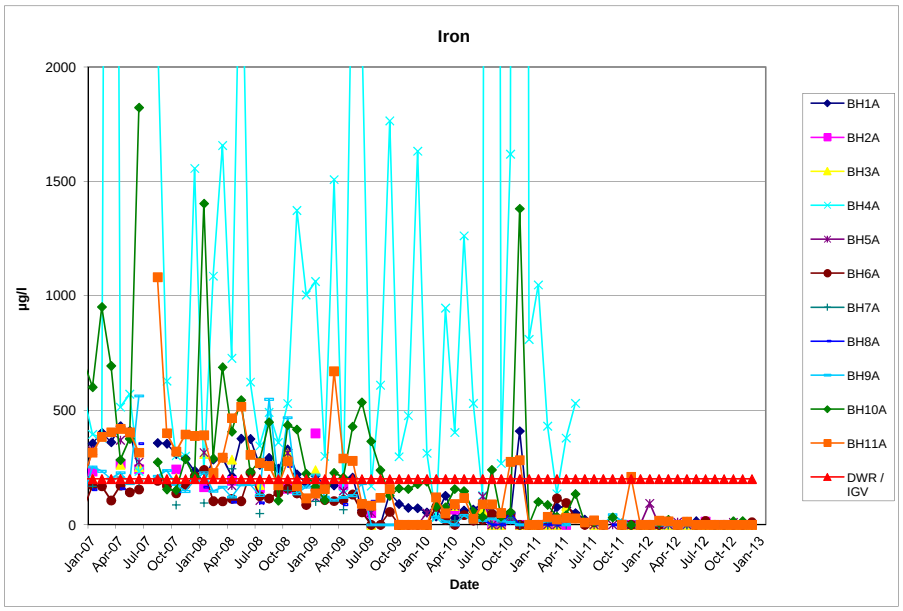

Conductivity
uS/cm @ 20
2800
2400
2000
1600
1200
800
400
0
Apr-07
Jul-07
Oct-07
Jan-08
Apr-08
Jul-08
Oct-08
Jan-09
Apr-09
Jul-09
Oct-09
Jan-10
Apr-10
Jul-10
Oct-10
Jan-11
Apr-11
Jul-11
Oct-11
Jan-12
Apr-12
Jul-12
Oct-12
Jan-13
Date of Sampling
BH1A
BH2A
BH3A
BH4A
BH5A
BH6A
BH7A
BH8A
BH9A
BH10A
BH11A
IGV
DWR

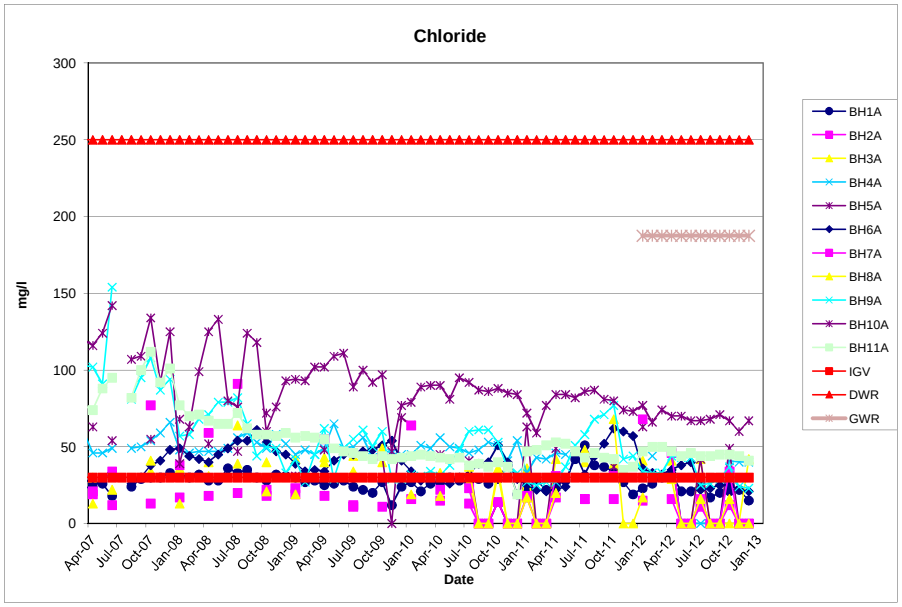

Temperature
Degree C
24
20
16
12
8
4
0
Apr-07
Jul-07
Oct-07
Jan-08
Apr-08
Jul-08
Oct-08
Jan-09
Apr-09
Jul-09
Oct-09
Jan-10
Apr-10
Jul-10
Oct-10
Jan-11
Apr-11
Jul-11
Oct-11
Jan-12
Apr-12
Jul-12
Oct-12
Jan-13
Date of Sampling
BH1A
BH2A
BH3A
BH4A
BH5A
BH6A
BH7A
BH8A
BH9A
BH10A
BH11A
IGV

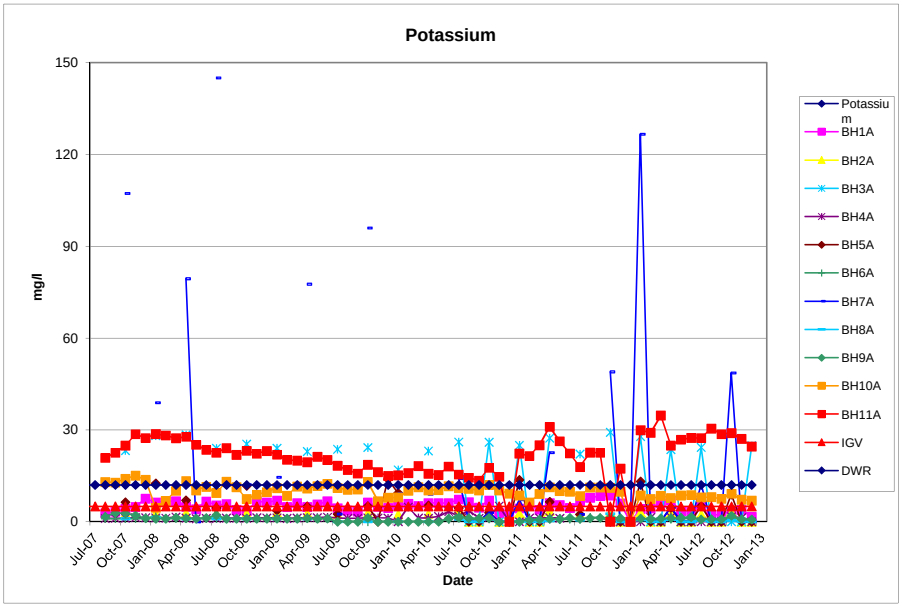

Ammonia
mg/ N
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Apr-07
Jul-07
Oct-07
Jan-08
Apr-08
Jul-08
Oct-08
Jan-09
Apr-09
Jul-09
Oct-09
Jan-10
Apr-10
Jul-10
Oct-10
Jan-11
Apr-11
Jul-11
Oct-11
Jan-12
Apr-12
Jul-12
Oct-12
Jan-13
Date of Sampling
BH1A
BH3A
BH4A
BH6A
BH8A
BH9A
BH10A
BH11A
IGV
DWR
GWR

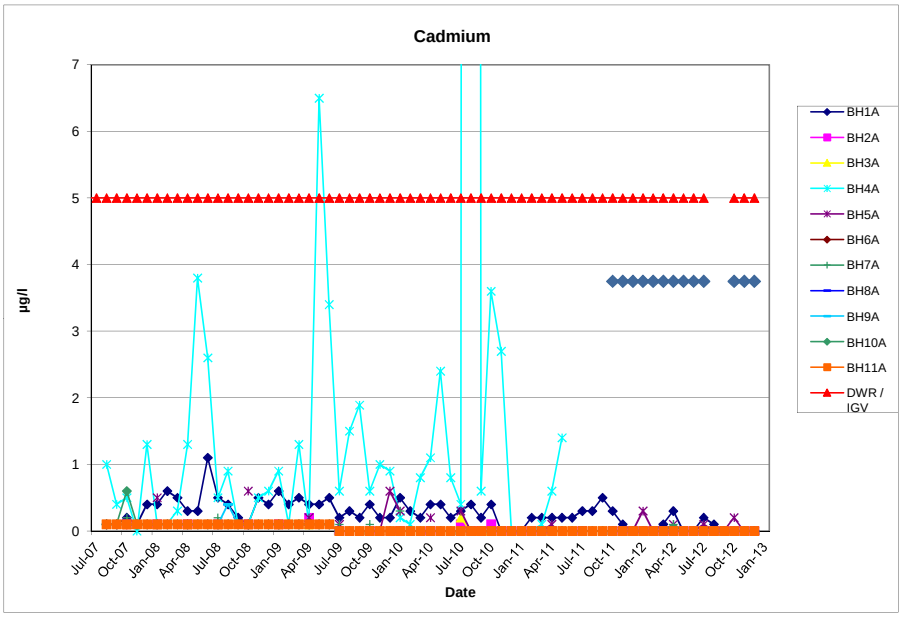

Ammonia
mg/l N
12
10
8
6
4
2
0
Apr-07
Jul-07
Oct-07
Jan-08
Apr-08
Jul-08
Oct-08
Jan-09
Apr-09
Jul-09
Oct-09
Jan-10
Apr-10
Jul-10
Oct-10
Jan-11
Apr-11
Jul-11
Oct-11
Jan-12
Apr-12
Jul-12
Oct-12
Jan-13
Date of Sampling
BH4A
BH5A
BH7A
IGV
DWR
GWR

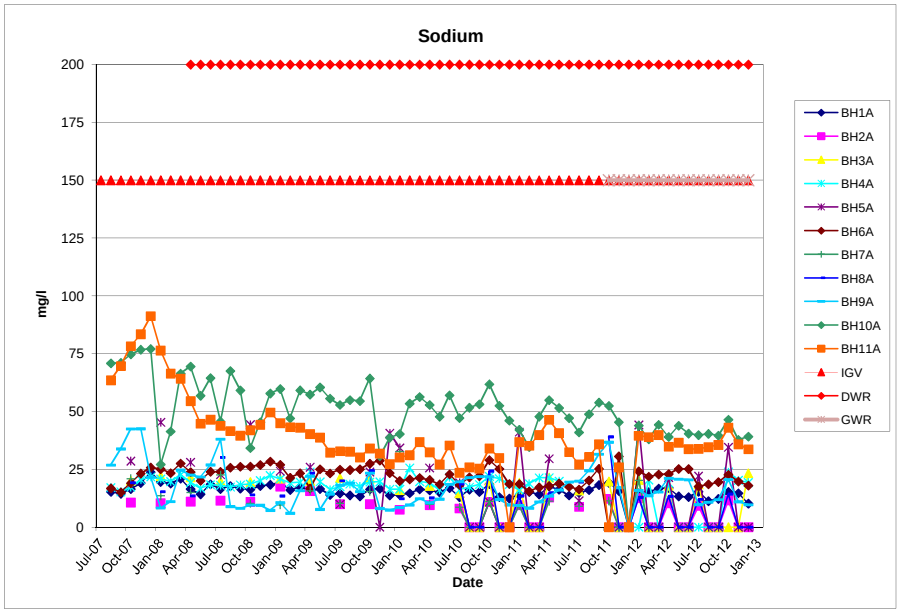

Manganese
µg/l
900
800
700
600
500
400
300
200
100
0
Jan-07
Apr-07
Jul-07
Oct-07
Jan-08
Apr-08
Jul-08
Oct-08
Jan-09
Apr-09
Jul-09
Oct-09
Jan-10
Apr-10
Jul-10
Oct-10
Jan-11
Apr-11
Jul-11
Oct-11
Jan-12
Apr-12
Jul-12
Oct-12
Jan-13
Date
BH1A
BH2A
BH3A
BH4A
BH5A
BH6A
BH7A
BH8A
BH9A
BH10A
BH11A
DWR / IGV

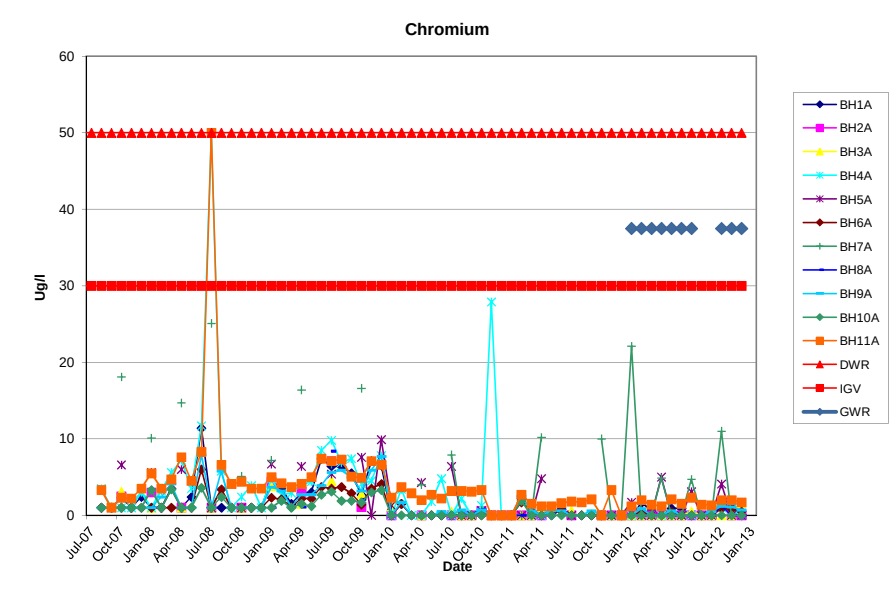

Iron
µg/l
2000
1500
1000
500
0
Jan-07
Apr-07
Jul-07
Oct-07
Jan-08
Apr-08
Jul-08
Oct-08
Jan-09
Apr-09
Jul-09
Oct-09
Jan-10
Apr-10
Jul-10
Oct-10
Jan-11
Apr-11
Jul-11
Oct-11
Jan-12
Apr-12
Jul-12
Oct-12
Jan-13
Date
BH1A
BH2A
BH3A
BH4A
BH5A
BH6A
BH7A
BH8A
BH9A
BH10A
BH11A
DWR / IGV

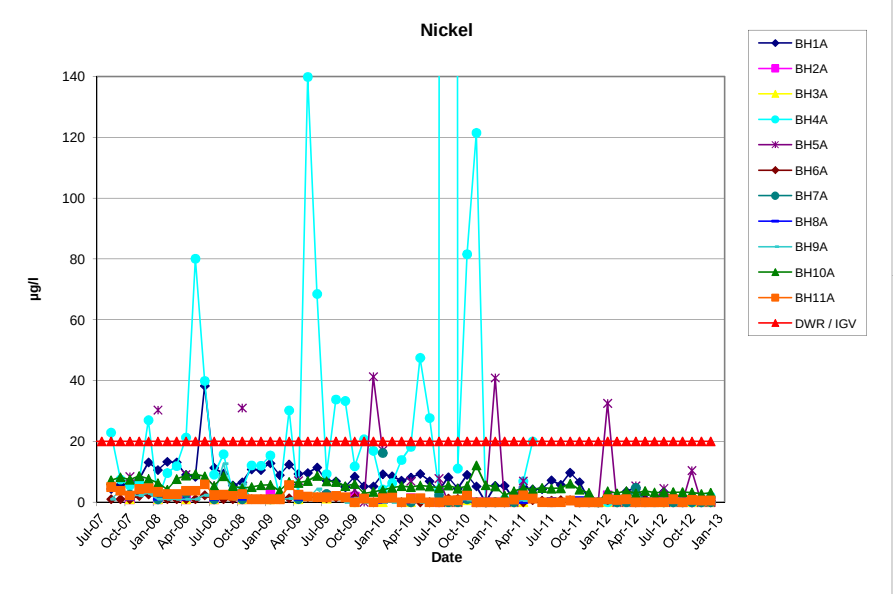

Chloride
mg/l
300
250
200
150
100
50
0
Apr-07
Jul-07
Oct-07
Jan-08
Apr-08
Jul-08
Oct-08
Jan-09
Apr-09
Jul-09
Oct-09
Jan-10
Apr-10
Jul-10
Oct-10
Jan-11
Apr-11
Jul-11
Oct-11
Jan-12
Apr-12
Jul-12
Oct-12
Jan-13
Date
BH1A
BH2A
BH3A
BH4A
BH5A
BH6A
BH7A
BH8A
BH9A
BH10A
BH11A
IGV
DWR
GWR

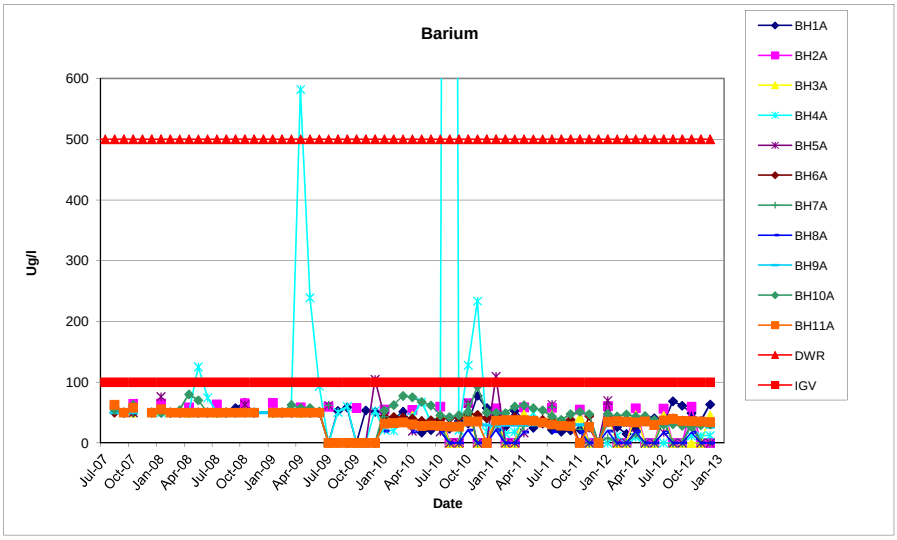

Potassium
150
120
90
60
30
0
mg/l
Jul-07
Oct-07
Jan-08
Apr-08
Jul-08
Oct-08
Jan-09
Apr-09
Jul-09
Oct-09
Jan-10
Apr-10
Jul-10
Oct-10
Jan-11
Apr-11
Jul-11
Oct-11
Jan-12
Apr-12
Jul-12
Oct-12
Jan-13
Date
Potassium
BH1A
BH2A
BH3A
BH4A
BH5A
BH6A
BH7A
BH8A
BH9A
BH10A
BH11A
IGV
DWR

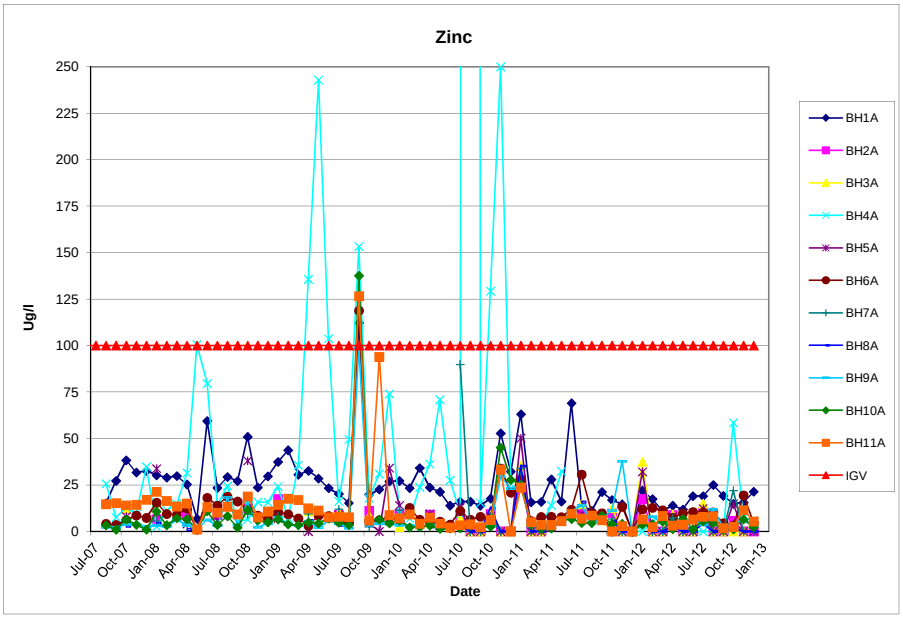

Cadmium
7
6
5
4
3
2
1
0
µg/l
Jul-07
Oct-07
Jan-08
Apr-08
Jul-08
Oct-08
Jan-09
Apr-09
Jul-09
Oct-09
Jan-10
Apr-10
Jul-10
Oct-10
Jan-11
Apr-11
Jul-11
Oct-11
Jan-12
Apr-12
Jul-12
Oct-12
Jan-13
Date
BH1A
BH2A
BH3A
BH4A
BH5A
BH6A
BH7A
BH8A
BH9A
BH10A
BH11A
DWR / IGV

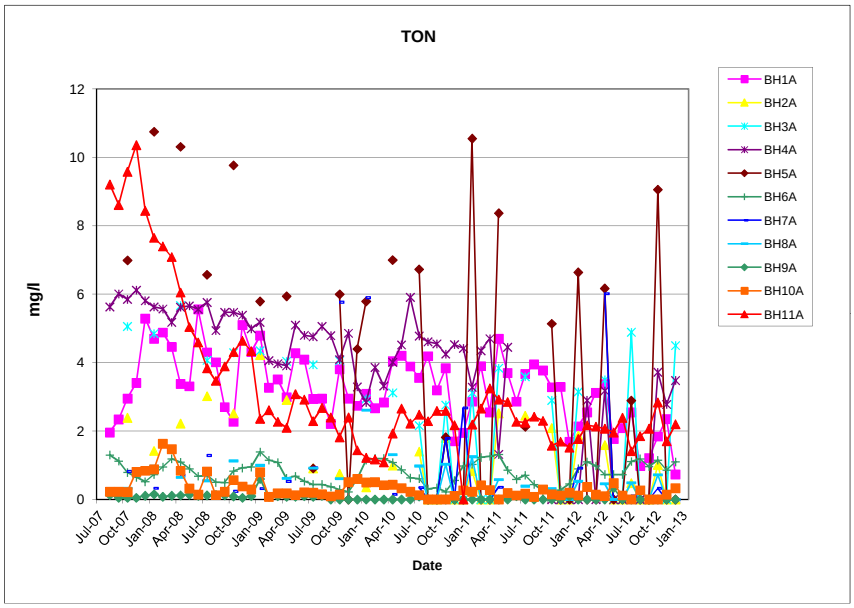

Sodium
200
175
150
125
100
75
50
25
0
mg/l
Jul-07
Oct-07
Jan-08
Apr-08
Jul-08
Oct-08
Jan-09
Apr-09
Jul-09
Oct-09
Jan-10
Apr-10
Jul-10
Oct-10
Jan-11
Apr-11
Jul-11
Oct-11
Jan-12
Apr-12
Jul-12
Oct-12
Jan-13
Date
BH1A
BH2A
BH3A
BH4A
BH5A
BH6A
BH7A
BH8A
BH9A
BH10A
BH11A
IGV
DWR
GWR


Chromium
Ug/l
Date
BH1A
BH2A
BH3A
BH4A
BH5A
BH6A
BH7A
BH8A
BH9A
BH10A
BH11A
DWR
IGV
GWR


Nickel
µg/l
Date
BH1A
BH2A
BH3A
BH4A
BH5A
BH6A
BH7A
BH8A
BH9A
BH10A
BH11A
DWR / IGV


Barium
Ug/l
Date
BH1A
BH2A
BH3A
BH4A
BH5A
BH6A
BH7A
BH8A
BH9A
BH10A
BH11A
DWR
IGV


Zinc
Ug/l
250
225
200
175
150
125
100
75
50
25
0
Jul-07
Oct-07
Jan-08
Apr-08
Jul-08
Oct-08
Jan-09
Apr-09
Jul-09
Oct-09
Jan-10
Apr-10
Jul-10
Oct-10
Jan-11
Apr-11
Jul-11
Oct-11
Jan-12
Apr-12
Jul-12
Oct-12
Jan-13
Date
BH1A
BH2A
BH3A
BH4A
BH5A
BH6A
BH7A
BH8A
BH9A
BH10A
BH11A
IGV


TON
mg/l
12
10
8
6
4
2
0
Jul-07
Oct-07
Jan-08
Apr-08
Jul-08
Oct-08
Jan-09
Apr-09
Jul-09
Oct-09
Jan-10
Apr-10
Jul-10
Oct-10
Jan-11
Apr-11
Jul-11
Oct-11
Jan-12
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Jul-12
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Jan-13
Date
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BH2A
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BH4A
BH5A
BH6A
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BH8A
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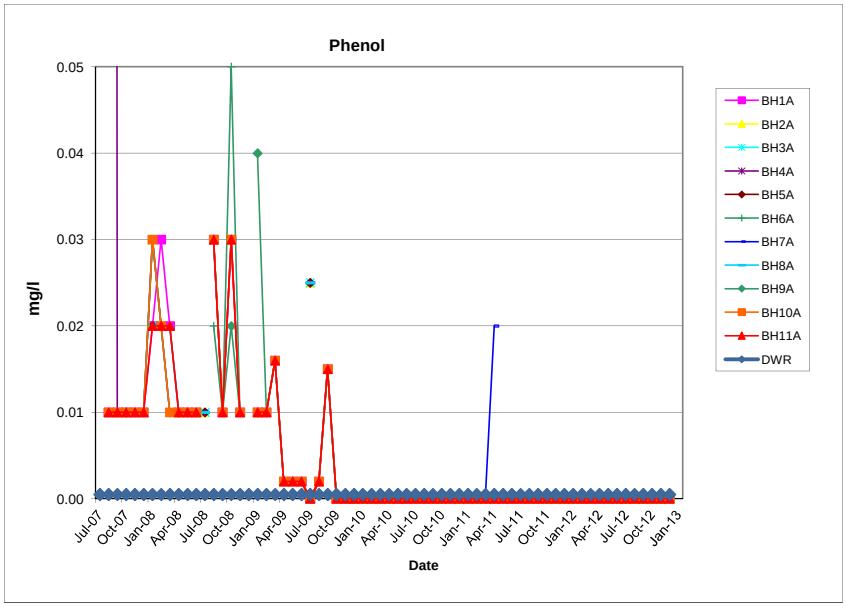
BH11A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mg/l
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0.04
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0.01
0.00
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Oct-07
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Apr-08
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Oct-08
Jan-09
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Date
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BH7A
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BH9A
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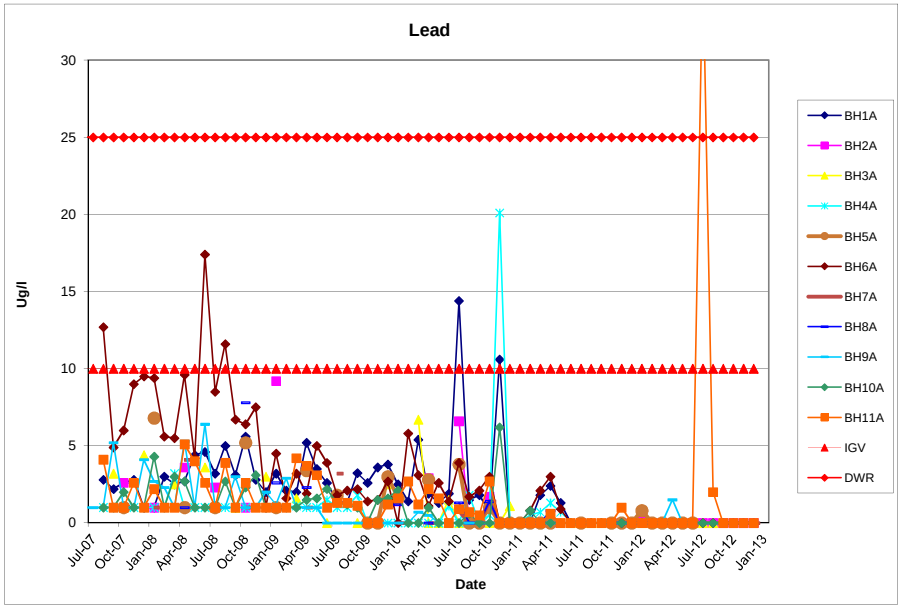
DWR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Ug/l
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25
20
15
10
5
0
Jul-07
Oct-07
Jan-08
Apr-08
Jul-08
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Apr-09
Jul-09
Oct-09
Jan-10
Apr-10
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Date
BH1A
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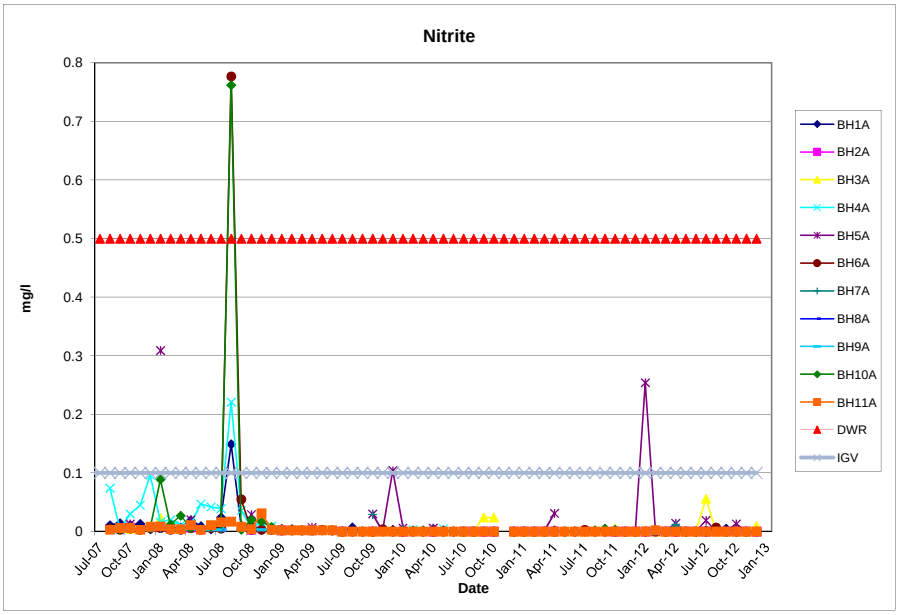
BH11A
IGV
DWR


Nitrite
mg/l
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0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Jul-07
Oct-07
Jan-08
Apr-08
Jul-08
Oct-08
Jan-09
Apr-09
Jul-09
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Jan-10
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Date
BH1A
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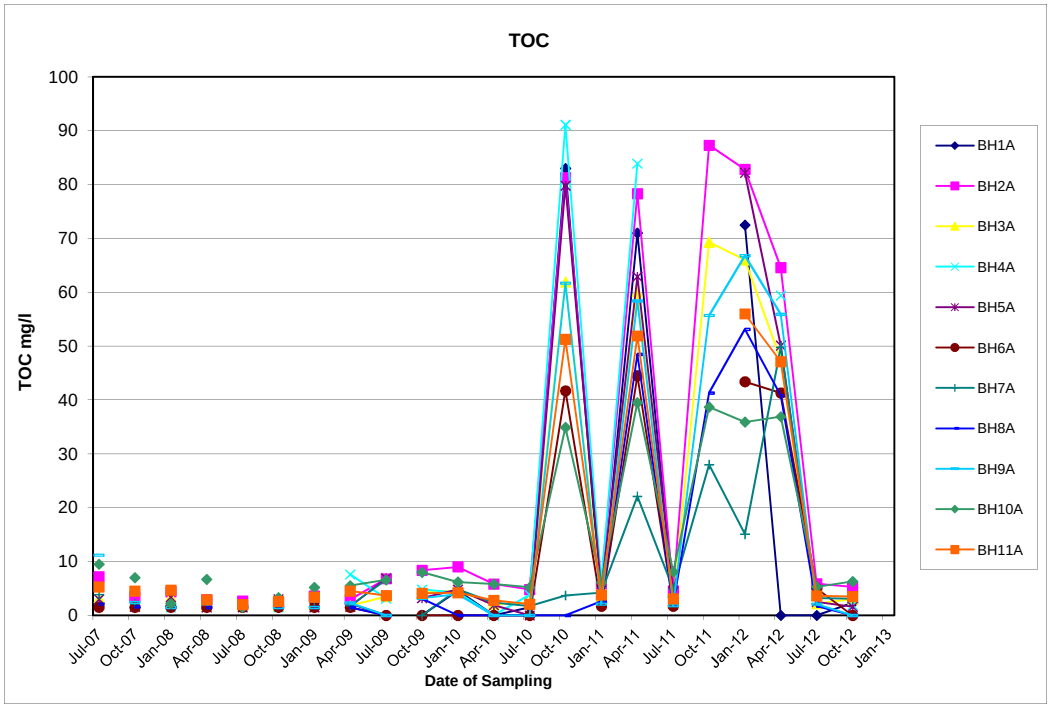
DWR
IGV


TOC
TOC mg/l
100
90
80
70
60
50
40
30
20
10
0
Jul-07
Oct-07
Jan-08
Apr-08
Jul-08
Oct-08
Jan-09
Apr-09
Jul-09
Oct-09
Jan-10
Apr-10
Jul-10
Oct-10
Jan-11
Apr-11
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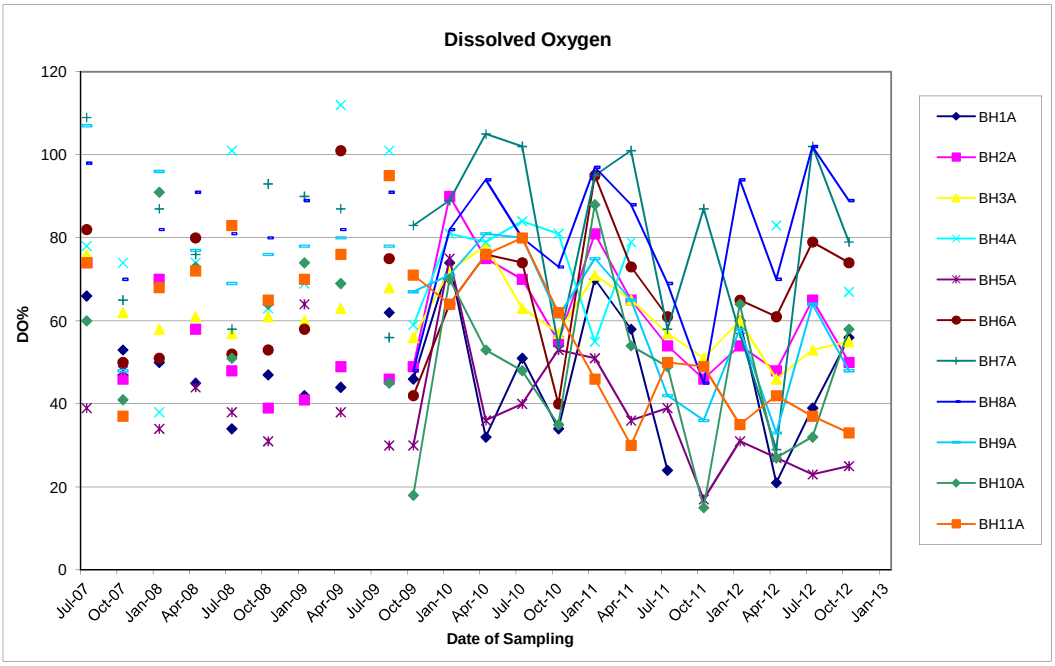
Apr-12
Jul-12
Oct-12
Jan-13
Date of Sampling
BH1A
BH2A
BH3A
BH4A
BH5A
BH6A
BH7A
BH8A
BH9A
BH10A
BH11A


Dissolved Oxygen
DO%
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100
80
60
40
20
0
Jul-07
Oct-07
Jan-08
Apr-08
Jul-08
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Jan-09
Apr-09
Jul-09
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Jan-10
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Jul-10
Oct-10
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Oct-12
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Date of Sampling
BH1A
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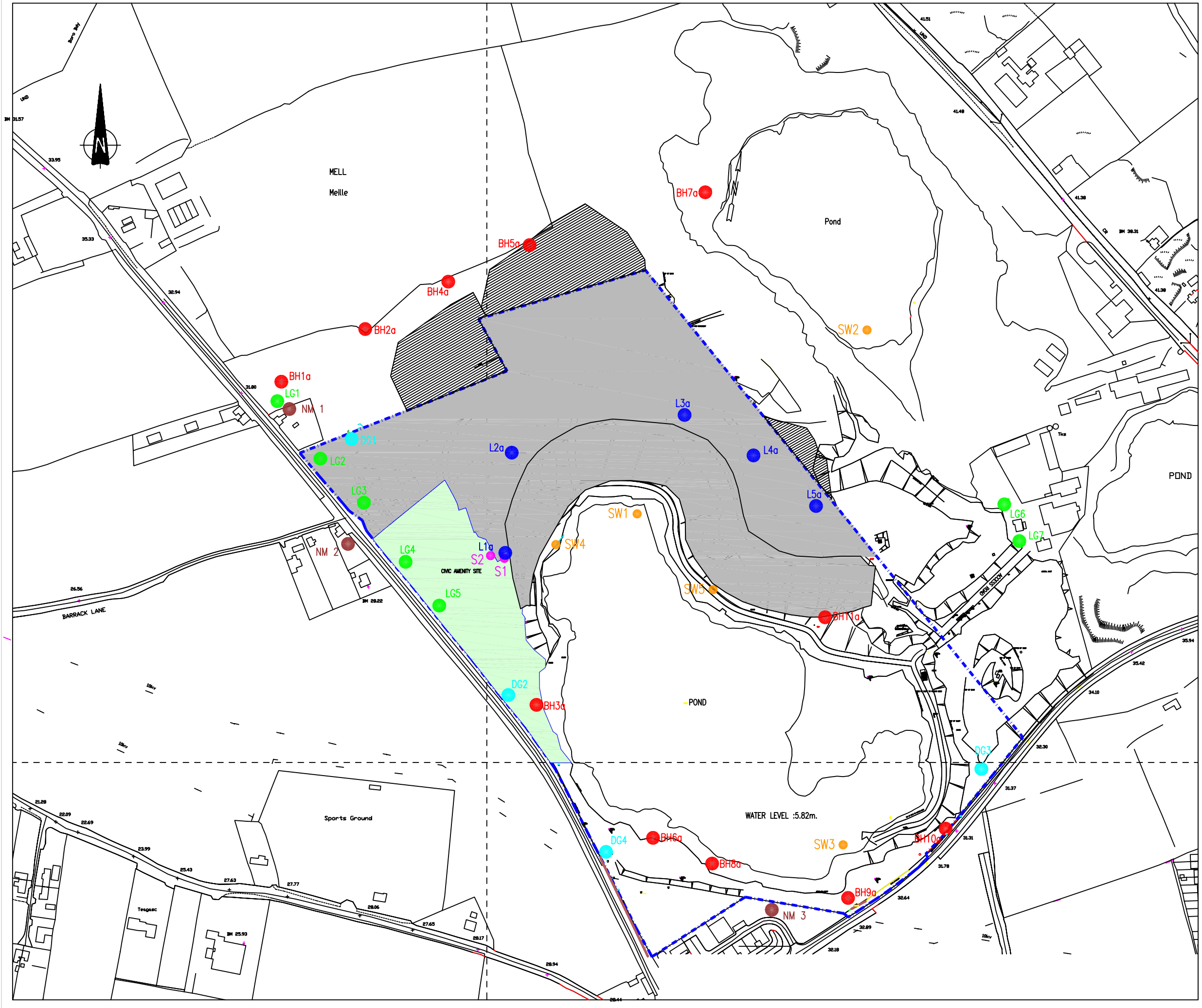
APPENDIX F

DRAWINGS



NOTES

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

2. Existing Services.
   Any information concerning the location of existing services indicated on this drawing is intended for general guidance only. It shall be the responsibility of the contractor to determine and verify the exact horizontal and vertical alignment of all cables, pipes, etc. (both underground and overhead) before work commences.

3. Issue of Drawings.
   Hard copies, dwf and pdf will form a controlled issue of the drawing. All other formats (dwg, dxf etc.) are deemed to be an uncontrolled issue and any work carried out based on these files is at the recipients own risk. RPS will not accept any responsibility for any errors arising from the use of these files, either by human error by the recipient, listing of un-dimensioned measurements, compatibility issues with the recipient's software, and any errors arising when these files are used to aid the recipients drawing production, or setting out on site.

4. 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
- S1 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
IBR0378 /100	-

Project Leader	Drawn By	Date	Initial Review
DD	JD	June 2012	AMcG

APPENDIX G

SURFACE WATER RESULTS

Drogheda Landfill Site Surfacewater Quality

Monitoring Point:		SW1															
Date Collected		**DWR**	**IGV**	**2010 GW Regs**	**08-Dec-09**	**13-Jan-10**	**27-Apr-10**	**27-Jul-10**	**19-Oct-11**	**20-Jan-11**	**12-Apr-11**	**12-Jul-11**	**04-Oct-11**	**17-Jan-12**	**24-Apr-12**	**25-Jul-12**	**09-Oct-12**
Alkalinity	**mg/l CaCO3**				120		142		116		135				85		
Aluminium	**ug/1**	200	200	150											12.9	10	9.3
Ammonia	**mg/l N**	0.23 mg/l N	0.15	0.175	0.31	0.22	0.09	<0.03	0.03	0.07	0.04	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Antimony	**ug/l**	5			59.6										<0.5	<0.5	<0.5
Arsenic	**µg/l**		10	7.5	2.2										0.66	1.8	1.97
Barium	**µg/l**		100			58.1	73.8	42.3	53.4	52.0	57.9	40.7		44.6	30.5	23.9	24.1
Beryllium	**µg/l**														<0.5	<0.5	<0.5
B.O.D.	**mg/l O2**					2.5	2.1	2.9	2.3	<1.5	<1.5	1.6	<1.5	<1.5	<1.5	2.2	2.2
Boron	**ug/l**	1000	1000	750										177.1	186.3	186.6	212.9
Cadmium	**µg/l**	5	5	3.75	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1
Calcium	**mg/l Ca**		200		38.28		49.93		37.89		42.97			33.82	25.15	20.76	21.47
C.O.D.	**mg/l O2**				31	18	20	34	<10	<10	15	23	20	17	13	17	22
Chloride	**mg/l Cl**	250	30	187.5	85	83	94	93	86	80	82	86	84	74	74	66	68
Chromium	**µg/l**	50	30	37.5	3.3	1.1	<1	<0.5	<0.5	<5	<0.5	<0.5		<0.5	<0.5	<0.5	<0.5
Cobalt	**µg/l**														<0.5	<0.5	<0.5
Coliform Bacteria	**(No/100 ml)**	0															
Conductivity	**µS/cm @ 25**	2500	1000	1875	558	547	629	532	559	537	597	526	483	521	448	409	422
Copper	**µg/l**	2000	30	1500	1.6		1.5		2.7		1.6			1.7	1.5	1.8	1.9
Cyanide	**mg/l**	0.05	10														
D.O.	**% Saturation**				98	94	117	115	101	132	102	114	89	97	97	110	99
E_ Coli	**No/100 ml**	0															
Fluoride	**mg/l**	0.8	1000										<0.150				
Iron	**µg/l**	200	200		<50	61.1	16.8	18.4	37.3	<100	12.5	16.4		<10	<10	<10	25.7
Lead	**µg/l**	25	10	18.75	<1	<1	<1	<0.5	<0.5	<5	<0.5	<0.5		<0.5	<0.5	<0.5	<0.5
Magnesium	**mg/l Mg**		50		9.75		10.83		11.86		11.29			9.34	9.6	8.87	9.44
Manganese	**µg/l**	50	50		25.2		63		34.9		19.4			1.6	2.9	4.8	5.5
Mercury	**µg/l**	1	1	0.75	<0.1		<0.1		<0.05		<0.05			nm	<0.05	nm	nm
Molybdenum	**µg/l**		35												0.8	0.7	0.6
Nickel	**µg/l**	20	20	15	4.7	4.2	5.1	5.1	6.0	5.9	4	4.8		4.3	3.4	3.4	3.5
Nitrite	**mg/l N**	0.5	0.1	0.375	0.012	0.014	0.008	<0.002	0.003	0.003	0.004	<0.002		0.003	<0.002	<0.002	<0.002
o-Phosphate	**mg/l P**		30		<0.02		<0.02		<0.02		<0.02		<0.02		<0.02		
pH		6.5 - 9.5			8.1	8	8.3	8.7	8.6	8.1	8.3	8.8	8.9	8.2	8.8	8.7	8.5
Phenol	**mg/l**		0.0005		<0.015	<0.015	<0.015	<0.025	<0.025	<0.025	<0.013	<0.008	<0.016	<0.002	<0.025	<0.002	<0.002
Potassium	**mg/l**		5		10.37	8.99	10.67	11.05	12.36	9.11	9.51	8.08		8.71	8.56	7.74	9.08
Sampling Depth	**mg/l**																
Selenium	**µg/l**	10													<0.5	<0.5	0.6
Silver	**µg/l**														<0.5	nm	nm
Sodium	**mg/l**	200	150	150	47.70		54.69		62.09		48.26			42.98	43.94	39.36	46.47
Strontium	**µg/l**														88.23	84.15	75.29
Sulphate	**mg/l SO4**	250	200	187.5	24.7		29.2		23.2		27.6		21.3		23.4		
Suspended Solids													<5				
Temp	**°C**				5.3	0.5	15.6	24.0	11.0	1.3	13.9	19.2	16.4	6.8	14	20.4	14.5
Thallium	**µg/l**														<0.1	<0.1	<0.1
Time sampled					12.50	12.2	13.3	12.40	13:00	12.45	13:10	12:15	13:00	14:35	12:10	13:40	12:00
Tin (µg/l)	**µg/l**														<1	<1	<1
T.O.C.	**mg/l**	NAC															
T.O.N	**mg/l N**		NAC		0.08	0.16	0.28	0.17	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
Total Suspended Solids	**mg/l**				<5	13	<5	7	<5	<5	<5	<5		<5	6	<5	<5
Uranium	**µg/l**														0.52	0.42	0.38
Vanadium	**µg/l**														<0.5	<0.5	0.63
Zinc	**µg/l**		100		2.3		3.7		7.0					7.6	2.2	4.4	1.5

	Drogheda Landfill Site Surfacewater Quality																
Monitoring Point:	**SW2**																
Date Collected		**DWR**	**IGV**	**2010 GW Regs**	**08-Dec-09**	**13-Jan-10**	**27-Apr-10**	**27-Jul-10**	**19-Oct-11**	**20-Jan-11**	**12-Apr-11**	**12-Jul-11**	**04-Oct-11**	**17-Jan-12**	**24-Apr-12**	**25-Jul-12**	**09-Oct-12**
Alkalinity	**mg/l CaCO3**				308		140		320		145				148		
Aluminium	**ug/1**	200	200	150											<5	5.5	<5
Ammonia	**mg/l N**	0.23 mg/l N	0.15	0.175	0.04	<0.03	<0.03	<0.03	0.03	<0.03	<0.03	<0.03	<0.03	0.03	<0.03	<0.03	<0.03
Antimony	**ug/l**	5													1.1	1.09	1
Arsenic	**µg/l**		10	7.5											0.79	0.78	1.07
Barium	**µg/l**		100		54.1	12.9	40.3	47.0	65.3	46.5	41.4	59		41.2	40.5	39.1	41.5
Beryllium	**µg/l**														<0.5	<0.5	<0.5
B.O.D.	**mg/l O2**				<1.5	2.4	2.3	8.7	<1.5	1.6	<1.5	<1.5	<1.5	<1.5	<1.5	2.6	2.4
Boron	**ug/l**	1000	1000	750										167.8	179.5	181	212.4
Cadmium	**µg/l**	5	5	3.75	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	0.1		<0.1	<0.1	<0.1	<0.1
Calcium	**mg/l Ca**		200		100.99		40.45		132.46		42.35			36.43	37.94	36.46	37.34
C.O.D.	**mg/l O2**				38	28	19	29	<10	10	13	18	14	<10	13	27	20
Chloride	**mg/l Cl**	250	30	187.5	16	31	66	97	14	48	63	16	62	62	61	59	58
Chromium	**µg/l**	50	30	37.5	7.4	<1	<1	<0.5	0.7	<5	<0.5	<0.5		<0.5	<0.5	<0.5	0.6
Cobalt	**µg/l**														<0.5	<0.5	<0.5
Coliform Bacteria	**(No/100 ml)**	0															
Conductivity	**µS/cm @ 25**	2500	1000	1875	598	247	603	531	665	633	586	692	584	603	568	554	578
Copper	**µg/l**	2000	30	1500	3.9		<1		3.5		1.1			1	0.7	12.1	1.2
Cyanide	**mg/l**	0.05	10														
D.O.	**% Saturation**				91	101	112	120	91	106	108	95	93	94	87	101	90
E_ Coli	**No/100 ml**	0															
Fluoride	**mg/l**	0.8	1000										0.23				
Iron	**µg/l**	200	200		<50	155	<10	90.7	34.2	<100	29.2	47.1		<10	<10	<10	<10
Lead	**µg/l**	25	10	18.75	1.6	<1	<1	<0.5	1.4	<5	<0.5	<0.5		<0.5	<0.5	<0.5	<0.5
Magnesium	**mg/l Mg**		50		8.08		20.62		10.92		22.23			19.73	20.97	21.55	22.25
Manganese	**µg/l**	50	50		10.0		4.9		29.0		20.1			1.7	2.7	1.3	2
Mercury	**µg/l**	1	1	0.75	<0.1		<0.1		<0.05		<0.05			nm	<0.05	nm	nm
Molybdenum	**µg/l**		35												1.7	1.8	<0.5
Nickel	**µg/l**	20	20	15	1.1	1	1.8	5.5	1.4	<5	1.2	<0.5		1.8	1.1	1.5	1.7
Nitrite	**mg/l N**	0.5	0.1	0.375	<0.002	<0.002	<0.002	<0.002	<0.002	0.002	<0.002	<0.002		0.005	<0.002	<0.002	<0.002
o-Phosphate	**mg/l P**		30		0.03		<0.02		0.03		<0.02		<0.02		<0.02		
pH		6.5 - 9.5			7.1	7.8	8.5	9.3	7.5	8.4	8.5	7.5	8.6	8.2	8.5	8.7	8.3
Phenol	**mg/l**		0.0005		<0.015	<0.015	<0.015	<0.025	<0.025	<0.025	<0.013	<0.008	<0.016	<0.002	<0.025	<0.002	<0.002
Potassium	**mg/l**		5		2.61	3.42	32.07	11.65	3.06	22.88	30.16	2.41		29.1	30.8	28.48	30.43
Sampling Depth	**mg/l**																
Selenium	**µg/l**	10													<0.5	0.6	0.9
Silver	**µg/l**														<0.5	nm	nm
Sodium	**mg/l**	200	150	150	7.48		27.67		10.79		26.64			24.72	25.67	24.58	29.33
Strontium	**µg/l**														204.16	84.15	188.67
Sulphate	**mg/l SO4**	250	200	187.5	16.7		56		12.2		52.8		50.9		49.3		
Suspended Solids													<5				
Temp	**°C**				8.0	2	15.8	23.0	11.0	4.0	15	16	16.4	8.1	13.1	19.7	16.2
Thallium	**µg/l**														<0.1	<0.1	<0.1
Time sampled					15.10	13	13.2	12.55	nt	13.15	13:20	13:10	13:30	13:40	13:00	13:20	12:45
Tin (µg/l)	**µg/l**														<1	<1	<1
T.O.C.	**mg/l**	NAC															
T.O.N	**mg/l N**		NAC		0.35	<0.08	<0.08	<0.08	1.82	<0.08	<0.08	2.55	<0.08	<0.08	<0.08	<0.08	<0.08
Total Suspended Solids	**mg/l**				<5	32	<5	15	<5	<5	10	27		<5	7	<5	<5
Uranium	**µg/l**														0.25	0.26	0.23
Vanadium	**µg/l**														<0.5	0.71	0.84
Zinc	**µg/l**		100				2.5		9.6					4.7	5.2	2.5	2.8

Drogheda Landfill Site Surfacewater Quality

Monitoring Point:					SW3												
Date Collected		**DWR**	**IGV**	**2010 GW Regs**	**08-Dec-09**	**13-Jan-10**	**27-Apr-10**	**27-Jul-10**	**19-Oct-11**	**20-Jan-11**	**12-Apr-11**	**12-Jul-11**	**04-Oct-11**	**17-Jan-12**	**24-Apr-12**	**25-Jul-12**	**09-Oct-12**
Alkalinity	**mg/l CaCO3**						141				130				87		
Aluminium	**ug/1**	200	200	150											55.7	14.6	7.4
Ammonia	**mg/l N**	0.23 mg/l N	0.15	0.175		0.23	0.1	<0.03	0.03	0.09	0.03	<0.03	<0.03	0.03	<0.03	<0.03	<0.03
Antimony	**ug/l**	5													<0.5	<0.5	<0.5
Arsenic	**µg/l**		10	7.5											0.61	1.52	1.79
Barium	**µg/l**		100			61.1	74.6	37.2	52.6	45.0	64.2	41.1	22.7	41.2	29.2	22.7	23.3
Beryllium	**µg/l**														<0.5	<0.5	<0.5
B.O.D.	**mg/l O2**					2.6	1.5	<1.5	<1.5	1.8	<1.5	<1.5	<1.5	<1.5	<1.5	1.9	<1.5
Boron	**ug/l**	1000	1000	750										167.8	181.6	185.4	229.2
Cadmium	**µg/l**	5	5	3.75		<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Calcium	**mg/l Ca**		200				49.78				43.85			36.43	25.08	20.82	21.14
C.O.D.	**mg/l O2**					22	20	13	22	22	22	60	21	<10	23	24	35
Chloride	**mg/l Cl**	250	30	187.5		88	94	53	87	67	84	86	85	62	75	66	67
Chromium	**µg/l**	50	30	37.5		1.1	<1	2.9	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Cobalt	**µg/l**														<0.5	<0.5	<0.5
Coliform Bacteria	**(No/100 ml)**	0															
Conductivity	**µS/cm @ 25**	2500	1000	1875		577	632	533	555	447	579	528	476	603	448	407	429
Copper	**µg/l**	2000	30	1500			1.2				1.5			1	1.5	1.5	0.9
Cyanide	**mg/l**	0.05	10														
D.O.	**% Saturation**					104	108	106	98	127	103	112	90	94	102	110	99
E_ Coli	**No/100 ml**	0															
Fluoride	**mg/l**	0.8	1000														
Iron	**µg/l**	200	200			<50	<10	15.5	25.5	<100	12.1	12.9	<10	<10	<10	15.3	15.5
Lead	**µg/l**	25	10	18.75		<1	<1	0.7	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Magnesium	**mg/l Mg**		50				10.75				11.53			19.73	9.42	8.76	9.36
Manganese	**µg/l**	50	50				65.7				19.9			1.7	3.3	3.2	4.5
Mercury	**µg/l**	1	1	0.75			<0.1				<0.05			nm	<0.05	nm	nm
Molybdenum	**µg/l**		35												0.7	0.9	0.6
Nickel	**µg/l**	20	20	15		4.5	4.9	1.2	6.0	5.6	4	4.7	4.5	1.8	3.4	3.2	3.4
Nitrite	**mg/l N**	0.5	0.1	0.375		0.016	0.008	0.002	0.002	0.004	0.004	<0.002	<0.002	0.005	<0.002	<0.002	<0.002
o-Phosphate	**mg/l P**		30				<0.02				<0.02				<0.02		
pH		6.5 - 9.5				8	8.3	8.4	8.5	8.3	8.3	8.8	8.9	8.2	8.9	9	8.7
Phenol	**mg/l**		0.0005			<0.015	<0.015	<0.025	<0.025	<0.025	<0.013	<0.008	<0.016	<0.002	<0.025	<0.002	<0.002
Potassium	**mg/l**		5			9.41	10.39	26.94	12.28	7.85	9.84	8.36	10.44	29.1	8.34	7.85	9.17
Sampling Depth	**mg/l**																
Selenium	**µg/l**	10													<0.5	<0.5	<0.5
Silver	**µg/l**														<0.5	nm	nm
Sodium	**mg/l**	200	150	150			54.03				49.53			24.72	42.65	39.05	47.65
Strontium	**µg/l**														86.27	84.15	75.17
Sulphate	**mg/l SO4**	250	200	187.5			29.1				27.8				23.3		
Suspended Solids																	
Temp	**°C**					0.6	15.6	18.0	11.2	0.8	14.4	19.1	16.4	8.1	13.7	20.1	14.2
Thallium	**µg/l**														<0.1	<0.1	<0.1
Time sampled						13.15	13.55	12.20	13:10	13.15	13:35	12:50	13:20	13:40	13:10	14:15	12:10
Tin (µg/l)	**µg/l**														<1	<1	<1
T.O.C.	**mg/l**	NAC															
T.O.N	**mg/l N**		NAC			0.14	0.33	0.12	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
Total Suspended Solids	**mg/l**					11	<5	<5	<5	6	<5	<5	8	<5	<5	<5	<5
Uranium	**µg/l**														0.47	0.43	0.38
Vanadium	**µg/l**														<0.5	<0.5	0.61
Zinc	**µg/l**		100				1.8				1.8			4.7	2	2.1	<0.5

Drogheda Landfill Site Surfacewater Quality

Monitoring Point:		SW4																
Date Collected		**31-Jul-08**	**30-Oct-08**	**20-Jan-09**	**28-Apr-09**	**21-Jul-09**	**20-Oct-09**	**08-Dec-09**	**27-Jul-10**	**19-Oct-11**	**20-Jan-11**	**12-Apr-11**	**12-Jul-11**	**04-Oct-11**	**17-Jan-12**	**24-Apr-12**	**25-Jul-12**	**09-Oct-12**
Alkalinity	**mg/l CaCO3**				200							224				216		
Aluminium	**ug/1**															32.5	28.2	19.2
Ammonia	**mg/l N**		0.04	0.04	0.10		<0.03			<0.03	<0.03	0.03	0.03	<0.03	<0.03	0.07	0.04	<0.03
Antimony	**ug/l**															<0.5	<0.5	<0.5
Arsenic	**µg/l**															0.72	0.74	0.75
Barium	**µg/l**		<50	<50	<50		51.6			53.6	37.9	36.5	27.3	38	42.4	34.8	47.5	44.6
Beryllium	**µg/l**															<0.5	<0.5	<0.5
B.O.D.	**mg/l O2**		<2.0	<1.5	<1.5		<1.5			1.8	<1.5	<1.5	<1.5	1.5	<1.5	<1.5	<1.5	<1.5
Boron	**ug/l**														34.8	28.3	44.3	50.3
Cadmium	**µg/l**		<0.10	<0.10	<0.1		<0.1			<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Calcium	**mg/l Ca**				85.54							86.63			105.23	87.75	112.96	125.71
C.O.D.	**mg/l O2**		31	23	24		26			12	611	13	24	13	23	16	36	16
Chloride	**mg/l Cl**		10	12	16		14			14	15	17	13	15	22	16	9	11
Chromium	**µg/l**		2.4	3.7	2.7		2.6			<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.4
Cobalt	**µg/l**															<0.5	<0.5	<0.5
Coliform Bacteria	**(No/100 ml)**																	
Conductivity	**µS/cm @ 25**		711	712	543		735			702	608	528	309	425	656	541	641	717
Copper	**µg/l**				6.9							2.7			4.2	2.6	3.2	3.8
Cyanide	**mg/l**																	
D.O.	**% Saturation**		76	60	102		59			44	108	83	99	52	64	89	106	57
E_ Coli	**No/100 ml**																	
Fluoride	**mg/l**																	
Iron	**µg/l**		135.5	385.9	79.1		<50			24.4	<100	10.1	<10	<10	<10	12.6	<10	<10
Lead	**µg/l**		<1	<1	<1		<1			<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Magnesium	**mg/l Mg**				7.45							8.39			8.59	8.86	11.21	10.98
Manganese	**µg/l**				2.2							5.6			<1	1.5	1.2	1.9
Mercury	**µg/l**				<0.1							<0.05			nm	<0.05	nm	nm
Molybdenum	**µg/l**															1.8	1.4	1.7
Nickel	**µg/l**		<1	3	1.2		2.3			1.9	<5	1.3	0.6	0.6	1.4	<0.5	<0.5	1.0
Nitrite	**mg/l N**		0.006	0.003	0.004		<0.002			0.004	<0.002	0.002	<0.002	0.029	<0.002	0.007	0.009	0.003
o-Phosphate	**mg/l P**		nm	0.02	0.04							<0.02				0.02		
pH			8.1	7.9	8.2		7.8			8.1	8.1	8.1	8.4	8	8.1	8.1	8.1	7.9
Phenol	**mg/l**		0.03	nm			nm			nm	<0.025	<0.013	<0.016	<0.016	<0.002	<0.025	<0.002	<0.002
Potassium	**mg/l**		7.09	6.2	10.53		7.15			7.19	<2.5	4.39	9.62	14.27	6.92	5.03	2.99	2.25
Sampling Depth	**mg/l**																	
Selenium	**µg/l**															<0.5	<0.5	<0.5
Silver	**µg/l**															<0.5	nm	nm
Sodium	**mg/l**				12.59							10.48			13.95	11.62	11.79	14.04
Strontium	**µg/l**															221.81	277.57	256.450
Sulphate	**mg/l SO4**				54.6							27.3				46.3		
Suspended Solids																		
Temp	**°C**		8.8	5.9	11.0		11.9			11.6	4.9	10.7	16	15.5	7.7	10.3	18	14.6
Thallium	**µg/l**															<0.1	<0.1	<0.1
Time sampled			13	13.1	13.35		12.40			13:45	13.00	13:20	12:30	13:10	14:45	12:55	14:05	12:40
Tin (µg/l)	**µg/l**															<1	<1	<1
T.O.C.	**mg/l**																	
T.O.N	**mg/l N**		1.68	2.92	3.23		0.58			0.65	0.64	0.77	<0.08	0.59	1.26	1.67	0.17	0.46
Total Suspended Solids	**mg/l**		<5	36	<5					<5	<5	<5	<5	<5	10	<5	<5	<5
Uranium	**µg/l**															2.43	3.05	3.18
Vanadium	**µg/l**															0.76	1.06	1.18
Zinc	**µg/l**				2.3							1.7			7.3	3.1	7.2	2.4
	dry																	

Drogheda Landfill Site Surfacewater Quality

Monitoring Point:		SW5																
Date Collected		**31-Jul-08**	**30-Oct-08**	**20-Jan-09**	**28-Apr-09**	**21-Jul-09**	**20-Oct-09**	**08-Dec-09**	**27-Jul-10**	**19-Oct-11**	**20-Jan-11**	**12-Apr-11**	**12-Jul-11**	**04-Oct-11**	**17-Jan-12**	**24-Apr-12**	**25-Jul-12**	**09-Oct-12**
Alkalinity	**mg/l CaCO3**				222							268				316		
Aluminium	**ug/1**															25.3	16.2	14.9
Ammonia	**mg/l N**		<0.03	<0.03	0.10		0.05			0.09	<0.03	0.03	0.12	0.35	<0.03	0.05	0.08	0.05
Antimony	**ug/l**															<0.5	<0.5	<0.5
Arsenic	**µg/l**															0.82	0.55	0.87
Barium	**µg/l**		<50	<50	<50		53.9			54.8	37.8	41.4	41.9	54.9	41.5	42.5	57.8	50.1
Beryllium	**µg/l**															<0.5	<0.5	<0.5
B.O.D.	**mg/l O2**		<2.0	<1.5	<1.5		<3.0			2.5	<1.5	<1.5	<1.5	2.7	<1.5	<1.5	<1.5	<1.5
Boron	**ug/l**														31.5	24.8	45.3	43.7
Cadmium	**µg/l**		<0.10	<0.10	<0.1		<0.1			<0.1	<1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	0.1
Calcium	**mg/l Ca**				93.00							98.74			112.13	118.78	144.59	139.69
C.O.D.	**mg/l O2**		57	24	23		45			12	12	11	24	21	13	11	26	15
Chloride	**mg/l Cl**		10	13	17		10			13	15	16	14	20	15	15	9	10
Chromium	**µg/l**		<1	3.2	2.5		<1			<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.9
Cobalt	**µg/l**															<0.5	<0.5	<0.5
Coliform Bacteria	**(No/100 ml)**																	
Conductivity	**µS/cm @ 25**		791	750	565		752			749	626	585	414	725	651	656	752	751
Copper	**µg/l**				3.3							2.3			213.7	2.2	3.1	2.8
Cyanide	**mg/l**																	
D.O.	**% Saturation**		80	82	124		56			33	118	84	89	41	36	40	104	38
E_ Coli	**No/100 ml**																	
Fluoride	**mg/l**																	
Iron	**µg/l**		152.7	106.3	87.1		<50			36.7	<100	<10	<10	20.1	<10	37.8	10.3	12.6
Lead	**µg/l**		<1	<1	<1		<1			<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Magnesium	**mg/l Mg**				7.32							7.47			6.93	8.25	11.49	9.81
Manganese	**µg/l**				<1							2.2			2.1	2.6	1.2	3.6
Mercury	**µg/l**				<0.1							<0.05			nm	<0.05	nm	nm
Molybdenum	**µg/l**															1	0.9	1.0
Nickel	**µg/l**		<1	<1	1.2		2.1			1.4	6.7	1	<0.5	<0.5	1.1	<0.5	<0.5	0.5
Nitrite	**mg/l N**		<0.003	<0.002	0.003		0.032			0.051	<0.002	<0.002	0.009		0.051	0.037	0.002	0.008
o-Phosphate	**mg/l P**		nm	0.46	0.02							<0.02		nm		0.08		
pH			7.9	7.9	8.1		7.8			8.1	8.0	8	8.2	7.8	7.9	7.9	7.8	7.8
Phenol	**mg/l**		0.03	nm			nm			nm	<0.025	<0.013	<0.016	<0.016	<0.002	<0.025	<0.002	<0.002
Potassium	**mg/l**		3.1	4.06	8.15		5.69			4.27	<2.5	3.22	8.24	4.85	4.87	3.88	1.46	1.67
Sampling Depth	**mg/l**																	
Selenium	**µg/l**															<0.5	<0.5	<0.5
Silver	**µg/l**															<0.5	nm	nm
Sodium	**mg/l**				12.24							9.86			12.33	11.21	11.6	13.10
Strontium	**µg/l**															230.63	291.91	251.600
Sulphate	**mg/l SO4**				43.0							25.1				30.3		
Suspended Solids																		
Temp	**°C**		8.9	5.9	11.5		12.1			11.8	3.8	11	15.6	15.4	8.1	10.3	18	14.7
Thallium	**µg/l**															<0.1	<0.1	<0.1
Time sampled			13.1	13.2	13.50		13.00			13:50	13.25	13:45	13:10	13:45	15:00	13:20	14:25	12:50
Tin (µg/l)	**µg/l**															<1	<1	<1
T.O.C.	**mg/l**																	
T.O.N	**mg/l N**		1	2.84	3.26		0.53			0.85	0.49	0.97	1.64	0.64	1.34	1.75	0.17	0.65
Total Suspended Solids	**mg/l**		<5	6	<5					<5	<5	<5	<5	<5	<5	<5	<5	<5
Uranium	**µg/l**															2.18	2.81	2.48
Vanadium	**µg/l**															0.78	1.08	1.22
Zinc	**µg/l**				2.7							2.2			2.4	3	2.5	1.0
	dry																	

APPENDIX G

LANDFILL GAS RESULTS

LANDFILL GAS MONITORING FORM

Facility Name: Drogheda Landfill **Waste Licence no**.:	**Facility Address:** Mell Drogheda	
Licensee: Drogheda Borough Council		
Date of licensing:	**Date of sampling:** 09/01/12	**Time of sampling:** 9:30
Instrument used: Geotechnical Instruments GA2000	**Date Next Full Calibration:** June 2012 **Last Field Calibration:** (include date and gases)	
Monitoring Personnel: Mark Watters	**Weather:** cloudy	**Barometric pressure:** (e.g. 1001-1003 mbar rising) **Mean temperature:**

Results [1]

Sample Station Number	CH_4 (%v/v)	CO_2 (% v/v)	O_2 (% v/v)	CO ppm	H_2S ppm	Comments
GW 1	16.9	25.0	6.0	0	27	Manifold 1
GW 2	17.4	25.8	1.7	0	40	Manifold 1
GW 3	6.0	10.5	7.5	0	0	Manifold 1
GW 4	0.3	1.3	12.8	0	0	Manifold 1
GW 5						Manifold 1 Water in pipe
GW 6	25.8	25.5	3.2	0	1	Manifold 1
GW 7	2.4	6.7	16.1	0	0	Manifold 1
GW 8	15.9	11.6	12.4	0	0	Manifold 1
GW 9	8.9	10.7	13.6	0	0	Manifold 1
GW 10	0.4	4.0	16.7	0	0	Manifold 1
GW 11	13.4	20.2	10.6	0	0	Manifold 1
GW 12	23.6	25.1	6.7	0	4	Manifold 1
GW 13	0.1	2.5	18.3	0	0	Manifold 2
GW 14						Manifold 2 Nozzle broken
GW 15	13.6	22.3	8.2	0	1	Manifold 2
GW 16	23.1	26.3	1.8	0	2	Manifold 2
GW 17	17.6	24.8	1.9	0	1	Manifold 2
GW 18	30.6	28.1	0.9	0	12	Manifold 2
GW 19	22.8	26.1	0.0	0	0	Manifold 2
GW 20	21.9	26.0	0.4	0	0	Manifold 2
GW 21	10.3	20.6	0.5	0	0	Manifold 2
GW 22	28.4	26.1	2.1	0	0	Manifold 2
GW 23	40.2	27.5	2.7	0	0	Manifold 2
GW 24	23.8	18.9	9.3	0	12	Manifold 2

General Comments

Note:

LANDFILL GAS MONITORING FORM		
Facility Name: Drogheda Landfill **Waste Licence no**.:	**Facility Address:** Mell Drogheda	
Licensee: Drogheda Borough Council		
Date of licensing:	**Date of sampling:** 09-01-12	**Time of sampling:** 11:00
Instrument used: Geotechnical Instruments GA2000	**Date Next Full Calibration:** June 2012 **Last Field Calibration:** (include date and gases)	
Monitoring Personnel: Mark Watters	**Weather:** Cloudy	**Barometric pressure:** (e.g. 1001-1003 mbar rising) **Mean temperature:**

Results [1]

Sample Station Number	CH_4 (%v/v)	CO_2 (% v/v)	O_2 (% v/v)	CO ppm	H_2S ppm	Comments
GW 25	49.8	35.2	2.0	0	17	Manifold 3
GW 26	40.9	30.1	4.6	0	8	Manifold 3
GW 27	43.0	31.7	2.6	0	13	Manifold 3
GW 28	1.1	3.0	15.8	30	0	Manifold 3
GW 29	43.6	30.8	1.7	0	7	Manifold 3
GW 30	38.2	27.8	2.9	0	3	Manifold 3
GW 31	6.4	4.0	12.8	17	0	Manifold 3
GW 32	0.0	0.0	16.0	0	0	Manifold 3
GW 33	46.8	34.3	1.0	0	0	Manifold 3
GW 34	0.1	0.0	15.0	0	0	Manifold 3
GW 35	0.1	1.4	19.1	0	0	Manifold 4
GW 36	22.0	18.0	7.3	0	0	Manifold 4
GW 37	0.1	0.2	18.6	0	0	Manifold 4
GW 38	36.1	21.2	1.4	0	0	Manifold 4
GW 39	0.1	0.4	19.3	0	0	Manifold 4
GW 40	35.4	27.9	2.1	0	0	Manifold 4
GW 41	26.2	24.8	0.3	0	0	Manifold 4
GW 42	23.2	23.4	0.1	0	2	Manifold 4
GW 43	0.1	1.0	19.4	0	0	Manifold 4
GW 44						Manifold 4 **Water in pipe**
GW 45	13.5	19.1	4.9	0	0	Manifold 5
GW 46	42.6	32.1	2.3	0	0	Manifold 5
GW 47	33.0	26.7	0.9	0	8	Manifold 5
GW 48	39.7	31.3	0.1	1	10	Manifold 5

General Comments

Note:

LANDFILL GAS MONITORING FORM		
Facility Name: Drogheda Landfill **Waste Licence no**.:	**Facility Address:** Mell Drogheda	
Licensee: Drogheda Borough Council		
Date of licensing:	**Date of sampling:** 09/01/12	**Time of sampling:** 14:40
Instrument used: Geotechnical Instruments GA2000	**Date Next Full Calibration:** June 2012 **Last Field Calibration:** (include date and gases)	
Monitoring Personnel: Mark Watters	**Weather:** Cloudy	**Barometric pressure:** (e.g. 1001-1003 mbar rising) **Mean temperature:**

Results [1]

Sample Station Number	CH_4 (%v/v)	CO_2 (% v/v)	O_2 (% v/v)	CO ppm	H_2S ppm	Comments
GW 49	36.5	27.2	0.3	1	6	Manifold 5
GW 50	25.8	25.3	0.3	2	1	Manifold 5
GW 51	25.6	23.7	1.0	0	0	Manifold 5
GW 52	0.0	1.9	15.6	0	0	Manifold 5
GW 53	24.0	23.4	2.1	0	0	Manifold 5
GW 54	22.6	23.2	0.6	0	0	Manifold 5
BH1A	0.0	0.1	20.9	0	0	31.953m A.O.D Top of Cover
BH2A	0.0	0.1	21.0	0	0	32.362m A.O.D Top of Cover
BH3A	0.0	0.3	20.2	0	0	33.664m A.O.D Top of Cover
BH4A	0.1	0.6	20.5	0	0	33.570m A.O.D Top of Cover
BH5A	0.1	1.9	17.1	0	0	36.130m A.O.D Top of Cover
BH6A	0.0	0.1	20.7	0	0	35.951m A.O.D Top of Cover
BH7A	0.1	0.1	21.0	0	0	25.172m A.O.D Top of Cover
BH8A	0.1	1.4	18.6	0	0	36.151m A.O.D Top of Cover
BH9A	0.1	0.3	20.7	0	0	34.345m A.O.D Top of Cover
BH10A	0.1	0.1	21.0	0	0	32.776m A.O.D Top of Cover
BH11A	0.1	0.2	20.9	0	0	21.715m A.O.D Top of Cover
LG1	0.0	0.1	20.9	0	0	
LG2	0.0	0.8	20.5	0	0	
LG3	0.0	0.6	20.7	0	0	
LG4	0.0	1.6	17.7	0	0	
LG5	0.0	9.1	5.6	0	0	
LG6	0.0	0.0	21.1	0	0	
LG7	0.0	0.0	21.0	0	0	

General Comments

LANDFILL GAS MONITORING FORM

Facility Name: Drogheda Landfill **Waste Licence no**.:	**Facility Address:** Mell Drogheda	
Licensee: Drogheda Borough Council		
Date of licensing:	**Date of sampling:** 29/02/12	**Time of sampling:** 9:20
Instrument used: Geotechnical Instruments GA2000	**Date Next Full Calibration:** June 2012 **Last Field Calibration:** (include date and gases)	
Monitoring Personnel: Mark Watters	**Weather:** Sunny	**Barometric pressure:** 1014mbar **Mean temperature:** 12^0C

Results [1]

Sample Station Number	CH_4 (%v/v)	CO_2 (% v/v)	O_2 (% v/v)	CO ppm	H_2S ppm	Comments
GW 1	15.5	25.4	2.8	0	15	Manifold 1
GW 2	16.2	26.5	0.4	0	22	Manifold 1
GW 3	2.2	6.5	9.9	0	0	Manifold 1
GW 4	0.0	0.2	18.4	0	0	Manifold 1
GW 5	0.0	0.1	20.0	0	0	Manifold 1
GW 6	27.8	24.5	1.9	0	2	Manifold 1
GW 7	0.0	1.9	16.3	0	0	Manifold 1
GW 8	0.0	1.3	19.5	0	0	Manifold 1
GW 9	0.0	0.3	20.0	0	0	Manifold 1
GW 10	0.0	0.7	19.8	0	0	Manifold 1
GW 11	14.9	19.2	8.8	0	1	Manifold 1
GW 12	25.2	24.6	3.6	0	5	Manifold 1
GW 13	0.0	2.5	18.7	0	0	Manifold 2
GW 14						Manifold 2 **Broken Well**
GW 15	15.8	22.1	5.0	0	0	Manifold 2
GW 16	26.8	26.2	0.0	0	2	Manifold 2
GW 17	16.1	24.2	1.1	0	0	Manifold 2
GW 18	32.6	27.1	1.6	0	7	Manifold 2
GW 19	24.7	24.5	0.8	0	0	Manifold 2
GW 20	26.0	25.4	0.0	0	0	Manifold 2
GW 21	14.0	21.4	0.7	0	0	Manifold 2
GW 22	19.0	21.4	4.3	0	0	Manifold 2
GW 23	42.5	27.8	1.8	0	3	Manifold 2
GW 24	23.8	16.8	9.6	0	9	Manifold 2

General Comments

Note:

LANDFILL GAS MONITORING FORM						
Facility Name: Drogheda Landfill **Waste Licence no**.:					**Facility Address:** Mell Drogheda	
Licensee: Drogheda Borough Council						
Date of licensing:					**Date of sampling:** 29/02/12	**Time of sampling:** 10:20
Instrument used: Geotechnical Instruments GA2000					**Date Next Full Calibration:** June 2012 **Last Field Calibration:** (include date and gases)	
Monitoring Personnel: Mark Watters					**Weather:** Sunny	**Barometric pressure:** 1014mbar **Mean temperature:**
Results [1]						
Sample Station Number	CH_4 (%v/v)	CO_2 (% v/v)	O_2 (% v/v)	CO ppm	H_2S ppm	Comments
GW 25	49.2	35.1	0.4	0	10	Manifold 3
GW 26	43.2	32.0	2.4	1	7	Manifold 3
GW 27	43.8	31.7	1.2	0	14	Manifold 3
GW 28	1.0	2.9	16.6	26	0	Manifold 3
GW 29	44.6	29.5	0.4	0	3	Manifold 3
GW 30	41.5	28.5	1.4	0	1	Manifold 3
GW 31	6.1	3.9	15.5	17	0	Manifold 3
GW 32	0.0	0.7	19.5	1	0	Manifold 3
GW 33	48.6	33.4	1.5	0	2	Manifold 3
GW 34	0.0	0.1	15.1	0	0	Manifold 3
GW 35	0.0	1.6	19.3	0	0	Manifold 4
GW 36	22.2	18.4	7.6	0	1	Manifold 4
GW 37	0.0	0.3	16.8	5	0	Manifold 4
GW 38	37.1	20.9	1.4	1	0	Manifold 4
GW 39	0.0	0.3	19.9	3	0	Manifold 4
GW 40	34.5	29.7	2.9	0	1	Manifold 4
GW 41	26.6	25.5	0.6	1	2	Manifold 4
GW 42	22.3	24.3	0.2	1	3	Manifold 4
GW 43	0.0	1.3	18.3	0	0	Manifold 4
GW 44						Manifold 4 **Water in pipe**
GW 45	13.5	19.9	4.3	1	1	Manifold 5
GW 46	41.0	31.2	1.0	0	1	Manifold 5
GW 47	33.3	28.6	0.0	0	14	Manifold 5
GW 48	40.1	30.5	0.0	2	16	Manifold 5

General Comments

Note:

LANDFILL GAS MONITORING FORM

Facility Name: Drogheda Landfill **Waste Licence no**.:	**Facility Address:** Mell Drogheda	
Licensee: Drogheda Borough Council		
Date of licensing:	**Date of sampling:** 28&29/02/12	**Time of sampling:** (10:45 29th) 14:20 28th)
Instrument used: Geotechnical Instruments GA2000	**Date Next Full Calibration:** June 2012 **Last Field Calibration:** (include date and gases)	
Monitoring Personnel: Mark Watters	**Weather:** Sunny	**Barometric pressure:** 1014mbar **Mean temperature:** 12°C

Results [1]

Sample Station Number	CH_4 (%v/v)	CO_2 (% v/v)	O_2 (% v/v)	CO ppm	H_2S ppm	Comments
GW 49	35.6	28.1	0.0	3	9	Manifold 5
GW 50	25.2	25.1	0.0	2	3	Manifold 5
GW 51	26.5	25.2	1.8	0	4	Manifold 5
GW 52	0.2	1.9	16.1	2	0	Manifold 5
GW 53	24.5	22.9	2.7	1	2	Manifold 5
GW 54	21.521.9	0.9	0	20		Manifold 5
BH1A	0.0	0.2	21.3	1	0	31.953m A.O D Top of Cover
BH2A	0.0	0.0	21.5	2	0	32.362m A.O.D Top of Cover
BH3A	0.0	2.0	17.8	1	0	33.664m A.O.D Top of Cover
BH4A	0.0	0.0	21.3	0	0	33.570m A.O.D Top of Cover
BH5A	0.0	2.1	17.0	1	0	36.130m A.O.D Top of Cover
BH6A	0.0	0.1	20.7	0	0	35.951m A.O.D Top of Cover
BH7A	0.0	0.0	21.4	2	0	25.172m A.O.D Top of Cover
BH8A	0.1	1.2	18.9	0	0	36.151m A.O.D Top of Cover
BH9A	0.0	0.2	20.4	0	0	34.345m A.O.D Top of Cover
BH10A	0.1	0.1	20.7	0	0	32.776m A.O.D Top of Cover
BH11A	0.0	0.1	21.3	0	0	21.715m A.O.D Top of Cover
LG1	0.0	0.1	21.3	3	0	
LG2	0.0	6.8	13.6	1	0	
LG3	0.0	4.8	15.3	2	0	
LG4	0.0	1.4	18.2	0	0	
LG5	0.0	10.9	4.6	1	0	
LG6	0.0	0.0	21.1	0	0	
LG7	0.0	0.0	21.2	0	0	
PZ8						
PZ9						
PZ10						

LANDFILL GAS MONITORING FORM

Facility Name: Drogheda Landfill **Waste Licence no**.:	**Facility Address:** Mell Drogheda	
Licensee: Drogheda Borough Council		
Date of licensing:	**Date of sampling: 29/03/12**	**Time of sampling: 11.55**
Instrument used: Geotechnical Instruments GA2000	**Date Next Full Calibration:** June 2012 **Last Field Calibration:** (include date and gases)	
Monitoring Personnel: MW & SB	**Weather:** Sunny	**Barometric pressure:** (e.g. 1001-1003 mbar rising) 1030 **Mean temperature:**

Results [1]

Sample Station Number	CH_4 (%v/v)	CO_2 (% v/v)	O_2 (% v/v)	CO ppm	H_2S ppm	Comments
GW 1	3.4	3.9	16.8	0	0	Manifold 1
GW 2	2.1	2.5	18.4	0	0	Manifold 1
GW 3	4.3	6.0	14.2	0	0	Manifold 1
GW 4	0.9	1.8	18.5	0	0	Manifold 1
GW 5	27.1	23.9	1.3	0	6	Manifold 1
GW 6	28.8	25.4	0.8	0	4	Manifold 1
GW 7	0.3	1.7	1905	0	0	Manifold 1
GW 8	0.3	1.0	20.2	0	0	Manifold 1
GW 9	0.2	0.5	20.4	0	0	Manifold 1
GW 10	0.2	0.4	20.4	0	0	Manifold 1
GW 11	13.6	20.6	3.4	0	5	Manifold 1
GW 12	25.5	26.3	0.1	0	12	Manifold 1
GW 13	0.3	0.8	19.9	0	0	Manifold 2
GW 14	0.3	0.1	20.4	0	0	Manifold 2
GW 15	16.9	22.4	2.6	0	5	Manifold 2
GW 16	29.2	27.5	0	0	8	Manifold 2
GW 17	19.3	25.4	1.4	0	0	Manifold 2
GW 18	31.0	26.4	1.9	0	21	Manifold 2
GW 19	22.5	21.9	4.1	0	4	Manifold 2
GW 20	28.8	27.5	0	0	2	Manifold 2
GW 21	5.5	12.6	9.3	0	0	Manifold 2
GW 22	8.8	16.3	6.2	0	0	Manifold 2
GW 23	43.3	28.0	1.9	0	23	Manifold 2
GW 24	23.0	16.0	12.1	0	13	Manifold 2

General Comments

Note:

LANDFILL GAS MONITORING FORM		
Facility Name: Drogheda Landfill **Waste Licence no**.:	**Facility Address:** Mell Drogheda	
Licensee: Drogheda Borough Council		
Date of licensing:	**Date of sampling:29/03/12**	**Time of sampling: 11.55**
Instrument used: Geotechnical Instruments GA2000	**Date Next Full Calibration:** June 2012 **Last Field Calibration:** (include date and gases)	
Monitoring Personnel: MW & SB	**Weather:** Sunny	**Barometric pressure:** (e.g. 1001-1003 mbar rising) 1030 **Mean temperature:**

Results [1]

Sample Station Number	CH_4 (%v/v)	CO_2 (% v/v)	O_2 (% v/v)	CO ppm	H_2S ppm	Comments
GW 25	51.6	36.3	0.0	0	30	Manifold 3
GW 26	45.7	32.9	1.8	0	13	Manifold 3
GW 27	45.9	32.9	1.8	0	20	Manifold 3
GW 28	1.5	2.9	17.8	32	0	Manifold 3
GW 29	47.3	31.7	0.1	0	10	Manifold 3
GW 30	43.2	29.6	1.6	0	4	Manifold 3
GW 31	7.2	4.0	16.5	33	0	Manifold 3
GW 32	0.3	0.3	20.3	0	0	Manifold 3
GW 33	48.5	35.3	0.5	0	4	Manifold 3
GW 34	0.3	0.1	20.4	0	0	Manifold 3
GW 35	0.3	0.5	20.5	0	0	Manifold 4
GW 36	22.2	19.8	5.1	0	8	Manifold 4
GW 37	0.3	0.1	20.5	0	0	Manifold 4
GW 38	40.5	21.7	2.0	0	0	Manifold 4
GW 39	0.4	0.2	20.1	0	0	Manifold 4
GW 40	36.4	31.7	0.5	1	4	Manifold 4
GW 41	24.4	24.6	0.6	0	4	Manifold 4
GW 42	23.9	25.8	0.0	0	5	Manifold 4
GW 43	0.3	0.5	20.3	0	0	Manifold 4
GW 44	0.4	0.4	20.5	0	0	Manifold 4
GW 45	13.9	20.7	1.3	0	4	Manifold 5
GW 46	35.3	28.1	3.7	0	4	Manifold 5
GW 47	30.3	28.2	0.9	0	36	Manifold 5
GW 48	37.8	31.9	0.0	1	26	Manifold 5

General Comments

Note:

LANDFILL GAS MONITORING FORM

Facility Name: Drogheda Landfill **Waste Licence no**.:	**Facility Address:** Mell Drogheda	
Licensee: Drogheda Borough Council		
Date of licensing:	**Date of sampling:** 29/03/12	**Time of sampling: 11.55**
Instrument used: Geotechnical Instruments GA2000	**Date Next Full Calibration:** June 2012 **Last Field Calibration:** (include date and gases)	
Monitoring Personnel: MW & SB	**Weather:** Sunny	**Barometric pressure:** (e.g. 1001-1003 mbar rising) 1030 **Mean temperature:**

Results [1]

Sample Station Number	CH_4 (%v/v)	CO_2 (% v/v)	O_2 (% v/v)	CO ppm	H_2S ppm	Comments
GW 49	36.3	29.4	0.0	0	24	Manifold 5
GW 50	25.6	26.2	0.0	1	10	Manifold 5
GW 51	26.9	26.2	0.6	0	15	Manifold 5
GW 52	0.4	1.3	19.1	1	0	Manifold 5
GW 53	24.3	23.9	2.1	0	6	Manifold 5
GW 54	23.8	23.7	0.7	1	33	Manifold 5
BH1A	0.2	0.3	20.7	0	0	
BH2A	0.4	0.1	20.9	0	0	
BH3A	0.3	0.7	20.1	0	0	
BH4A	0.4	0.1	20.8	0	0	
BH5A	0.4	2.5	15.6	0	0	
BH6A	0.3	0.1	21.3	0	0	
BH7A	0.4	0.1	20.7	0	0	
BH8A	0.3	0.8	20.8	0	0	
BH9A	0.3	1.9	18.5	0	0	
BH10A	0.3	0.1	21.1	0	0	
BH11A	0.4	0.1	20.9	0	0	
LG1	0.3	0.3	20.8	0	0	
LG2	0.3	6.3	16.7	0	0	
LG3	0.2	0.3	20.0	0	0	
LG4	0.2	0.9	19.0	0	0	
LG5	0.3	8.4	9.6	0	0	
LG6	0.0	0.1	20.6	0	0	
LG7	0.0	0.0	20.6	0	0	
PZ8	0.3	0.7	20.0	0	0	**Constructed 26/02/12**
PZ9	0.3	0.1	12.1	0	0	**Constructed 26/02/12**
PZ10	0.3	0.2	19.7	0	0	**Constructed 26/02/12**

LANDFILL GAS MONITORING FORM

Facility Name: Drogheda Landfill **Waste Licence no**.:	**Facility Address:** Mell Drogheda	
Licensee: Drogheda Borough Council		
Date of licensing:	**Date of sampling:30/04/12**	**Time of sampling: 09.30**
Instrument used: Geotechnical Instruments GA2000	**Date Next Full Calibration:** June 2012 **Last Field Calibration:** (include date and gases)	
Monitoring Personnel: Shane Boylan	**Weather:** Overcast, Wet, Windy	**Barometric pressure:** (e.g. 1001-1003 mbar rising) 1008 **Mean temperature:**

Results [1]

Sample Station Number	CH_4 (%v/v)	CO_2 (% v/v)	O_2 (% v/v)	CO ppm	H_2S ppm	Comments
GW 1	17.8	18.4	8.5	0	0	Manifold 1
GW 2	18.0	18.8	7.9	0	0	Manifold 1
GW 3	17.6	17.8	8.8	0	0	Manifold 1
GW 4	23.4	23.3	3.2	0	0	Manifold 1
GW 5	19.4	19.5	6.7	0	0	Manifold 1
GW 6	33.9	28.4	0.0	0	3	Manifold 1
GW 7	27.2	20.4	1.8	0	0	Manifold 1
GW 8	19.3	12.9	6.6	0	0	Manifold 1
GW 9	23.0	23.7	4.4	0	0	Manifold 1
GW 10	1.6	12.7	16.5	0	0	Manifold 1
GW 11	17.0	22.1	2.8	0	6	Manifold 1
GW 12	29.0	27.2	0.0	0	15	Manifold 1
GW 13	0.4	0.9	20.2	0	0	Manifold 2
GW 14	0.4	0.1	21.0	0	0	Manifold 2
GW 15	24.7	27.0	0.0	0	12	Manifold 2
GW 16	25.9	27.1	0.3	0	5	Manifold 2
GW 17	30.3	25.8	2.8	0	61	Manifold 2
GW 18	45.7	31.4	0.0	0	39	Manifold 2
GW 19	33.7	25.6	4.2	0	1	Manifold 2
GW 20	33.5	25.9	4.4	0	5	Manifold 2
GW 21	5.6	18.2	1.2	0	0	Manifold 2
GW 22	10.2	18.5	13.9	0	0	Manifold 2
GW 23	35.4	23.1	6.4	0	0	Manifold 2
GW 24	50.1	29.8	4.5	0	13	Manifold 2

General Comments

Note:

LANDFILL GAS MONITORING FORM						
Facility Name: Drogheda Landfill **Waste Licence no**.:					**Facility Address:** Mell Drogheda	
Licensee: Drogheda Borough Council						
Date of licensing:					**Date of sampling:**	**Time of sampling:**
Instrument used: Geotechnical Instruments GA2000					**Date Next Full Calibration:** **Last Field Calibration:** (include date and gases)	
Monitoring Personnel:					**Weather:**	**Barometric pressure:** (e.g. 1001-1003 mbar rising) **Mean temperature:**
Results [1]						
Sample Station Number	CH_4 (%v/v)	CO_2 (% v/v)	O_2 (% v/v)	CO ppm	H_2S ppm	Comments
GW 25	23.9	20.1	6.1	0	0	Manifold 3
GW 26	21.1	18.5	7.7	0	0	Manifold 3
GW 27	21.5	18.6	7.4	0	1	Manifold 3
GW 28	1.8	3.0	18.3	36	0	Manifold 3
GW 29	18.8	17.9	7.9	0	1	Manifold 3
GW 30	20.5	18.4	7.7	0	0	Manifold 3
GW 31	7.7	4.1	16.7	33	0	Manifold 3
GW 32	18.6	18.0	8.0	0	0	Manifold 3
GW 33	17.6	16.9	8.8	0	1	Manifold 3
GW 34	16.8	16.2	9.3	0	0	Manifold 3
GW 35	0.4	0.8	20.1	0	0	Manifold 4
GW 36	17.3	15.6	9.7	0	0	Manifold 4
GW 37	0.3	0.1	20.2	0	0	Manifold 4
GW 38	18.1	17.6	8.2	0	0	Manifold 4
GW 39	0.4	0.2	20.2	0	0	Manifold 4
GW 40	18.8	18.0	6.7	0	0	Manifold 4
GW 41	18.4	17.6	7.5	0	0	Manifold 4
GW 42	17.5	16.8	8.4	0	0	Manifold 4
GW 43	1.2	2.3	15.0	0	0	Manifold 4
GW 44	0.7	3.5	14.7	0	0	Manifold 4
GW 45	16.5	12.5	12.6	0	0	Manifold 5
GW 46	16.5	12.2	12.7	0	0	Manifold 5
GW 47	17.5	13.1	12.1	0	0	Manifold 5
GW 48	22.2	17.3	9.1	0	0	Manifold 5

General Comments

Note:

LANDFILL GAS MONITORING FORM

Facility Name: Drogheda Landfill **Waste Licence no**.: **Licensee:** Drogheda Borough Council	**Facility Address:** Mell Drogheda	
Date of licensing:	**Date of sampling:**	**Time of sampling:**
Instrument used: Geotechnical Instruments GA2000	**Date Next Full Calibration:** **Last Field Calibration:** (include date and gases)	
Monitoring Personnel:	**Weather:**	**Barometric pressure:** (e.g. 1001-1003 mbar rising) **Mean temperature:**

Results [1]

Sample Station Number	CH_4 (%v/v)	CO_2 (% v/v)	O_2 (% v/v)	CO ppm	H_2S ppm	Comments
GW 49	18.8	14.1	11.3	0	0	Manifold 5
GW 50	19.4	14.5	11.1	0	0	Manifold 5
GW 51	22.0	16.8	9.3	0	0	Manifold 5
GW 52	0.5	0.6	19.7	0	0	Manifold 5
GW 53	22.9	17.4	9.3	0	0	Manifold 5
GW 54	21.0	16.4	9.7	0	0	Manifold 5
BH1A	0.2	0.3	20.8	0	0	31.953m A.O D Top of Cover
BH2A	0.3	0.1	21.4	0	0	32.362m A.O.D Top of Cover
BH3A	0.4	3.2	18.2	0	0	33.664m A.O.D Top of Cover
BH4A	0.3	0.1	21.5	0	0	33.570m A.O.D Top of Cover
BH5A	0.3	0.1	21.4	0	0	36.130m A.O.D Top of Cover
BH6A	0.3	0.1	21.3	0	0	35.951m A.O.D Top of Cover
BH7A	0.3	0.1	21.5	0	0	25.172m A.O.D Top of Cover
BH8A	0.4	1.0	21.0	0	0	36.151m A.O.D Top of Cover
BH9A	0.3	0.1	21.4	0	0	34.345m A.O.D Top of Cover
BH10A	0.3	0.1	21.4	0	0	32.776m A.O.D Top of Cover
BH11A	0.3	0.1	21.5	0	0	21.715m A.O.D Top of Cover
LG1	0.3	0.1	21.3	0	0	
LG2	0.3	2.6	18.0	0	0	
LG3	0.3	4.5	19.1	0	0	
LG4	0.4	0.1	21.1	0	0	
LG5	0.3	2.0	18.9	0	0	
LG6	0.0	0.0	20.6	0	0	
LG7	0.0	0.1	20.6	0	0	
PZ8	0.3	0.5	17.9	0	0	**Constructed 26/02/12**
PZ9	0.3	0.2	6.8	0	0	**Constructed 26/02/12**
PZ10	0.3	0.7	13.5	0	0	**Constructed 26/02/12**

LANDFILL GAS MONITORING FORM

Facility Name: Drogheda Landfill **Waste Licence no**.:	**Facility Address:** Mell Drogheda	
Licensee: Drogheda Borough Council		
Date of licensing:	**Date of sampling:** 16-05-12	**Time of sampling:** 09.15
Instrument used: Geotechnical Instruments GA2000	**Date Next Full Calibration:** June 2012 **Last Field Calibration:** (include date and gases)	
Monitoring Personnel: Shane Boylan	**Weather:** Dry/Sunny/Overcast	**Barometric pressure:** (e.g. 1001-1003 mbar rising) 1030 **Mean temperature:**

Results [1]

Sample Station Number	CH_4 (%v/v)	CO_2 (% v/v)	O_2 (% v/v)	CO ppm	H_2S ppm	Comments
GW 1	34.6	27.4	0.7	3	0	Manifold 1
GW 2	33.9	27.7	0.7	0	1	Manifold 1
GW 3	35.9	27.2	1.0	1	2	Manifold 1
GW 4	38.7	29.1	0.0	0	4	Manifold 1
GW 5	38.8	29.0	0.1	0	3	Manifold 1
GW 6	29.4	27.3	0.1	0	2	Manifold 1
GW 7	11.9	5.9	12.7	0	0	Manifold 1
GW 8	2.7	1.0	18.3	0	0	Manifold 1
GW 9	20.8	13.2	9.0	0	0	Manifold 1
GW 10	39.7	29.2	0.1	0	0	Manifold 1
GW 11	40.2	29.5	0.2	0	2	Manifold 1
GW 12	40.8	29.4	0.3	0	4	Manifold 1
GW 13	0.6	2.3	17.6	0	0	Manifold 2
GW 14	0.6	0.1	19.8	0	0	Manifold 2 Connector broken
GW 15	44.3	29.9	0.0	0	6	Manifold 2
GW 16	28.3	27.7	0.0	0	4	Manifold 2
GW 17	33.8	28.1	0.0	0	7	Manifold 2
GW 18	38.5	29.9	0.0	0	37	Manifold 2
GW 19	46.2	30.6	0.0	0	0	Manifold 2
GW 20	47.0	30.7	0.0	0	0	Manifold 2
GW 21	18.7	19.8	0.6	0	0	Manifold 2
GW 22	28.3	25.5	1.7	0	0	Manifold 2
GW 23	49.6	31.2	0.0	0	5	Manifold 2
GW 24	49.8	33.2	0.0	0	10	Manifold 2

General Comments

Note:

LANDFILL GAS MONITORING FORM

Facility Name: Drogheda Landfill **Waste Licence no**.:	**Facility Address:** Mell Drogheda	
Licensee: Drogheda Borough Council		
Date of licensing:	**Date of sampling:**	**Time of sampling:**
Instrument used: Geotechnical Instruments GA2000	**Date Next Full Calibration:** **Last Field Calibration:** (include date and gases)	
Monitoring Personnel:	**Weather:**	**Barometric pressure:** (e.g. 1001-1003 mbar rising) **Mean temperature:**

Results [1]

Sample Station Number	CH_4 (%v/v)	CO_2 (% v/v)	O_2 (% v/v)	CO ppm	H_2S ppm	Comments
GW 25	42.3	32.5	0.1	0	6	Manifold 3
GW 26	42.3	32.8	0.0	0	0	Manifold 3
GW 27	41.6	32.4	0.1	0	1	Manifold 3
GW 28	1.9	3.2	17.8	34	0	Manifold 3
GW 29	40.6	33.9	0.0	0	1	Manifold 3
GW 30	49.1	37.6	0.2	0	0	Manifold 3
GW 31	18.3	4.9	16.2	28	0	Manifold 3
GW 32	79.5	42.6	0.0	0	0	Manifold 3
GW 33	>>>	44.5	0.0	0	0	Manifold 3
GW 34	>>>	43.3	0.0	0	0	Manifold 3
GW 35	42.3	1.5	18.6	0	0	Manifold 4
GW 36	>>>	21.2	6.7	0	0	Manifold 4
GW 37	53.4	0.2	20.1	0	0	Manifold 4
GW 38	>>>	19.6	8.7	0	0	Manifold 4
GW 39	46.9	0.2	19.8	0	0	Manifold 4
GW 40	76.1	18.8	1.3	0	0	Manifold 4
GW 41	33.7	10.0	8.0	0	0	Manifold 4
GW 42	23.1	8.3	10.1	0	0	Manifold 4
GW 43	0.0	0.8	19.0	0	0	Manifold 4
GW 44	0.1	0.4	18.6	0	0	Manifold 4
GW 45	7.0	10.4	5.4	0	7	Manifold 5
GW 46	12.3	15.4	0.0	0	3	Manifold 5
GW 47	8.2	15.6	0.0	0	63	Manifold 5
GW 48	3.5	10.1	9.0	0	1	Manifold 5

General Comments

Note:

LANDFILL GAS MONITORING FORM						
Facility Name: Drogheda Landfill **Waste Licence no**.: **Licensee:** Drogheda Borough Council					**Facility Address:** Mell Drogheda	
Date of licensing:					**Date of sampling:**	**Time of sampling:**
Instrument used: Geotechnical Instruments GA2000					**Date Next Full Calibration:** **Last Field Calibration:** (include date and gases)	
Monitoring Personnel:					**Weather:**	**Barometric pressure:** (e.g. 1001-1003 mbar rising) **Mean temperature:**
Results [1]						
Sample Station Number	CH_4 (%v/v)	CO_2 (% v/v)	O_2 (% v/v)	CO ppm	H_2S ppm	Comments
GW 49	24.4	22.2	0.1	0	9	Manifold 5
GW 50	7.2	9.5	13.1	0	0	Manifold 5
GW 51	10.1	11.8	12.6	0	0	Manifold 5
GW 52	0.4	0.6	18.9	0	0	Manifold 5
GW 53	8.5	10.7	12..3	0	0	Manifold 5
GW 54	8.1	10.7	12.6	0	0	Manifold 5
BH1A	0.3	0.3	21.0	0	0	31.953m A.O D Top of Cover
BH2A	0.5	0.1	21.3	0	0	32.362m A.O.D Top of Cover
BH3A	0.6	0.4	20.3	0	0	33.664m A.O.D Top of Cover
BH4A	0.4	0.1	21.3	0	0	33.570m A.O.D Top of Cover
BH5A	0.4	1.6	18.6	0	0	36.130m A.O.D Top of Cover
BH6A	0.4	0.1	21.0	0	0	35.951m A.O.D Top of Cover
BH7A	0.5	0.2	20.3	0	0	25.172m A.O.D Top of Cover
BH8A	0.0	0.1	21.0	0	0	36.151m A.O.D Top of Cover
BH9A	0.3	0.7	20.5	0	0	34.345m A.O.D Top of Cover
BH10A	0.4	0.1	21.0	0	0	32.776m A.O.D Top of Cover
BH11A	0.3	0.1	21.1	0	0	21.715m A.O.D Top of Cover
LG1	0.5	0.1	20.9	0	0	
LG2	0.5	7.2	13.6	0	0	
LG3	0.4	0.5	21.0	0	0	
LG4	0.4	1.9	17.7	0	0	
LG5	0.5	6.5	13.8	0	0	
LG6	0.4	0.2	21.2	0	0	
LG7	0.4	0.1	21.2	0	0	
PZ8	0.5	0.9	21.1	0	0	**Constructed 26/02/12**
PZ9	0.4	0.6	12.9	0	0	**Constructed 26/02/12**
PZ10	0.3	0.4	19.1	0	0	**Constructed 26/02/12**

LANDFILL GAS MONITORING FORM

Facility Name: Drogheda Landfill **Waste Licence no**.:	**Facility Address:** Mell Drogheda	
Licensee: Drogheda Borough Council		
Date of licensing:	**Date of sampling:** **27-06-12**	**Time of sampling:** 09.00
Instrument used: Geotechnical Instruments GA2000	**Date Next Full Calibration:** 06/06/13 **Last Field Calibration:** (include date and gases)	
Monitoring Personnel: Shane Boylan	**Weather:** Overcast	**Barometric pressure:** (e.g. 1001-1003 mbar rising) **Mean temperature:** 1010

Results

Sample Station Number	CH_4 (%v/v)	CO_2 (% v/v)	O_2 (% v/v)	CO ppm	H_2S ppm	Comments
GW 1	40.7	29.5	0.3	5	3	Manifold 1
GW 2	40.5	29.9	0.3	3	4	Manifold 1
GW 3	40.9	29.4	0.3	3	9	Manifold 1
GW 4	40.8	29.6	0.1	6	11	Manifold 1
GW 5	27.7	27.2	0.0	2	6	Manifold 1
GW 6	34.0	27.3	0.0	3	7	Manifold 1
GW 7	39.1	25.4	1.0	4	0	Manifold 1
GW 8	15.8	11.9	7.1	4	0	Manifold 1
GW 9	42.4	29.7	0.1	1	1	Manifold 1
GW 10	43.8	30.3	0.1	4	4	Manifold 1
GW 11	44.1	30.4	0.1	3	6	Manifold 1
GW 12	44.1	30.1	0.1	2	10	Manifold 1
GW 13	44.8	31.1	0.1	5	9	Manifold 2
GW 14	4.5	15.6	0.3	3	0	Manifold 2
GW 15	1.1	3.4	17.9	3	0	Manifold 2
GW 16	56.2	35.1	0.0	5	16	Manifold 2
GW 17	43.8	30.7	0.0	8	68	Manifold 2
GW 18	46.8	30.2	0.1	6	45	Manifold 2
GW 19	50.3	31.2	0.1	7	7	Manifold 2
GW 20	49.9	31.3	0.0	7	11	Manifold 2
GW 21	24.4	22.5	0.4	4	1	Manifold 2
GW 22	0.2	16.0	5.5	0	1	Manifold 2
GW 23	52.9	31.4	0.2	4	6	Manifold 2
GW 24	61.2	37.4	0.1	3	25	Manifold 2

General Comments

Note:

Results						
Sample Station Number	CH_4 (%v/v)	CO_2 (% v/v)	O_2 (% v/v)	CO ppm	H_2S ppm	Comments
GW 25	44.2	31.2	0.3	2	1	Manifold 3
GW 26	44.0	30.9	0.3	6	1	Manifold 3
GW 27	43.5	31.2	0.4	4	4	Manifold 3
GW 28	1.7	3.0	17.9	22	1	Manifold 3
GW 29	43.7	31.1	0.5	1	7	Manifold 3
GW 30	43.4	31.0	0.2	6	1	Manifold 3
GW 31	7.1	4.0	16.6	27	0	Manifold 3
GW 32	44.6	32.0	0.2	8	6	Manifold 3
GW 33	53.2	35.9	0.1	7	7	Manifold 3
GW 34	46.9	32.8	0.1	8	7	Manifold 3
GW 35	0.2	4.6	11.6	4	1	Manifold 4
GW 36	31.6	27.1	0.2	4	7	Manifold 4
GW 37	0.2	0.1	20.2	1	0	Manifold 4
GW 38	29.7	22.7	5.6	0	0	Manifold 4
GW 39	0.3	0.3	20.1	0	1	Manifold 4
GW 40	35.8	30.7	0.2	5	3	Manifold 4
GW 41	33.4	28.7	0.3	1	13	Manifold 4
GW 42	34.3	29.0	0.3	4	19	Manifold 4
GW 43	0.1	3.4	13.0	0	0	Manifold 4
GW 44	0.0	3.7	15.1	0	0	Manifold 4
GW 45	43.6	30.9	0.6	6	1	Manifold 5
GW 46	43.7	33.4	0.2	2	6	Manifold 5
GW 47	40.3	30.8	0.2	6	44	Manifold 5
GW 48	42.2	30.4	0.8	6	3	Manifold 5
GW 49	42.9	31.3	0.5	3	3	Manifold 5
GW 50	43.2	31.3	0.4	6	6	Manifold 5
GW 51	42.1	30.8	0.8	4	2	Manifold 5
GW 52	0.4	1.2	18.9	3	1	Manifold 5

Results						
Sample Station Number	CH_4 (%v/v)	CO_2 (% v/v)	O_2 (% v/v)	CO ppm	H_2S ppm	Comments
GW 53	41.3	30.0	1.0	3	1	Manifold 5
GW 54	41.4	29.8	1.0	4	1	Manifold 5
BH1A	0.1	0.1	20.5	2	0	31.953m A.O D Top of Cover
BH2A	0.2	0.0	20.7	0	0	32.362m A.O.D Top of Cover
BH3A	0.1	0.7	20.0	0	0	33.664m A.O.D Top of Cover
BH4A	0.1	0.8	17.7	0	0	33.570m A.O.D Top of Cover
BH5A	0.1	2.3	16.7	0	1	36.130m A.O.D Top of Cover
BH6A	0.1	0.0	20.8	0	0	35.951m A.O.D Top of Cover
BH7A	0.1	0.2	19.7	2	0	25.172m A.O.D Top of Cover
BH8A	0.1	0.0	20.8	0	0	36.151m A.O.D Top of Cover
BH9A	0.2	0.0	20.7	0	0	34.345m A.O.D Top of Cover
BH10A	0.0	0.0	20.8	2	0	32.776m A.O.D Top of Cover
BH11A	0.1	0.0	20.7	1	0	21.715m A.O.D Top of Cover
LG1	0.1	0.0	20.7	0	0	
LG2	0.2	5.6	13.7	1	0	
LG3	0.1	0.1	20.4	1	1	
LG4	0.1	5.4	11.4	2	0	
LG5	0.1	5.4	11.4	2	0	
LG6	0.4	0.2	21.2	0	0	
LG7	0.4	0.1	21.2	0	0	
PZ8	0.1	0.3	20.3	0	0	Constructed 26/02/12
PZ9	0.1	0.7	14.2	0	0	Constructed 26/02/12
PZ10	0.1	0.2	19.1	2	1	Constructed 26/02/12

LANDFILL GAS MONITORING FORM		
Facility Name: Drogheda Landfill **Waste Licence no**.: **Licensee:** Drogheda Borough Council	**Facility Address:** Mell Drogheda	
Date of licensing:	**Date of sampling: 30/07/12**	**Time of sampling: 08:45**
Instrument used: Geotechnical Instruments GA2000	**Date Next Full Calibration:** 06/06/13 **Last Field Calibration:** (include date and gases)	
Monitoring Personnel: Shane Boylan	**Weather:** Dry/ Sunny	**Barometric pressure:** (e.g. 1001-1003 mbar rising) 1015mb **Mean temperature:**

Results

Sample Station Number	CH_4 (%v/v)	CO_2 (% v/v)	O_2 (% v/v)	CO ppm	H_2S ppm	Comments
GW 1	3.4	103	11.2	0	1	Manifold 1
GW 2	6.0	20.7	2.1	0	0	Manifold 1
GW 3	3.5	9.1	12.6	0	0	Manifold 1
GW 4	0.2	0.0	20.1	0	1	Manifold 1
GW 5	16.3	22.0	1.2	1	4	Manifold 1
GW 6	18.2	23.3	1.0	0	4	Manifold 1
GW 7	0.2	0.5	19.8	0	0	Manifold 1
GW 8	0.2	0.2	19.9	0	0	Manifold 1
GW 9	0.2	0.1	19.8	0	0	Manifold 1
GW 10	0.2	0.7	19.0	0	1	Manifold 1
GW 11	9.9	20.1	3.1	0	6	Manifold 1
GW 12	15.9	23.9	0.8	2	11	Manifold 1
GW 13	0.1	3.5	17.0	1	2	Manifold 2
GW 14	0.5	0.1	18.8	0	0	Manifold 2 Connector broken
GW 15	7.9	20.3	1.3	0	5	Manifold 2
GW 16	20.7	25.0	1.3	0	5	Manifold 2
GW 17	2.9	16.5	4.2	0	1	Manifold 2
GW 18	26.9	26.2	0.1	1	5	Manifold 2
GW 19	1.4	7.2	13.4	1	1	Manifold 2
GW 20	16.3	23.2	0.5	2	1	Manifold 2
GW 21	23.9	21.9	0.4	0	1	Manifold 2
GW 22	0.1	16.9	4.6	0	0	Manifold 2
GW 23	36.5	25.1	3.4	0	14	Manifold 2
GW 24	29.6	22.6	7.5	0	17	Manifold 2

General Comments

Note:

Results						
Sample Station Number	CH_4 (%v/v)	CO_2 (% v/v)	O_2 (% v/v)	CO ppm	H_2S ppm	Comments
GW 25	39.5	33.7	0.1	1	11	Manifold 3
GW 26	28.0	22.7	6.6	0	3	Manifold 3
GW 27	36.7	31.3	1.7	0	6	Manifold 3
GW 28	1.3	3.3	17.6	22	1	Manifold 3
GW 29	35.5	28.8	0.6	2	8	Manifold 3
GW 30	33.3	27.6	2.3	0	2	Manifold 3
GW 31	6.5	4.3	16.3	26	0	Manifold 3
GW 32	0.1	1.0	19.5	0	0	Manifold 3
GW 33	44.6	33.5	1.1	0	5	Manifold 3
GW 34	0.0	0.0	20.2	0	0	Manifold 3
GW 35	0.1	3.3	17.6	0	1	Manifold 4
GW 36	18.2	18.4	5.9	0	8	Manifold 4
GW 37	0.1	0.1	17.4	0	0	Manifold 4
GW 38	35.1	21.1	2.4	0	0	Manifold 4
GW 39	0.1	0.4	19.7	0	0	Manifold 4
GW 40	30.1	29.4	1.1	0	5	Manifold 4
GW 41	24.8	27.7	0.3	0	7	Manifold 4
GW 42	16.1	24.5	0.3	1	0	Manifold 4
GW 43	0.0	2.3	18.5	0	0	Manifold 4
GW 44	0.1	1.3	18.8	0	0	Manifold 4
GW 45	9.7	19.6	3.5	0	4	Manifold 5
GW 46	26.3	22.4	6.8	1	4	Manifold 5
GW 47	25.5	27.7	0.3	0	33	Manifold 5
GW 48	24.2	28.9	0.2	0	9	Manifold 5
GW 49	30.8	28.4	0.0	0	17	Manifold 5
GW 50	17.8	24.6	0.1	0	8	Manifold 5
GW 51	21.7	25.4	0.9	0	11	Manifold 5
GW 52	0.2	1.8	18.1	0	0	Manifold 5

Results						
Sample Station Number	CH_4 (%v/v)	CO_2 (% v/v)	O_2 (% v/v)	CO ppm	H_2S ppm	Comments
GW 53	19.0	22.6	3.3	0	5	Manifold 5
GW 54	15.1	22.3	0.9	0	19	Manifold 5
BH1A	0.1	0.5	19.6	0	0	31.953m A.O D Top of Cover
BH2A	0.0	0.0	20.4	0	0	32.362m A.O.D Top of Cover
BH3A	0.0	0.8	19.7	0	0	33.664m A.O.D Top of Cover
BH4A	0.1	0.1	20.0	0	0	33.570m A.O.D Top of Cover
BH5A	0.2	1.4	18.8	0	0	36.130m A.O.D Top of Cover
BH6A	0.0	0.0	20.8	1	0	35.951m A.O.D Top of Cover
BH7A	0.1	0.0	20.7	0	0	25.172m A.O.D Top of Cover
BH8A	0.0	0.1	20.5	0	0	36.151m A.O.D Top of Cover
BH9A	0.0	0.3	20.4	0	0	34.345m A.O.D Top of Cover
BH10A	0.0	0.0	20.7	0	0	32.776m A.O.D Top of Cover
BH11A	0.1	0.1	20.8	0	0	21.715m A.O.D Top of Cover
LG1	0.1	0.1	20.1	1	0	
LG2	0.2	10.9	8.3	0	0	
LG3	0.2	0.2	20.0	0	0	
LG4	0.0	2.0	18.7	0	0	
LG5	0.1	10.8	8.1	0	0	
LG6	0.4	0.2	21.1	0	0	
LG7	0.3	0.1	21.0	0	0	
PZ8	0.0	1.8	17.4	0	0	Constructed 26/02/12
PZ9	0.0	0.0	21.0	0	0	Constructed 26/02/12
PZ10	0.0	0.8	17.5	0	0	Constructed 26/02/12

LANDFILL GAS MONITORING FORM

Facility Name: Drogheda Landfill **Waste Licence no**.:	**Facility Address:** Mell Drogheda	
Licensee: Drogheda Borough Council		
Date of licensing:	**Date of sampling:** 28-08-12	**Time of sampling:** 8:30
Instrument used: Geotechnical Instruments GA2000	**Date Next Full Calibration: 06/06/12** **Last Field Calibration:** (include date and gases)	
Monitoring Personnel: Shane Boylan	**Weather:** Sunny	**Barometric pressure:** (e.g. 1001-1003 mbar rising) 1004mb **Mean temperature:**

Results

Sample Station Number	CH_4 (%v/v)	CO_2 (% v/v)	O_2 (% v/v)	CO ppm	H_2S ppm	Comments
GW 1	12.3	11.1	12.5	3	0	Manifold 1
GW 2	12.3	11.0	12.2	3	0	Manifold 1
GW 3	12.6	10.6	12.4	0	1	Manifold 1
GW 4	23.8	21.5	4.5	0	2	Manifold 1 CONNECTOR BROKEN
GW 5	11.0	9.6	13.1	0	1	Manifold 1
GW 6	31.4	27.3	0.2	3	3	Manifold 1
GW 7	20.1	21.7	3.3	0	1	Manifold 1
GW 8	20.5	16.8	4.8	1	0	Manifold 1
GW 9	7.5	21.4	8.3	0	1	Manifold 1
GW 10	28.6	26.0	0.7	3	6	Manifold 1
GW 11	26.6	26.2	0.2	4	8	Manifold 1
GW 12	31.3	26.9	0.5	4	10	Manifold 1
GW 13	2.7	20.4	2.2	3	0	Manifold 2
GW 14	2.3	9.3	11.1	0	1	Manifold 2 CONNECTOR BROKEN
GW 15	47.8	33.5	1.0	4	1	Manifold 2
GW 16	38.4	27.5	3.3	3	15	Manifold 2
GW 17	34.6	24.6	25.1	3	19	Manifold 2
GW 18	50.3	32.5	0.3	0	43	Manifold 2
GW 19	37.5	27.3	3.6	2	6	Manifold 2
GW 20	39.3	29.0	3.1	2	6	Manifold 2
GW 21	8.3	19.0	0.9	0	0	Manifold 2
GW 22	0.1	18.7	1.7	1	0	Manifold 2
GW 23	41.8	31.3	2.7	2	8	Manifold 2
GW 24	50.0	34.3	2.3	1	12	Manifold 2

General Comments

Note:

Results						
Sample Station Number	CH_4 (%v/v)	CO_2 (% v/v)	O_2 (% v/v)	CO ppm	H_2S ppm	Comments
GW 25	10.0	8.2	14.9	1	0	Manifold 3
GW 26	12.3	9.8	14.4	0	0	Manifold 3
GW 27	12.4	9.7	14.0	0	0	Manifold 3
GW 28	1.2	3.2	18.3	17	0	Manifold 3
GW 29	9.5	8.0	15.3	0	0	Manifold 3
GW 30	12.1	9.7	14.1	0	0	Manifold 3
GW 31	6.7	4.2	16.7	33	0	Manifold 3
GW 32	10.5	9.1	14.4	1	0	Manifold 3
GW 33	10.2	8.3	14.8	0	0	Manifold 3
GW 34	9.8	7.9	15.2	0	0	Manifold 3
GW 35	0.1	3.4	16.6	0	0	Manifold 4
GW 36	10.7	7.9	15.3	0	0	Manifold 4
GW 37	0.1	0.0	21.0	0	0	Manifold 4
GW 38	11.0	8.4	15.1	0	1	Manifold 4
GW 39	0.2	0.3	20.5	2	0	Manifold 4
GW 40	10.9	8.4	15.0	0	0	Manifold 4
GW 41	10.9	8.4	15.1	0	0	Manifold 4
GW 42	10.8	8.4	15.0	0	0	Manifold 4
GW 43	0.1	2.0	18.4	0	0	Manifold 4
GW 44	0.1	1.9	18.2	2	0	Manifold 4
GW 45	24.3	19.8	7.4	2	0	Manifold 5
GW 46	23.0	18.9	8.0	1	0	Manifold 5
GW 47	24.3	19.8	7.3	5	0	Manifold 5
GW 48	24.1	19.5	7.6	3	0	Manifold 5
GW 49	25.8	20.8	6.8	0	1	Manifold 5
GW 50	24.2	19.5	7.3	3	0	Manifold 5
GW 51	24.7	20.1	7.3	0	0	Manifold 5
GW 52	0.2	1.9	18.5	3	0	Manifold 5

Results						
Sample Station Number	CH_4 (%v/v)	CO_2 (% v/v)	O_2 (% v/v)	CO ppm	H_2S ppm	Comments
GW 53	24.4	19.6	7.5	0	0	Manifold 5
GW 54	24.7	20.3	7.2	0	0	Manifold 5
BH1A	0.1	0.2	20.4	1	0	31.953m A.O D Top of Cover
BH2A	0.2	0.0	20.7	0	0	32.362m A.O.D Top of Cover
BH3A	0.0	0.2	20.3	0	0	33.664m A.O.D Top of Cover
BH4A	0.0	0.0	20.8	1	0	33.570m A.O.D Top of Cover
BH5A	0.1	2.7	15.2	0	0	36.130m A.O.D Top of Cover
BH6A	0.0	0.0	20.8	0	0	35.951m A.O.D Top of Cover
BH7A	0.1	0.0	20.8	0	0	25.172m A.O.D Top of Cover
BH8A	0.0	0.0	20.9	0	0	36.151m A.O.D Top of Cover
BH9A	0.0	0.8	20.0	1	0	34.345m A.O.D Top of Cover
BH10A	0.0	0.0	20.8	0	0	32.776m A.O.D Top of Cover
BH11A	0.0	0.1	20.8	1	0	21.715m A.O.D Top of Cover
LG1	0.1	0.1	20.5	0	0	
LG2	0.7	4.4	16.6	0	0	
LG3	0.2	0.4	20.4	0	0	
LG4	0.0	8.0	14.3	0	0	
LG5	0.0	0.1	20.4	0	0	
LG6	0.4	0.1	21.2	0	0	
LG7	0.3	0.1	21.1	0	0	
PZ8	0.0	2.5	14.9	0	0	Constructed 26/02/12
PZ9	0.0	1.3	13.2	0	0	Constructed 26/02/12
PZ10	0.0	0.3	19.2	0	0	Constructed 26/02/12

LANDFILL GAS MONITORING FORM

Facility Name: Drogheda Landfill **Waste Licence no.:**	**Facility Address:** Mell Drogheda	
Licensee: Drogheda Borough Council		
Date of licensing:	**Date of sampling:** 23/10/12	**Time of sampling:** 08:45
Instrument used: Geotechnical Instruments GA2000	**Date Next Full Calibration:** 06/06/13 **Last Field Calibration:** (include date and gases)	
Monitoring Personnel: Shane Boylan	**Weather:** Wet/overcast	**Barometric pressure:** (e.g. 1001-1003 mbar rising) 1027mb **Mean temperature:**

Results

Sample Station Number	CH_4 (%v/v)	CO_2 (% v/v)	O_2 (% v/v)	CO ppm	H_2S ppm	Comments
GW 1	27.0	18.4	2.8	2	0	Manifold 1
GW 2	25.2	24.0	3.3	0	0	Manifold 1
GW 3	25.6	23.8	3.7	1	0	Manifold 1
GW 4	27.1	26.8	1.2	0	0	Manifold 1
GW 5	27.1	25.3	2.1	2	0	Manifold 1
GW 6	26.8	27.0	0.1	0	0	Manifold 1
GW 7	16.9	12.4	2.1	0	0	Manifold 1
GW 8	10.9	9.5	6.6	0	0	Manifold 1
GW 9	24.9	21.0	5.1	0	0	Manifold 1
GW 10	27.0	26.1	1.7	0	0	Manifold 1
GW 11	27.3	26.8	1.3	1	0	Manifold 1
GW 12	25.8	26.8	0.2	0	2	Manifold 1
GW 13	0.3	3.5	14.4	1	0	Manifold 2
GW 14	0.4	1.5	17.3	2	0	Manifold 2 Broken Connector
GW 15	46.4	32.0	1.9	1	2	Manifold 2
GW 16	47.3	31.9	1.9	1	2	Manifold 2
GW 17	47.3	32.4	1.6	3	3	Manifold 2
GW 18	42.9	30.9	0.2	3	9	Manifold 2
GW 19	46.6	32.2	1.7	0	0	Manifold 2
GW 20	47.4	32.2	1.9	0	0	Manifold 2
GW 21	15.9	22.1	0.2	1	0	Manifold 2
GW 22	0.3	20.0	2.5	1	0	Manifold 2
GW 23	47.2	28.8	4.6	0	1	Manifold 2
GW 24	59.0	37.6	0.4	0	6	Manifold 2

General Comments

Note:

Results						
Sample Station Number	CH_4 (%v/v)	CO_2 (% v/v)	O_2 (% v/v)	CO ppm	H_2S ppm	Comments
GW 25	25.1	18.2	10.3	3	0	Manifold 3
GW 26	18.9	13.3	13.0	0	0	Manifold 3
GW 27	15.6	10.4	14.2	0	0	Manifold 3
GW 28	1.3	3.3	17.9	11	0	Manifold 3
GW 29	5.7	3.9	18.2	0	0	Manifold 3
GW 30	17.1	11.3	13.4	2	0	Manifold 3
GW 31	7.4	4.9	16.0	29	0	Manifold 3
GW 32	15.7	13.0	12.6	0	0	Manifold 3
GW 33	5.0	3.4	18.5	0	0	Manifold 3
GW 34	5.5	3.6	18.3	0	0	Manifold 3
GW 35	0.2	2.5	17.9	0	0	Manifold 4
GW 36	10.3	7.4	16.3	0	0	Manifold 4
GW 37	0.2	0.1	20.2	0	0	Manifold 4
GW 38	9.3	6.8	16.7	0	0	Manifold 4
GW 39	0.2	0.5	19.8	0	0	Manifold 4
GW 40	8.7	6.3	16.9	0	0	Manifold 4
GW 41	9.1	6.5	16.6	0	0	Manifold 4
GW 42	8.5	6.1	16.9	0	0	Manifold 4
GW 43	0.2	1.7	18.2	0	0	Manifold 4
GW 44	0.2	2.1	17.6	0	0	Manifold 4
GW 45	15.4	14.5	11.3	1	0	Manifold 5
GW 46	44.1	35.1	0.1	1	4	Manifold 5
GW 47	14.2	14.0	11.5	0	0	Manifold 5
GW 48	21.8	20.6	6.9	0	0	Manifold 5
GW 49	12.6	12.5	12.4	0	0	Manifold 5
GW 50	12.5	12.6	12.1	0	0	Manifold 5
GW 51	19.8	18.6	7.9	0	0	Manifold 5
GW 52	0.4	1.6	18.7	0	0	Manifold 5

Results						
Sample Station Number	CH_4 (%v/v)	CO_2 (% v/v)	O_2 (% v/v)	CO ppm	H_2S ppm	Comments
GW 53	18.9	18.3	8.2	0	0	Manifold 5
GW 54	18.9	18.5	8.0	0	0	Manifold 5
BH1A	0.2	0.1	20.5	0	0	31.953m A.O D Top of Cover
BH2A	0.2	0.0	20.8	0	0	32.362m A.O.D Top of Cover
BH3A	0.1	0.5	19.9	0	0	33.664m A.O.D Top of Cover
BH4A	0.2	1.8	15.3	0	0	33.570m A.O.D Top of Cover
BH5A	0.2	1.9	17.1	0	0	36.130m A.O.D Top of Cover
BH6A	0.1	0.0	20.8	0	0	35.951m A.O.D Top of Cover
BH7A	0.1	0.0	20.7	2	0	25.172m A.O.D Top of Cover
BH8A	0.2	1.1	19.3	0	0	36.151m A.O.D Top of Cover
BH9A	0.1	0.1	20.8	0	0	34.345m A.O.D Top of Cover
BH10A	0.2	0.1	20.5	0	0	32.776m A.O.D Top of Cover
BH11A	0.1	0.2	20.8	0	0	21.715m A.O.D Top of Cover
LG1	0.1	0.2	20.1	0	0	
LG2	0.3	7.6	13.5	0	0	
LG3	0.3	0.4	20.4	0	0	
LG4	0.1	0.9	19.7	0	0	
LG5	0.2	0.0	20.7	0	0	
LG6	0.2	0.0	20.8	0	0	
LG7						Broken cannot read
PZ8	0.2	1.6	18.2	0	0	Constructed 26/02/12
PZ9	0.1	0.0	20.8	0	0	Constructed 26/02/12
PZ10	0.2	0.4	18.6	0	0	Constructed 26/02/12

LANDFILL GAS MONITORING FORM		
Facility Name: Drogheda Landfill **Waste Licence no.:** **Licensee:** Drogheda Borough Council	**Facility Address:** Mell Drogheda	
Date of licensing:	**Date of sampling:** 27/11/12	**Time of sampling:** 08:40
Instrument used: Geotechnical Instruments GA2000	**Date Next Full Calibration:** 06/06/13 **Last Field Calibration:** (include date and gases)	
Monitoring Personnel: Shane Boylan	**Weather:** Wet/Windy & Cold	**Barometric pressure:** (e.g. 1001-1003 mbar rising) 1014 **Mean temperature:**

Results

Sample Station Number	CH_4 (%v/v)	CO_2 (% v/v)	O_2 (% v/v)	CO ppm	H_2S ppm	Comments
GW 1	5.1	20.8	3.2	0	0	Manifold 1
GW 2	5.1	21.1	3.4	0	0	Manifold 1
GW 3	9.5	9.3	12.0	0	0	Manifold 1
GW 4	0.5	1.7	18.4	0	1	Manifold 1
GW 5	26.8	24.1	1.9	1	4	Manifold 1
GW 6	26.0	25.5	1.6	0	3	Manifold 1
GW 7	0.2	1.0	20.3	0	0	Manifold 1
GW 8	0.2	0.4	20.5	0	0	Manifold 1
GW 9	0.2	0.1	20.7	0	0	Manifold 1
GW 10	0.2	0.3	20.0	0	0	Manifold 1
GW 11	15.0	23.6	1.8	0	6	Manifold 1
GW 12	22.9	24.9	1.5	0	6	Manifold 1
GW 13	0.3	2.2	17.4	0	1	Manifold 2
GW 14						Manifold 2 Connector broken
GW 15	22.0	21.2	4.6	0	1	Manifold 2
GW 16	27.8	27.1	0.9	0	3	Manifold 2
GW 17	6.9	18.0	6.2	2	0	Manifold 2
GW 18	20.7	27.8	0.3	2	1	Manifold 2
GW 19	27.2	26.6	1.3	0	0	Manifold 2
GW 20	27.3	26.7	0.5	0	0	Manifold 2
GW 21	16.5	20.2	2.0	0	0	Manifold 2
GW 22	0.2	18.1	3.0	0	0	Manifold 2
GW 23	23.8	14.9	10.8	0	2	Manifold 2
GW 24	30.9	23.0	8.2	1	10	Manifold 2

General Comments

Note:

Results						
Sample Station Number	CH_4 (%v/v)	CO_2 (% v/v)	O_2 (% v/v)	CO ppm	H_2S ppm	Comments
GW 25	19.2	35.2	0.6	0	8	Manifold 3
GW 26	40.2	29.1	4.0	2	3	Manifold 3
GW 27	42.2	30.6	3.2	0	5	Manifold 3
GW 28	1.6	4.1	17.5	14	0	Manifold 3
GW 29	42.2	29.3	1.3	0	4	Manifold 3
GW 30	38.6	27.1	3.2	0	1	Manifold 3
GW 31	7.2	5.1	16.2	31	0	Manifold 3
GW 32	0.3	0.6	20.4	0	0	Manifold 3
GW 33	46.4	32.6	2.6	0	1	Manifold 3
GW 34	0.2	0.0	21.1	0	0	Manifold 3
GW 35	0.2	1.0	20.3	0	0	Manifold 4
GW 36	21.0	17.8	6.9	0	3	Manifold 4
GW 37	0.2	0.1	20.8	0	0	Manifold 4
GW 38	30.8	17.9	5.0	0	0	Manifold 4
GW 39	0.3	0.5	20.3	0	0	Manifold 4
GW 40	37.8	32.2	0.5	0	3	Manifold 4
GW 41	29.6	29.6	0.3	0	5	Manifold 4
GW 42	20.6	25.1	0.5	1	1	Manifold 4
GW 43	0.1	1.4	19.4	0	0	Manifold 4
GW 44	0.2	0.8	20.4	0	0	Manifold 4
GW 45	12.6	20.0	2.5	2	2	Manifold 5
GW 46	26.9	21.0	8.6	3	2	Manifold 5
GW 47	33.1	29.3	0.8	0	6	Manifold 5
GW 48	32.2	30.4	0.6	0	8	Manifold 5
GW 49	35.9	28.9	0.8	0	6	Manifold 5
GW 50	23.5	25.0	0.4	0	4	Manifold 5
GW 51	27.0	26.5	1.0	0	6	Manifold 5
GW 52	0.3	2.0	18.5	0	0	Manifold 5

Results						
Sample Station Number	CH_4 (%v/v)	CO_2 (% v/v)	O_2 (% v/v)	CO ppm	H_2S ppm	Comments
GW 53	24.7	23.8	3.0	0	2	Manifold 5
GW 54	17.5	22.4	1.1	0	1	Manifold 5
BH1A	0.2	0.3	20.2	0	0	31.953m A.O D Top of Cover
BH2A	0.1	0.4	20.3	0	0	32.362m A.O.D Top of Cover
BH3A	0.1	0.5	20.1	0	0	33.664m A.O.D Top of Cover
BH4A	0.1	0.4	20.3	0	0	33.570m A.O.D Top of Cover
BH5A	0.2	1.5	17.3	0	0	36.130m A.O.D Top of Cover
BH6A	0.1	0.3	20.4	0	0	35.951m A.O.D Top of Cover
BH7A	0.2	0.0	20.8	0	0	25.172m A.O.D Top of Cover
BH8A	0.1	0.0	19.9	0	0	36.151m A.O.D Top of Cover
BH9A	0.2	0.9	20.1	0	0	34.345m A.O.D Top of Cover
BH10A	0.1	0.7	19.6	0	0	32.776m A.O.D Top of Cover
BH11A	0.1	0.3	21.2	0	0	21.715m A.O.D Top of Cover
LG1	0.2	0.1	20.6	0	0	
LG2	0.2	0.3	20.5	0	0	
LG3	0.1	0.2	20.4	0	0	
LG4	0.2	0.5	20.5	0	0	
LG5	0.6	17.3	2.5	0	0	
LG6	0.2	0.0	20.8	0	0	
LG7						BROKEN CANNOT READ
PZ8	0.1	2.1	17.8	0	0	Constructed 26/02/12
PZ9	0.0	0.0	19.8	0	0	Constructed 26/02/12
PZ10	0.3	0.1	19.1	0	0	Constructed 26/02/12