



ANNUAL ENVIRONMENTAL REPORT

January - December 2013

For

Dundalk Landfill Site

Co. Louth

Waste Licence Reference W0034-02

By

Dundalk Town Council

To

Environmental Protection Agency



**DUNDALK LANDFILL & RECYCLING CENTRE
(W0034-02)**

ANNUAL ENVIRONMENTAL REPORT

JANUARY – DECEMBER 2013

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1.0 INTRODUCTION

This Annual Environmental Report (AER) has been prepared to meet the requirements of Waste Licence W0034-02 for Dundalk Landfill.

The site is owned by Dundalk Town Council and is located at Newry Road, Dundalk. It is situated on the northern bank of the Castletown River in an area of intertidal mudflats. The northern boundary of the site adjoins low lying and poorly drained agricultural lands. Residential and industrial properties adjoin the western boundary of the site.

Dundalk Landfill Site has been in operation since 1980. In 2000 Dundalk Town Council submitted an application to the Environmental Protection Agency (EPA) for the continued operation of the landfill site, as required by the Waste Management (Licensing) Regulations 1997. The landfill site ceased to accept waste in October 2002.

In March 2005, the EPA granted the Council a revised Waste Licence (registration number W0034-02) for the facility, in accordance with the Third and Fourth Schedule of the Waste Management Act, 1996-2003.

A hydrogeological study¹ was undertaken in accordance with Condition 4.14 of the Waste Licence W0034-01 in 2004 to develop a leachate management system at the site. The report recommended that the Best Practicable Environmental Option for the remediation of Dundalk landfill is the capping of the landfill with a low permeability liner augmented by monitored natural attenuation. Groundwater remediation of the Quaternary gravel aquifer impacted by Dundalk landfill leachate is reliant on both the landfill capping intervention and on monitored in-situ natural attenuation processes. Discharge into the Northern Stream will reduce following capping of the site owing the reduction of the leachate head within the waste.

The landfill site was restored in 2006. Works include installation of capping layer, provision of storm water drainage, leachate collection trench, provision of gas collection system, provision of gas flare, grading of site to provide for future football pitches and the provision of access road.

Gas abstraction system provided on site includes for a Gas collection layer under the impermeable layer of capping material which provides a path of least resistance to the 47 No boreholes laid out on a grid system over the main body of the site. The boreholes are connected via 63mm. diameter pipework to a 250mm diameter main gas collection pipe which transfers the gas collected, under suction, provided by compressor, and to the 600 m³ enclosed Flare Unit. A SCADA system and Programmable Logic Controller produces data which is available by download weekly or by telephone from council offices. The boreholes in the area of historical fill adjoining the rear of Hardy's Grainstore have also been attached to the active gas collection system.

1.1 REPORT PERIOD

The reporting period of this report refers to January to December 2013. The landfill site ceased to accept waste in October 2002. A Recycling Centre is currently in operation at the facility.

¹ Proposal for leachate management, July 2004. RPS MCOS.

2.0 WASTE ACTIVITIES CARRIED OUT AT THE FACILITY

Waste is no longer accepted at the landfill facility except for restoration purposes. The maximum tonnage of waste to be accepted at the Recycling Centre is 20,000 tonnes per annum in accordance with Table A1 of the Waste Licence.

The waste intake at the Recycling Centre is limited to 20,000 tonnes per annum of municipal waste and construction and demolition waste. The licence also allows composting of biodegradable waste and green waste to 4,000 tonnes per annum.

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

- Class 11** **Blending or mixture prior to submission to any activity referred to in a preceding paragraph of this Schedule.**
- Class 12** **Repackaging prior to submission to any activity referred to in a preceding paragraph of this Schedule.**
- 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 any 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 collection, 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

3.1 LANDFILL

Dundalk Landfill Site was in operation for the acceptance of waste for disposal from 1980 until 2002. The site ceased to accept waste for disposal in October 2002 and waste was only brought on site for restoration purposes after this date. Waste data figures are derived from estimates and weighbridge readings. These figures are shown in Table 3.1.

Table 3.1 Waste Quantities Accepted (Tonnes) at Landfill2

Waste Types	1997	1998	1999	2000	2001	2002	2003	2004
Total	37,060	37,560	38,000	36,000	32,000	32,420	27,417	3,018

3.2 RECYCLING CENTRE

The Recycling Centre is open;

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

In accordance with Condition 5 of the waste licence only those waste types and quantities listed in Schedule A shall be disposed of at the facility unless prior agreement from the Agency has been obtained. The maximum annual tonnage of individual waste categories for acceptance to the site is listed in Schedule A of the Waste Licence.

The following are accepted at the Recycling Centre;

- mixed residual waste
- cardboard
- glass
- magazines/newspaper
- building rubble
- plastics
- clothing/textiles

² 1997-2001 figures based on estimates.

- green/garden waste
- wood
- aluminium cans/steel cans
- domestic appliances
- batteries
- electrical appliances
- scrap metal
- waste engine oil
- waste cooking oil

The quantity of waste received during the reporting period at the recycling facility is 8,549 tonnes. The figures are taken from National Waste Report 2012 Survey.

478 tonnes of mixed residual waste arising from members of the public was accepted for disposal at the recycling facility. Building Rubble (945 tonnes), wood packaging (540 tonnes) and wood non-packaging (580 tonnes) accepted at Dundalk recycling facility was also sent to Whiteriver Landfill Site where it was recovered. The remaining waste was recovered on or off site as listed in Table 3.2. 2,665 tonnes of garden and park waste from municipal sources (landscapers, householders etc.) was composted onsite. 1,620 tonnes of compost was produced in 2012. Compost analysis has been undertaken and is detailed in Section 5.12.

WEEE is collected by ERP from the recycling facility from the compliance schemes.

Table 3.2 Waste Quantities Accepted for Disposal and Recovery (Tonnes) at CWF3

Material Type	EWC Codes		Tonnage	Name of Destination Facility(ies), or Collector(s) If Directly Exported	Disposal Or Recovery "D" or "R" or "Both"
Mixed residual waste	20 03 01		318 + 130	Whiteriver Landfill W0060-03 and Indaver Incinerator W0167-02	D
Garden	20 02 01	Garden and park waste from municipal sources (landscapers, householders etc.)	2,607	Dundalk town council W0034-02	R
Cardboard packaging	15 01 01		838	Peute Europe NL-Z11501531VIHX	R
Newspaper and magazines	20 01 01		400	Peute Europe NL-Z11501531VIHX	R
Glass packaging	15 01 07		415	Glasson NI LN06/08	R
Metals	15 01 04		11	Tinnelly NI LN/0910	R
	15 01 01		29	Tinnelly NI LN/0910	R
	20 01 40		286	Tinnelly NI LN/0910	R
Plastic packaging	15 01 02		557	Shabra Plastics MN/080022-01	R
Textiles, non-packaging	20 01 11		23	Cookstown N.I wmex01/11	R
Wood packaging	15 01 03		446	Whiteriver Landfill W0060-03	R

³ National Waste Report 2013 Survey.

Material Type	EWC Codes		Tonnage	Name of Destination Facility(ies), or Collector(s) If Directly Exported	Disposal Or Recovery "D" or "R" or "Both"
Wood non-packaging	20 01 38		510	Whiteriver Landfill W0060-03	R
Lead acid batteries and accumulators	16 06 01*	non-portable (automotive and industrial)	8	Rilta W0192-02	R
Waste mineral oils	13 02 05*	lubrication, vehicle, machine, etc.	6.54	Enva Portlaoise (W0184-01)	R
Waste paint and varnish (including containers)	20 01 27		3.86	Enva Portlaoise (W0184-01)	R
Building Rubble	17 01 07		1,067	Whiteriver Landfill W0060-03	R
Total			7,655.4		

4.0 SUMMARY REPORT ON EMISSIONS

4.1 EMISSIONS TO SEWER

4.1.1 Discharge Point (From Landfill Site)

A leachate collection trench has been constructed on the southern slope of the landfill. The trench is lined on the estuary side of the trench and also to a level of 3.65mOD on the landfill side of the trench. The trench is connected to the foul sewer running along the western boundary of the site. Zero flow has been measured to date. The flow monitoring device has been removed from this trench as agreed with the EPA.

4.1.2 Discharge Point (from recycling facility)

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 has been completed for Dundalk landfill site and submitted to the EPA.

S1 is the sewer discharge monitoring location at manhole No 2, adjacent to weighbridge. This monitors run-off from the Recycling Centre and Material Recovery Facility and discharge from the composting facility. The estimated flow to sewer from this area is 1,600 m³. Reportable emissions for this location as per PRTR requirement are;

- Ammonia (NH₃)
- BOD
- COD
- Suspended solids
- Sulphate

4.2 EMISSIONS TO GROUNDWATER AND SURFACE WATER

There are no direct emissions to groundwater or surface water. A water balance calculation has been completed for Dundalk landfill site and is presented in Appendix A. The site is unlined and an area of approximately 79,000 m² has been capped. There is no active leachate extraction system on the site. Infiltrations in restored areas are in the range of 2-10% of effective rainfall. This equate to 1,207 m³ to 6,035 m³ of leachate produced.

4.3 EMISSIONS TO AIR

4.3.1 Composting and Biofilter Emissions

Compost analysis and biofilter emission monitoring has been undertaken during the reporting period. These are discussed in section 5.13 and 5.14.

4.3.2 Flare Emissions

The PRTR reporting and landfill gas survey have been completed for Dundalk landfill site and submitted to the EPA. The PRTR is including in Appendix B.

A 600m³ flare was installed at Dundalk Landfill Site. This was downsized in 2013 to a 300m³ flare.

Based on model predications and information from the landfill gas flare the estimated net emission of methane from the flare combustion process and both surface and lateral emissions from the landfill body is 75,822 kg/year (Table 4.1).

Table 4.1 Net Methane Emission

Quantities of Methane Flared and / or Utilised	T (Total) kg/Year
Total estimated methane generation (as per site model)	262,043.0
Methane flared	186,221.0
Methane utilised in engine/s	0.0
Net Methane Emission	75,822.0

Flue gas monitoring was also undertaken on the permanent landfill gas flare. All monitoring was carried out in accordance with Environmental Protection Agency Office of Environmental Enforcement (OEE) Air Emission Monitoring Guidance Note 2 (AG2). This report is available on site for inspection. NO_x as NO₂ emissions from the flare were within the emission limit values specified in Waste licence W0034-02.

5.0 SUMMARY OF RESULTS AND INTERPRETATIONS OF ENVIRONMENTAL MONITORING, INCLUDING LOCATION PLAN OF ALL MONITORING LOCATIONS

5.1 MONITORING LOCATIONS

Monitoring is carried out at locations and frequencies as specified in Schedules D of the waste licence. Monitoring points are labelled and permanent access to all monitoring points is maintained. The following parameters form the monitoring programme;

- Groundwater Quality
- Groundwater Levels
- Surface Water Quality
- Leachate Quality
- Leachate Levels
- Landfill Gas

All ditches and drains around the perimeter of the facility are kept clear to allow for surface water monitoring points to be maintained.

All monitoring points are detailed in Drawing Monitoring Locations as shown in Appendix C.

5.2 LEACHATE QUALITY

Leachate quality can vary during the lifetime of landfill sites depending on the phase of decomposition of the waste. Leachate results for the reporting period are presented in Appendix D and some of the characteristic parameters of the leachate are listed in Table 5.1

Raw leachate results have been compared to “Typical Leachate Composition of 30 Samples from UK/Irish Landfills accepting mainly Domestic Waste” (Landfill Operational Practices). As can be seen from the Table 5.2 all of the parameters are below the maximum concentration.

Table 5.1 Raw Leachate Concentrations

Parameters	Units	No. of Samples	Minimum	Maximum	Mean	Standard Deviation
Alkalinity	mg/l CaCO ₃					
Aluminium	µg/l	4	<5	8.3		
Ammonia	mg/l N	16	1.74	132.12	66	50
Antimony	µg/l	4	<0.5	0.63		
Arsenic	µg/l	4	<0.5	1.03		
Barium	µg/l	4	50	707.7	344	313
Beryllium	µg/l	4	<0.5	<0.5		
B.O.D.	mg/l O ₂	16	9	246.5	57	67
Boron	µg/l	4	63.2	1162.5	855	531
Cadmium	µg/l	4	<0.1	<0.1		
Calcium	mg/l Ca	4	91.45	228.26	154	57
C.O.D.	mg/l O ₂	16	32	1041	221	286
Chloride	mg/l Cl	16	12	234	91	58
Chromium	µg/l	4	3.7	7.5	6	2
Cobalt (µg/l)	µg/l	4	1.5	5	3	1
Conductivity	µS/cm @ 25	16	427	3310	1944	859
Copper	µg/l	4	0.7	4.8	3	2
Cyanide	mg/l CN	16	<0.05	<0.05		
Fluoride	mg/l	4	<0.150	<0.150		
Iron	µg/l	4	102.3	2325.8	1172	1195
Lead	µg/l	4	<0.5	<0.5		
Magnesium	mg/l Mg	4	11.59	67.69	46	24
Manganese	µg/l	4	520.1	2015.8	1082	680
Mercury	µg/l	4	<0.05	<0.05		
Molybdenum	µg/l	4	5.5	5.5	6	0
Nickel	µg/l	4	2.8	11.1	7	4

Parameters	Units	No. of Samples	Minimum	Maximum	Mean	Standard Deviation
o-Phosphate	mg/l P	16	<0.02	1.02	0	0
pH	0	16	6.8	7.2	7	0
Potassium	mg/l	4	6.7	75.82	50	30
Selenium	µg/l	4	<0.5	<0.5		
Sodium	mg/l	4	27.96	99.43	78	33
Strontium	µg/l	4	245.66	956.28	721	330
Sulphate	mg/l SO4	4	<2.0	77.3	29	42
Temp	°C	16	6.9	14.2	11	2
Thallium	µg/l	4	<0.1	<0.1		
T.O.N	mg/l N	16	<0.08	7.32		
Uranium	µg/l	4	<0.1	0.46		
Vanadium	µg/l	4	0.7	1.12	1	0
Zinc	µg/l	4	31.8	110.6	68	33

Table 5.2 Raw Leachate Concentrations

Parameter	Dundalk Landfill Site		From 30 Samples from UK/Irish Landfills Accepting Domestic Waste		
	Results in mg/l				
	Min.Conc	Max.Conc	Min.Conc	Max.Conc	Mean
Ammonia (mg/N)	1.74	132.12	<0.2	1700	491
BOD	9	246.5	4.5	>4800	>834
COD	32	1041	<10	33,700	3078
Chloride (mg/l)	12	234	27	3410	1256
Iron (µg/l)*	102.3	2325.8	0.4	664	54.4
Potassium (mg/l)	6.7	75.82	2.7	1480	491
Sodium (mg/l)	27.96	99.43	12	3000	904
TON (mg/l N)	<0.08	7.32	/	/	/

Parameter	Dundalk Landfill Site		From 30 Samples from UK/Irish Landfills Accepting Domestic Waste		
	Min.Conc	Max.Conc	Min.Conc	Max.Conc	Mean
Conductivity ($\mu\text{S}/\text{cm}$)	427	3310	503	19,200	7789
pH (pH units)	6.8	7.2	6.4	8.0	7.2

Leachate levels monitoring is undertaken at four locations on site as show on Table 5.3. The highest leachate head with the landfill site is at LG6. LG7 is no longer in use.

Table 5.3 Leachate Levels mOD

Date	L1	L2	L4	L6
Cover Level	5.33	4.53	10.51	13.36
mOD				
30/01/13	2.13	1.48	2.11	4.41
11/02/13	2.33	1.63	2.41	4.61
25/03/13	2.28	1.58	2.31	4.46
22/04/13	1.97	1.43	2.12	4.46
20/05/13	1.83	0.98	1.91	4.06
24/06/13	1.73	1.03	1.71	3.96
12/07/13	2.03	0.93	2.21	4.36
16/08/13	2.13	1.43	2.31	4.46
27/09/13	2.33	1.43	2.31	4.36

5.3 GROUNDWATER

As required under the Waste Licence, groundwater monitoring has been undertaken at the borehole locations as set out in Table D1.1 of the waste licence. Schedule D of the waste licence requires the monitoring of certain parameters on either a monthly, quarterly or annual basis; the frequencies of the monitoring of groundwater parameters are shown in Table 5.4 below.

Table 5.4 Groundwater Parameters Monitoring Frequencies

Monthly	Quarterly	Annually		
Groundwater Level	Visual Inspection/Odour	Aluminium	Manganese	Total Alkalinity
Ammoniacal Nitrogen	Dissolved Oxygen	Boron	Nickel	Orthophosphate
Chloride	pH	Cadmium	Potassium	TON
Electrical Conductivity	Temperature	Calcium	Sodium	Residue on Evaporation
	TOC	Chromium	Zinc	List I/II Organic
		Copper	Cyanide	
		Iron	Fluoride	
		Lead	Mercury	
		Magnesium	Sulphate	

A hydrogeological study was undertaken in accordance with Condition 4.14 of the Waste Licence W0034-01 in 2004 to develop a leachate management system at the site. The report recommended that the Best Practicable Environmental Option for the remediation of Dundalk landfill is the capping of the landfill with a low permeability liner augmented by monitored natural attenuation. Groundwater remediation of the Quaternary gravel aquifer impacted by Dundalk landfill leachate is reliant on both the landfill capping intervention and on monitored in-situ natural attenuation processes. Discharge into the Northern Stream will reduce following capping of the site owing the reduction of the leachate head within the waste.

The landfill site was restored in 2006. Works include installation of capping layer, provision of storm water drainage, leachate collection trench, provision of gas collection system, provision of gas flare, and grading of site.

A leachate collection trench has been constructed on the southern slope of the landfill. The trench is lined on the estuary side of the trench and also to a level of 3.65 mOD on the landfill side of the trench. The trench is connected to the foul sewer running along the western boundary of the site. Zero flow has been measured and subsequently the flow meter has now been removed.

The main groundwater flow path is generally towards the estuary, which is located to the south of the site. Groundwater monitoring has been undertaken at boreholes WM1, WM4, WM5, WM6, WM8, WM9 and WM10. Groundwater monitoring results are provided in full within Appendix E. These results are also presented graphically.

Groundwater was assessed against;

- EPA Interim guideline values⁴ (IGV),
- SI No 278 of 2007 EC (Drinking water) Regulations (DWR),
- SI No 9 of 2010 European Communities Environmental Objectives (Groundwater) Regulations 2010 as amended (GWR 2010).
- SI No 294 of 1989 European Communities (Quality of Surface Water Intended for the Abstraction of Drinking Water) Regulations (SWQS),and
- SI No 272 of 2009 European Communities Environmental Objectives (Surface Water) Regulations 2009 (EQS).

5.4 BASELINE DATA

Monitoring was carried out up-gradient of the site in order to obtain an overview of the baseline monitoring water quality of the surrounding groundwater. This allows for a baseline to be established from which the actual impact caused by the site on the down-gradient groundwater can be assessed. WM1 is the up-gradient monitoring point. Monitoring is undertaken on a monthly, quarterly and annual basis.

5.4.1 Monthly Parameters

Electrical Conductivity readings in WM1 were above the IGV (1000 μScm), GWR (800-1875 μScm) and DWR (2500 μScm) throughout the monitoring period. All Ammonia concentrations were below the GWR 2010 (0.175 mg/l N), IGV (0.15 mg/l) and the DWR (0.30 mg/l). The concentrations in WM1 were <0.03 mg/l at times during the monitoring period. Chloride concentrations were above the GWR 2010 (187.5 mg/l), IGV (30 mg/l) and the DWR (250 mg/l) throughout the monitoring period. The highest chloride reading recorded was 553 mg/l in February.

5.4.2 Quarterly Parameters

Dissolved Oxygen (DO) levels ranged from 17% to 40 % saturation. WM1 exhibits TOC values ranging from 2.3 mg/l to 3.1 mg/l. The pH levels in WM1 are within the IGV and DWR of 6.5 and 9.5.

5.4.3 Annually

Annual analysis for metals and non-metals was undertaken on the 15th of April 2013 as per licence requirement. Annual analysis for List I and II substances, metals and non-metals were undertaken at one location up gradient of the site in WM1 in April.

⁴EPA (2003) Towards setting guideline values for the protection of groundwater in Ireland. Interim Report

Aluminium, Antimony Arsenic, Barium, Boron, Cadmium, Chromium, Copper, Fluoride, Iron, Magnesium, Manganese, Lead, Mercury, Molybdenum, Nickel, Orthophosphate, Selenium, and Zinc are below the IGV, DWR and GWR 2010 were applicable in all up-gradient borehole. Parameters concentrations above the IGV, DWR and GWR 2010 are:

- Potassium 21.43 mg/l.
- Sodium 399.21 mg/l.
- Sulphate 292.5 mg/l.

Total Oxidised Nitrogen (TON) was 0.37 mg/l and TOC 2.3 mg/l.

Other parameters detected above the level of detection were:

- Alkalinity 436 mg/l,
- Calcium 100.82 mg/l,
- Strontium 531.62 µg/l, and
- Uranium 1.53 µg/l⁵.

Beryllium, Colbalt and Thallium are below the lower limit of detection,

Analysis for Polycyclic Aromatic Hydrocarbons (total 16 EPA PAHs) was <0.247 µg/l. All parameters measured where less than the limits of detection. For the purposes of determining compliance with the DWR of 0.1µg/l for PAH only four are considered – benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(ghi)perylene and indeno(1,2,3-cd)pyrene. Concentrations were as follows:

- benzo(b)fluoranthene <0.023 µg/l,
- benzo(k)fluoranthene <0.027 µg/l,
- benzo(ghi)perylene <0.016 µg/l, and
- indeno(1,2,3-cd)pyrene <0.014 µg/l.

Pesticide and herbicide and semi volatile organic compound parameters were carried out in WM1 in April. The results were either below the IGV for those comparable or were below the lower detection limit for the analytical methodology used analysis.

Phenol concentration was also analysed at WM1 and is <0.025 mg/l. This concentration is the limit of detection for the methodology used for Phenol however this is higher than the IGV of 0.5µg/l.

⁵ World Health Organisation (2011) Guidelines for Drinking-water Quality, Fourth Edition. Table A3.3 Guideline values for chemicals that are of health significance in drinking-water. Uranium 30 µg/l.

Volatiles organic compound parameters were either below the IGTV for those comparable or were below the lower detection limit for the analytical methodology used except 1,2,4-Trimethylbenzene (0.2 µg/l)⁶.

5.5 DOWN-GRADIENT DATA

The impact on the groundwater from leachate generated within the landfill can be identified from Boreholes WM4, WM5, WM6, WM8, WM9 and WM10. WM4 and WM8 are located in the gravel aquifer.

Table 5.5 Groundwater Parameters Down Gradient

	Units	No. of Samples	Minimum	Maximum	Mean	Standard Deviation
Alkalinity	mg/l CaCO₃	6	913	1230	1071	114
Aluminium	µg/l	6	<5	6.4		
Ammonia	mg/l N	71	<0.03	170	58	38
Antimony	µg/l	6	<0.5	<0.5		
Arsenic	µg/l	6	1.15	1.83	1	0
Barium	µg/l	6	28.5	157.7	122	50
Beryllium	µg/l	6	<0.5	<0.5		
Boron	µg/l	6	1038.4	2053.6	1355	376
Cadmium	µg/l	6	<0.1	<0.1		
Calcium	mg/l Ca	6	101.49	201.99	157	39
Chloride	mg/l Cl	71	37	5664	1243	1469
Chromium	µg/l	6	<0.5	3.9		
Cobalt	µg/l	6	<0.5	4.7		
Conductivity	µS/cm @ 25	72	1316	18540	5642	4008
Copper	µg/l	6	3.5	6.2	5	3
Cyanide	mg/l CN	6	<0.05	<0.05		
D.O.	% Saturation	24	12	26	17	6
Fluoride	mg/l	6	0.2	0.25	0	0
Iron	µg/l	6	<10	23247.4	4662	9137

⁶ World Health Organisation (2011) Guidelines for Drinking-water Quality, Fourth Edition. No guideline values are given for trimethylbenzene.

	Units	No. of Samples	Minimum	Maximum	Mean	Standard Deviation
Lead	µg/l	6	<0.5	<0.5		
Magnesium	mg/l Mg	6	48.4	215.58	101	62
Manganese	µg/l	6	63.7	2231.7	868	776
Mercury	µg/l	6	<0.05	<0.05		
Molybdenum	µg/l	6	0.7	2.9	2	1
Nickel	µg/l	6	3.2	11.3	6	3
o-Phosphate	mg/l P	6	<0.02	0.65		
pH	0	24	6.7	7.6	7	0
Potassium	mg/l	6	61.72	110.59	79	19
Residue on Evaporation	mg/l	6	1282	7377	2828	2413
Sampling Depth	m	72	2.5	5.5	4	1
Selenium	µg/l	6	<0.5	4.1		
Sodium	mg/l	6	96.38	1599.81	536	620
Strontium	µg/l	6	804.54	1599.91	996	308
Sulphate	mg/l SO ₄	6	5.1	141	53	52
Temp	°C	24	9	16.7	14	3
Thallium	µg/l	6	<0.1	<0.1		
T.O.C.	mg/l	24	13.4	94.4	38	25
T.O.N	mg/l N	6	0.08	1.95	1	1
Uranium	µg/l	6	0.13	1.28	1	1
Vanadium	µg/l	6	<0.5	1.7		
Zinc	µg/l	6	4.1	29.6	13	10

5.5.1 Monthly Parameters

Results from down gradient boreholes indicate elevated levels of Ammonia in the majority of boreholes. The highest Ammonia level recorded was 170 mg/l N WM9 in December. Elevated levels of Ammonia are indicative of leachate contamination. The hydrogeological study undertaken in 2004 predicated a range of concentrations in groundwater in the estuarine perimeter of the site after 10 years from the completion of the landfill capping. For Ammoniacal Nitrogen this range was 67-71 mg/l. WM6, WM8, WM9 and WM10 exceeded this range during the monitoring period.

Electrical Conductivity exceeded the DWR and GWR in all boreholes. The highest level was recorded in WM8 (18,540 μ S/cm). Chloride levels also exceeded the DWR throughout the monitoring period. The highest Chloride concentration recorded was 5,664 mg/l in WM4. It should be noted that saline water intrusion may contribute to the high levels of Chloride and Electrical Conductivity recorded down-gradient of the site as seawater can contain Chloride levels up to 20,000 mg/l.

5.5.2 Quarterly Parameters

TOC values provide a measure of organic contamination of the water, the higher the content the more oxygen is consumed. Organic contamination results in an increase in the growth of micro-organisms. TOC results showed a spike in concentrations in a number of boreholes. The highest level was recorded in WM8 (94.40 mg/l) in April. DO concentrations ranged from 12% to 26 % saturation.

5.5.3 Annually

Annual analysis for metals and non-metals was undertaken on the 15th of April 2013 as per licence requirement. Annual analysis for List I and II substances, metals and non-metals were undertaken at one location up gradient of the site in WM4 and WM5 in April.

Aluminium, Antimony Arsenic, Barium, Cadmium, Chromium, Copper, Fluoride, Lead, Mercury, Molybdenum, Nickel, Selenium, Sulphate, and Zinc are below the IGV, DWR and GWR 2010 were applicable in all up-gradient borehole.

Parameters concentrations above the IGV, DWR and GWR 2010 were:

- Boron 1038.4 to 2053.6 μ g/l
- Iron 1173.2 to 23,247.4 μ g/l except WM6 (89.7 μ g/l) and WM10 (41.2 μ g/l)
- Magnesium 67.72 to 215.58 mg/l except in WM8 (48.4 mg/l)
- Manganese 63.7 to 2231.7 μ g/l
- Orthophosphate 0.04 mg/l to 0.65 mg/l
- Potassium 61.72 mg/l to 110.59 mg/l
- Sodium 192.44 mg/l to 1599.81 mg/l except at WM8 (96.38 mg/l)and WM9 (106.82 mg/l)

Total Oxidised Nitrogen (TON) values down gradient range from <0.08 mg/l to 1.95 mg/l. TOC values down gradient range from 13.4 mg/l to 94.4 mg/l.

Other parameters detected above the level of detection were:

- Alkalinity 913 mg/l to 1,230 mg/l
- Calcium 101.49 mg/l to 201.99 mg/l
- Cobalt <0.5 to 4.7
- Strontium 804 µg/l to 1599.91 µg/l
- Uranium 0.13 to 1.28 µg/l⁷

Beryllium and Thallium are below the lower limit of detection.

Analysis for Polycyclic Aromatic Hydrocarbons (total 16 EPA PAHs) was <0.247 µg/l. All parameters measured were less than the limits of detection except for Acenaphthene (0.0309 µg/l) and Acenaphthylene (0.02 µg/l) at WM5. For the purposes of determining compliance with the DWR of 0.1µg/l for PAH only four are considered – benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(ghi)perylene and indeno(1,2,3-cd)pyrene. Concentrations were as follows:

- benzo(b)fluoranthene <0.023 µg/l,
- benzo(k)fluoranthene <0.027 µg/l,
- benzo(ghi)perylene <0.016 µg/l, and
- indeno(1,2,3-cd)pyrene <0.014 µg/l.

Semi volatile organic compound parameters were either below the IGV for those comparable or were below the lower detection limit for the analytical methodology used.

Volatiles organic compound parameters were either below the IGV for those comparable or were below the lower detection limit for the analytical methodology used except for 1,2,4-Trimethylbenzene (0.2 µg/l) and Benzene (0.3 µg/l) at WM5⁸.

5.5.4 Groundwater Levels

Groundwater levels monitoring is undertaken at six locations on site as show on Table 5.6. WM1 is upgradient of the site and WM4 and WM8 are located in gravel aquifer.

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

⁸ World Health Organisation (2011) Guidelines for Drinking-water Quality, Fourth Edition. Table A3.3 Guideline values for chemicals that are of health significance in drinking-water. Benzene 10 µg/l.

Table 5.6 Groundwater Level mOD

Location	WM1	WM4	WM5	WM6	WM8	WM9	WM10
Cover Level	4.77	5.12	5.57	5.87	5.15	5.78	5.64
mOD							
30 Jan 13	2.17	2.62	1.17	1.57	2.55	3.18	1.04
11 Feb 13	2.27	1.92	2.17	2.17	2.55	3.18	1.94
25 Mar 13	1.97	0.62	0.77	2.37	1.15	1.78	1.34
15 Apr 13	1.67	-0.38	0.27	1.17	2.15	2.08	0.54
07 May 13	1.97	1.52	1.57	1.57	2.25	2.08	1.24
10 Jun 13	1.67	0.72	1.07	1.07	2.05	1.38	0.74
22 July 13	1.87	1.32	1.87	1.47	1.55	1.58	1.14
06 Aug 13	1.87	1.22	1.47	1.37	1.25	1.18	1.14
16 Sept 13	1.67	1.12	1.07	1.07	1.05	1.28	0.74
07 Oct 13	1.87	0.72	0.47	1.47	1.05	1.58	0.74
18 Nov 13	1.87	1.12	1.57	1.37	0.75	1.58	1.34
02 Dec 13		1.02	1.37	1.07	2.15	1.88	1.14

5.6 REMEDIATION

The results show that groundwater is being impacted by the landfill site. A hydrogeological study was undertaken and the recommended Best Practicable Environmental Option for the remediation of Dundalk landfill was the capping of the landfill with a low permeability liner augmented by monitored natural attenuation. The hydrogeological study predicated a range of concentrations in groundwater (along boundary with estuary) after 10 years from the completion of the landfill. Capping was completed in 2006. A review of monitoring results shows some improvement in groundwater and surface water quality over time since capping was completed. This will continue to be monitored for longer term trends to assess the extent of the natural attenuation of the site.

In the 'Predicted Environmental Risk Assessment' represented by the Dundalk landfill to the Quaternary Gravel Aquifer and the Castletown Estuary after 10 years from the completion of the landfill capping it is predicted that the concentration range for Ammoniacal Nitrogen will be between 67 mg/l and 71 mg/l in groundwater (along boundary with estuary). In WM4 and WM5 the concentrations are below the maximum predicted concentration range. WM6 exceeds the maximum predicted

concentration range for Ammoniacal Nitrogen on nine sampling rounds in 2013. WM8 (gravel aquifer) exceeds the maximum predicted concentration range for Ammoniacal Nitrogen all year. WM9 exceeds the maximum predicted concentration range for Ammoniacal Nitrogen on four sampling rounds in 2013. WM10 exceeds the maximum predicted concentration range for Ammoniacal Nitrogen on one sampling round in 2013.

5.7 SURFACE WATER

The results contained in this report are 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, European Communities Environmental Objectives (Surface Water) Regulations 2009 as amended (ECEO) and Interim Guideline Value (IGV) Towards Setting Guideline Values for the Protection of Ground Water in Ireland. The frequencies of the monitoring of surface water parameters are shown in Table 5.7.

Table 5.7 Surface Water Parameters Monitoring Frequencies

Monthly	Quarterly	Annually	
Ammoniacal Nitrogen	BOD	Aluminium	Manganese
Chloride	COD	Boron	Nickel
Electrical Conductivity	Dissolved Oxygen	Cadmium	Potassium
	pH	Calcium	Sodium
	Total Suspended Solids	Chromium	Zinc
	Temperature	Copper	Mercury
	TON	Iron	Sulphate
		Lead	Alkalinity
		Magnesium	Orthophosphate

Samples SW1 to SW4 are taken along the course of the drainage ditch, which adjoins the northern boundaries of the landfill. Monitoring points SW5 to SW9 are located in the estuary.

SW5 and SW6 are adjacent (AD) to the landfill, whilst SW7 and SW8 are upstream (US) and SW9 downstream (DS) of the site.

Table 5.8 provides a summary of results in 2012 for SW1 to SW4 surface water locations.

Table 5.8 Surface Water Parameters SW1 to SW4

	Units	No. of Samples	Minimum	Maximum	Mean	Standard Deviation
Alkalinity	mg/l CaCO ₃	4	98	376	274	122
Aluminium	µg/l	4	5.4	34	14	14
Ammonia	mg/l N	45	0.03	20.19	3.39	4.14
Antimony	µg/l	4	0.77	2.01	1	1
Arsenic	µg/l	4	0.7	1.37	1	0
Barium	µg/l	4	39.5	84.3	59	23
Beryllium	µg/l	4	<0.5	<0.5		
B.O.D.	mg/l O ₂	15	2.1	53	14	15
Boron	µg/l	4	68.2	280.6	200	92
Cadmium	µg/l	4	<0.1	<0.1		
Calcium	mg/l Ca	4	91.24	113.11	103	11
C.O.D.	mg/l O ₂	15	18	522	146	150
Chloride	mg/l Cl	45	43	388	179	96
Chromium	µg/l	4	0.8	9.8	3	5
Cobalt (µg/l)	µg/l	4	0.8	1	1	0
Conductivity	µS/cm @ 25	45	475	2300	1394	469
Copper	µg/l	4	1.4	2	2	0
D.O.	% Saturation	15	12	94	42	24
Iron	µg/l	4	46.8	150.6	81	48
Lead	µg/l	4	<0.5	<0.5		
Magnesium	mg/l Mg	4	12.88	26.12	21	6
Manganese	µg/l	4	32	457.5	229	175
Mercury	µg/l	4	<0.05	<0.05		
Molybdenum	µg/l	4	1.6	9.4	4	4
Nickel	µg/l	4	1.3	3.5	3	1
o-Phosphate	mg/l P	4	<0.02	0.03		

	Units	No. of Samples	Minimum	Maximum	Mean	Standard Deviation
pH	0	15	7.1	8.4	7	0
Potassium	mg/l	4	16.48	18.98	18	1
Selenium	µg/l	4	0.5	0.5		
Sodium	mg/l	4	64.05	90.84	82	12
Strontium	µg/l	4	314.47	455.32	391	60
Sulphate	mg/l SO4	5	64.7	155.7	96	42
Suspended Solids	mg/l	4	14	1945	1091	1001
Temp	°C	16	5.9	18.4	13	5
Thallium	µg/l	4	<0.1	<0.1		
T.O.N	mg/l N	15	0.09	3.09	1	1
Total S Solids	mg/l	11	6	1238	149	384
Uranium	µg/l	4	0.5	0.91	1	0
Vanadium	µg/l	4	0.51	18.38	7	10
Zinc	µg/l	4	1.5	5	4	2

Table 5.9 Surface Water Parameters SW5 to SW9

	Units	No. of Samples	Minimum	Maximum	Mean	Standard Deviation
Alkalinity	mg/l CaCO ₃	4	87	100	92	6
Aluminium	µg/l	4	63.3	71.6	69	4
Ammonia	mg/l N	59	0.04	1.15	0	0
Antimony	µg/l	4	<0.5	<0.5		
Arsenic	µg/l	4	1.21	1.26	1	0
Barium	µg/l	4	29.1	35.2	31	3
Beryllium	µg/l	5	<0.5	<0.5		
B.O.D.	mg/l O ₂	18	1.3	5.4	3	1
Boron	µg/l	4	14.9	83.2	44	29
Cadmium	µg/l	4	<0.1	<0.1		
Calcium	mg/l Ca	4	31.82	38.31	34	3
C.O.D.	mg/l O ₂	19	12	63	37	17
Chloride	mg/l Cl	59	13	18220	5005	5384
Chromium	µg/l	4	<0.5	<0.5		
Cobalt (µg/l)	µg/l	4	<0.5	<0.5		
Conductivity	µS/cm @ 25	59	172	51200	14461	15077
Copper	µg/l	4	4.6	4.7	5	0
D.O.	% Saturation	19	68	118	87	16
Iron	µg/l	4	235.8	362.9	272	61
Lead	µg/l	4	<0.5	<0.5		
Magnesium	mg/l Mg	4	5.87	22.35	12	7
Manganese	µg/l	4	17.6	29.9	24	6
Mercury	µg/l	4	<0.05	<0.05		
Molybdenum	µg/l	4	0.5	0.7	1	0
Nickel	µg/l	4	3.2	3.6	3	0
o-Phosphate	mg/l P	5	0.04	0.07	0	0

	Units	No. of Samples	Minimum	Maximum	Mean	Standard Deviation
pH	0	19	7.4	8.8	8	0
Potassium	mg/l	4	5.2	11.8	8	3
Selenium	µg/l	4	0.5	0.5		
Sodium	mg/l	4	16.12	157.38	76	60
Strontium	µg/l	4	97.56	216.85	146	51
Sulphate	mg/l SO ₄	5	12.1	48.8	25	14
Suspended Solids	mg/l	6	25	58	35	12
Temp	°C	19	5.1	20	13	5
Thallium	µg/l	4	<0.1	<0.1		
T.O.N	mg/l N	19	0.2	1.98	1	1
Total S Solids	mg/l	13	13	61	31	16
Uranium	µg/l	4	0.28	0.35	0	0
Vanadium	µg/l	4	0.77	0.92	1	0
Zinc	µg/l	4	6.3	9	8	1

5.7.1 Monthly Parameters

Monthly chemical analyses of surface water are summarised in Appendix F. The results indicate elevated levels of Ammonia mg/l N, the highest concentration recorded in the stream was 55.17 mg/l N in SW1 and in the estuary was 1.38 mg/l N in SW9 (DS). Electrical Conductivity and Chloride also exceeded the SWQS throughout the monitoring period. The highest Chloride concentration recorded was 18,220 mg/l in WM9.

Elevated levels of Electrical Conductivity, and Chloride recorded at SW5 to SW9 were also due to the presence of estuarine water.

5.7.2 Quarterly Parameters

The pH values ranged from 7.2 to 8.8 in all surface water locations which are between the SWQS of 5.5 to 9.

The results indicated elevated levels of BOD and COD. The highest concentration for BOD in the stream was 53 mg/l in SW2 and in the estuary was 5.4 mg/l in SW8 (US). For COD the highest concentration was 552 mg/l in SW1 and in the estuary was 63 mg/l in SW9 (DS).

Total Suspended Solids exceeded the SWQS in all surface water monitoring locations at times, the highest concentration recorded in the stream was 1,238 mg/l in SW1 and in the estuary was 61 mg/l in SW9 (DS).

The Total Organic Nitrogen (TON) showed no abnormal change throughout 2013, the highest concentration recorded in the stream was 3.09 mg/l in SW3 and in the estuary was 1.98 mg/l in SW8 (US).

The majority of parameters assessed show that levels of contamination increase between sampling points SW1 and SW4, which are located along the drainage ditch running along the north of the site. It can be seen that elevated levels of Ammonia, COD and BOD have been recorded at the various monitoring locations along the drainage ditch. These results are presented graphical in Appendix F. A review of the contamination in the stream was undertaken and the following recommendations were made:

1. All discharge points entering the stream as identified in Drawing No. IBR0391/100 are to be included in the next four quarterly monitoring rounds in order to determine baseline inputs into the stream.
2. A review of existing landfill gas wells on site to determine if they could be used/retrofitted to monitor leachate levels within the site (especially along the northern boundary in the area previously identified where leachate and groundwater mound is present). This would indicate there is perched leachate which could be making its way into the stream.
3. The outlet pipe at SW1 should be investigated further to determine the exact area which contributes to the stream at this location.
4. Following a review of leachate levels along the northern boundary, vegetation will be removed along the length of the stream where possible so that all inputs to the stream can be clearly identified. This will identify any possible leachate breakout areas from the unlined slopes of landfill site where high leachate levels adjacent to the stream have been identified. A methodology of how this will be undertaken will be agreed to protect the integrity of the GCL liner. Agreement for this work will be required from the landowners.

A review of the existing landfill gas wells on site has shown that the existing landfill gas wells do not allow for the monitoring of leachate levels. The removal of vegetation along the length of the stream so that all inputs to the stream can be clearly determined will be undertaken in April/ May 2014.

5.7.3 Annual Parameters

Annual analysis was undertaken on 15th April, 2013.

Antimony, Aluminium, Antimony, Arsenic, Barium, Boron, Cadmium, Calcium, Chromium, Copper, Lead, Magnesium, Mercury, Nickel, Selenium, Sodium, and Zinc are below the IGV, DWR and EQS were applicable. Parameters exceeding the standards are as follows:

- Iron exceeded the DWR at a number of the estuarine locations.
- Manganese exceeded the IGV and DWR at a number of surface water locations in the stream.
- Potassium exceeded the IGV at all locations.

- Sulphate exceeded IGV at SW1.

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

- Cobalt <0.5 µg/l to 1.0 µg/l.
- Molybdenum <0.5 µg/l to 9.4 µg/l.
- Strontium 97.56 µg/l to 455.32 µg/l
- Uranium 0.5 to 0.91 µg/l and
- Vanadium <0.5 to 18.38 µg/l

Beryllium concentrations were below the level of detection.

Total Suspended Solids in the stream surface water monitoring locations ranged from <5 mg/l (SW3) to 1,238 mg/l (SW1). Total Suspended Solids in the estuarine stream surface water monitoring locations ranged from 15 mg/l to 33 mg/l.

Alkalinity concentrations range from 98 mg/l to 376 mg/l the stream surface water monitoring locations and from 87 mg/l to 100 mg/l in the estuarine water.

Ortho-phosphate concentrations in the stream ranged from <0.02 to 0.03 mg/l below the EQS MAC of 0.045 (High). Ortho-phosphate in the estuary was 0.07 mg/l at all locations.

The remaining parameters are below the lower limits of detection.

5.8 REMEDIATION

The results show that surface water is being impacted by the landfill site. In the hydrogeological study an Ammoniacal Nitrogen contaminant discharge was estimated at 70 mg/l after capping (after 10 years), predicting a long term concentration of 0.26 mg/l (or total ammonia 0.31 mg/l N⁹) in the estuary.

The highest concentration for the estuary is in SW9 (1.38 mg/l N) which is downstream of the site. SW5 and SW6 are adjacent to the site. Ammonia concentration ranged from 0.07 to 1.34 mg/l N in SW5 and 0.07 to 1.36 mg/l N in SW6. Ammonia mg/l N exceeds the predicting a long term concentration of 0.26 mg/l at SW5 and SW6 on majority of dates sampled in 2013.

5.9 SEWER DISCHARGES

The Waste Licence in Schedule D requires the monitoring of the BOD, COD, Ammonia, Suspended Solids, Sulphates, pH and Temperature on a quarterly basis.

S1 is the sewer discharge monitoring location at manhole No 2, adjacent to weighbridge. This monitors run-off from the Recycling Centre and Material Recovery Facility and discharge from the composting facility.

⁹ ammonia to ammoniacal nitrogen then multiply the value by 14/17

The following samples were not collected during the monitoring period;

- Landfill discharge monitoring location (S2) No flow.

- Landfill discharge monitoring location (S1) March, May, June, August, September November and December as there was no flow.

Table 5.10 illustrates the parameters that were monitored in S1. S1 results can be found in full in Appendix G. BOD, COD and SS exceeds the ELV in July. This has been reviewed and may have arisen due to blockage from toilet/canteen. COD exceeds the ELV in October.

Table 5.10 Parameters Monitored in S1

Parameter	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Emission Limit Value (ELV)	
													S1: Civic Waste Facility Grab Sample (mg/l)	S2: Leachate from Landfill Grab Sample (mg/l)
BOD	8.1	nm ¹⁰	NS ¹¹	29.3	NS	NS	1,824	NS	NS	>170	NS	NS	750	2000
COD	42	86	NS	191	NS	NS	5,440	NS	NS	1,840	NS	NS	1000	9000
Suspended Solids	41	95	NS	62	NS	NS	5,160	NS	NS	281	NS	NS	1000	2000
Sulphate	5.8	10.9	NS	82.1	NS	NS	2.8	NS	NS	51	NS	NS	300	400
pH	7.7	7.0	NS	7.1	NS	NS	7	NS	NS	7	NS	NS	6-9	6-9
Temperature	6.5	nm	NS	13	NS	NS		NS	NS	16.4	NS	NS	40°C	40°C

¹⁰ nm not measured¹¹ NS No sample

5.10 PERIMETER GAS MONITORING AND LANDFILL GAS EXTRACTION

Schedule D of the licence requires the licensee to conduct monthly monitoring of gas levels on the perimeter and in the waste of the landfill site. The gas is monitored using a GA2000 infra-red monitoring device. The monitoring locations are shown on Table 5.11 and shown in Drawing in Appendix H (External Gas Monitoring Points).

Table 5.11 Landfill Gas Monitoring Locations

Landfill Gas Wells within Waste and Boundary Locations	<p>GW1 to GW47 inclusive</p> <p>(as shown on Drawing No. 004 of the Restoration Plan for 34-1 (Nov 2002) agreed by the Agency)</p>
Piezometers Boundary Locations	<p>G1, G2, G3, G4, G5, G6, G7, G8, G9, G10, G16, G17,</p> <p>GM1, GM2, GM3, GM4, GM5, GM6, GM7, GM8, GM24</p>

Landfill gas around the periphery of the site is indicated by piezometers as shown in Table 5.7 above. GM7 and GM8 are no longer monitored.

A landfill gas trench has been installed to the west of the active landfill site to intercept the potential pathway of the gas migrating from the current active landfill site. Piezometers GM5 to GM7, G4 to G10 are to the west of the landfill gas trench.

A permanent gas extraction system has been installed at the facility. This includes a gas collection layer and 47 landfill gas extraction wells laid out on a grid system over the main body of the site. The wells are connected via 63mm diameter pipework to a 250mm diameter main gas collection pipe. A 600m³ enclosed Flare Unit and SCADA system was installed. This was downsized in 2013 to a 300m³ flare. The boreholes in the area of historical fill have also been attached to the active gas collection system. Records of field balancing are maintained.

Monthly monitoring of periphery piezometers around Dundalk Landfill site have indicated no exceedances of licence requirements of methane greater than or equal to 1.0% v/v. The highest recording was 0.3% v/v during the monitoring period.

There were a number of exceedances of Carbon Dioxide greater than or equal to 1.5% v/v in June. These were at G9 (5.5% v/v) and G20 (3.9% v/v).

5.11 ESTUARINE SOIL SAMPLES

Sediment sampling was undertaken at five locations in the estuary in September 2013. These results are presented in Table 5.12. These results have been compared to the Dutch Target values and intervention values for soil remediation soil/sediment. The results are below the Target Value for all parameters except Zinc at all locations and Copper at location SW8. The results are below the intervention value. No Targets Values are given for Manganese or Cyanide. Cyanide levels are

below the lower detection limit for the analytical method used. SW7 and SW8 are located upstream of the site.

Table 5.12 Sediment Results

Date Sampled	06/09/2013						
Parameter (mg/kg)	SW5	SW6	SW7	SW8	SW9	Target Value (Dutch)	Inter - vention Value (Dutch)
Total Solids %	60	69	49	40	49		
Cadmium	0.342	0.461	0.439	0.905	0.566	0.8	1.2
Copper	20.9	20.7	27.8	40.9	36.3	36	190
Chromium	22.5	24.5	29.5	34.5	30.5	100	380
Lead	23.9	32.8	32.7	35.3	35.9	85	530
Manganese	355	239	509	487	477		
Mercury	<0.14	<0.14	0.178	<0.14	<0.14	0.3	10
Zinc	166	186	193	245	366	140	720
Total cyanide mg/kg	<1	<1	<1	<1	<1		

5.12 DUST MONITORING

Dust monitoring was carried out three times in the year. Table 5.11 details the results of the three dust monitors installed on site. The waste licence requires dust deposition limits to be no more than **350** mg/m²/day. From Table 5.13 it can be seen that all dust deposition levels in all periods are below the limit.

Table 5.13 Dust Monitoring Results (mg/m²/day)

Sampling Period	Dust Monitor 1	Dust Monitor 2	Dust Monitor 3
07/01/2013	35.7	23.4	22.2
07/08/2013	152.6	67.8	63.3
03/09/2013	127	294.5	227.2

5.13 COMPOSTING MONITORING

V & W recycling compost hedge grass & hedge cuttings from Civic Amenity users. 2,607 tonnes was received for composting in 2013. Compost testing was undertaken by Bord na Mona Ltd and is provided in Appendix I. Samples are taken from 5 separate locations and depths within the compost pile to ensure a representative composite sample can be achieved.

The sampling of compost takes place from the static pile before the screening process and hence does not take account of the filtering process. The compost is passed through a rotating drum type sieve prior to bagging. Heavier material is returned to the process. Compost is also stored on site for 6 months (held over winter).

The four samples of compost were sent for analysis. The samples of compost were checked for compliance against Schedule F of Waste Licence W0034-02 and Oxygen Uptake Rate Bord na Móna Maturity Indicator Values (OS = organic solids) mmolO₂/kg OS/h.

Table 5.14 Bord na Móna Maturity Indicator Values

Compost Process Stage	
>26	Very Unstable
16-25	Unstable
11-15	Moderately Stable
5-10	Stable
<5	Completely stable

- **9th July 2013**

Sample complied with Schedule F, Maturity tests 2, 3 and 4. The oxygen uptake test was 6.8 mmolO₂/kgOS/h which is stable in accordance with Bord Na Mona Maturity Indicator Values.

Contaminants were <0.01 % to 0.27 % for all sieve sizes from 2-4 mm and above in compliance with the limit for impurities and gravel and stone. Trace elements comply with Class 1 Maximum Trace Element Concentration Limits for Compost. Sample complied with the human pathogen test BSI PAS 100 Standard Limits (Salmonella s.p.p absent in 25g sample and E. coli <1,000 CFU/g).

- **8th October 2013**

Sample complied with Schedule F, Maturity tests 2, 3 and 4. The oxygen uptake test was 4.0 mmolO₂/kgOS/h which is completely stable in accordance with Bord Na Mona Maturity Indicator Values.

Contaminants were <0.01 % to 3.2 % for all sieve sizes from 2-4 mm and above in compliance with the limits for impurities and gravel and stone. Trace elements comply with Class 1 Maximum Trace Element Concentration Limits for Compost. Sample complied with the human pathogen test BSI PAS 100 Standard Limits (Salmonella s.p.p absent in 25g sample and E. coli <1,000 CFU/g).

- **25th October 2013**

Sample complied with Schedule F, Maturity tests 2, 3 and 4. The oxygen uptake test was 3.0 mmolO₂/kgOS/h which is completely stable in accordance with Bord Na Mona Maturity Indicator Values.

Contaminants were <0.01 % to 1.05 % for all sieve sizes from 2-4 mm and above in compliance with the limits for impurities and gravel and stone. Trace elements comply with Class 1 Maximum Trace Element Concentration Limits for Compost. Sample complied with the human pathogen test BSI PAS 100 Standard Limits (Salmonella s.p.p absent in 25g sample and E. coli <1,000 CFU/g).

- **5th December 2013**

Sample complied with Schedule F, Maturity tests 2, 3 and 4. The oxygen uptake test was 2.6 mmolO₂/kgOS/h which is completely stable in accordance with Bord Na Mona Maturity Indicator Values.

Contaminants were <0.01 % to 2.1 % for all sieve sizes from 2-4 mm and above in compliance with the limits for impurities and gravel and stone. Trace elements comply with Class 1 Maximum Trace Element Concentration Limits for Compost. Sample complied with the human pathogen test BSI PAS 100 Standard Limits (Salmonella s.p.p absent in 25g sample and E. coli <1,000 CFU/g).

As stated above the sampling of compost takes place from the static pile before the screening process and hence does not take account of the filtering process. Contaminants are removed on site by a screening process undertaken by V&W Recycling, whereby the compost is passed through a rotating drum type sieve prior to bagging. Heavier material is returned to the process.

5.13.1 Bed Media

Moisture content, pH, Ammonia and Total viable counts were analysed for the bed media gases and are provided in Appendix J. There are no limits in waste licence for these parameters.

5.14 METEOROLOGICAL MONITORING

Temperature and rainfall readings are taken from Dublin Airport.

Table 5.15 Summary of Meteorological Monitoring for the Reporting Period

Total Rainfall in Millimetres for Dublin Airport													
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2013	94.4	47.3	85.5	40.1	45.8	60.8	68.8	48.5	35.1	127.8	26.6	83.2	763.9
mean	62.6	48.8	52.6	54.1	59.5	66.7	56.2	73.3	59.5	79.0	72.9	72.7	757.9

Mean Temperature in Degrees C. for Dublin Airport													
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2013	4.9	4.2	3.1	6.8	10.0	12.7	16.7	15.6	13.0	11.7	6.3	6.9	9.4
mean	5.3	5.3	6.8	8.3	10.9	13.6	15.6	15.3	13.4	10.5	7.4	5.6	9.8

6.0 RESOURCE AND ENERGY CONSUMPTION SUMMARY

Consumption of resources for the reporting period is shown in Table 6.1 below.

Table 6.1 Consumption of Resources

Parameters	CWF	Unit
Electricity	3,850	kWh
Water	2,810	m ³

7.0 DEVELOPMENT / INFRASTRUCTURAL WORKS IN PLACE AND PLANNED, TO PROCESS WASTE QUANTITIES PROJECTED FOR THE FOLLOWING YEAR (INCLUDING PLANT OPERATING CAPACITY, PROVISION OF ADEQUATE STANDBY CAPACITY AND PROVISION OF CONTINGENCY, BACKUP AND SPARES IN THE CASE OF BREAKDOWN)

There is no additional development /infrastructural works planned for 2013 in the recycling facility and landfill site.

7.1 PLANTS AND METHODS

The current plant on site comprises of;

- Compactor – The current compactor is used to bale recyclable materials
- Hopper – The hopper is used to accept recyclables.
- Conveyer Belt – The conveyer belt is used to sort materials
- Wood Shredder – The wood shredder is used to shred wood received at the Civic Waste Facility.

All machines have a 50% back-up capacity and V & W Recycling also have access to spares as required.

7.2 PROPRIETARY VACUUM AERATED STATIC PILE SYSTEM

The licence also allows composting of biodegradable waste and green waste to 4,000 tonnes per annum. A Proprietary Vacuum Aerated Static Pile System has been installed. No food waste is utilised through the composting system. Celtic Composting systems biofilters (2) were specified to have capacity of 8,000 tonnes of compost, thus providing 100% spare capacity in the event of breakdown.

8.0 SCHEDULE OF ENVIRONMENTAL OBJECTIVES AND TARGETS FOR THE FORTHCOMING YEAR

The following developments works (Environmental Objectives and Targets) will be carried out in 2013;

- Investigate the potential impact on the stream to the north of the site. Stream to be cleaned out to allow for detailed visual inspection.

9.0 TANK, DRUM, PIPELINE AND BUND TESTING AND INSPECTION REPORT

The use of specialist Oil tanks was approved by EPA and installed as part of the extension to the Civic Amenity Site in 2004/2005, provided these tanks were protected from vehicular impact. This was done by the provision of railings and the tanks are then set in additional recesses. There are no other bunds on site. No other inspections are undertaken.

10.0 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 and Environmental Management Plan were reviewed and updated in 2006 to include the procedures for the Recycling Centre and the closure of the Landfill site. A new flare procedure was developed in 2012 and is available for viewing on site.

11.0 REPORT ON INCIDENTS AND COMPLAINTS SUMMARIES

No complaints were received from the public and no incidents were reported. A site audit was carried out at the facility in July 2012. A summary is provided in Table 11.1.

Table 11.1 Summary of Non Compliances and Audit Observations Noted During Audits/Landfill Site Inspections Undertaken During the Reporting Period by EPA

Inspection Date and Reference	Summary of Audit Findings
<p>18/04/13</p> <p>(W0034-2)sm11lm</p>	<p>Restoration</p> <p>Corrective Action Required: The licensee shall remediate these depressions without further delay to prevent the accumulation of rainwater on the surface of the landfill.</p> <p>Leachate Management</p> <p>Corrective Action Required: The licensee is requested to submit a final report on this investigation to the Agency by 01/09/2013. The report shall specify the measures considered necessary to ensure the protection of surface waters.</p> <p>Following the completion of the investigation the surface water drainage plan for the landfill shall be reviewed and revised to ensure it accurately reflects drainage arrangements onsite.</p> <p>Landfill Gas Management</p> <p>Corrective Action The licensee shall update the flare procedure to ensure flare operation records are downloaded on a monthly basis and are maintained up to date. Records shall be periodically reviewed to ensure effective flare operation. The licensee shall investigate and record a reason for all flare shutdown periods particularly extended shutdown periods which have been defined by the licensee as a period greater than 7 days. The licensee is requested to prepare an incident procedure for instances of flare shutdown. The procedure shall require initiation of monitoring at perimeter gas wells following flare shutdown periods of greater than 2 -3 days. A schematic of the flare shall be attached to the flare procedure. Flare servicing records shall include a description of the works undertaken and any repairs made to the flare. Servicing of the flare shall be evenly spaced throughout the year.</p>

12.0 REVIEW OF NUISANCE CONTROLS

12.1 DUST CONTROL

There was one breach of the dust deposition limit in 2012. Daily wind directions are taken and during episodes of high winds no movement of compost is undertaken. In addition operational activities to 'wet down' materials are in place.

12.2 LITTER

The landfill site was closed in October 2002 and therefore there is no windblown litter arising from the landfill site. V & W Recycling (operators) of recycling facility do regular litter picks on blown paper waste etc and regular site cleanup.

12.3 ODOURS

The landfill site was closed in October 2002 and therefore the potential for odours has been reduced. The permanent capping and installation of an active extraction system reduces the occurrence of odour from landfill gas.

The doors to the waste processing building are kept closed where possible; the biofilters minimize the odours from the composting process in the recycling facility.

Odour is checked on a daily basis by V & W Recycling.

12.4 PEST CONTROL (VERMIN)

Pest control is undertaken by V & W Recycling. Bait traps are checked on a weekly basis.

12.5 NOISE

The measurements were completed on Thursday and Friday 6th – 7th March in accordance with the following environmental noise standards:

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

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

NSL 1: Daytime: LAeq (T 15 min) 70-69dBA;

Evening time: LAeq (T 15 min) constant at 68dBA;

Night time: LAeq (T 15 min) 62-56dBA

NSL 2: Daytime: LAeq (T 15min) 59-56dBA;

Evening time: LAeq (T 15 min) constant at 52dBA;

Night time: LAeq (T 15 min) 49-46dBA

NSL 3: Daytime: LAeq (T 15 min) 71-69dBA;

Evening time: LAeq (T 15 min) constant at 67dBA;

Night time: LAeq (T 15 min) 61-58dBA

NSL 4: Daytime: LAeq (T 15 min) 65-64dBA;

Evening time: LAeq (T 15 min) constant at 63dBA;

Night time: LAeq (T 15 min) 56-53dBA

The report found that traffic was 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 Waste licence W0034-02 requirements.

13.0 VOLUME OF LEACHATE PRODUCED AND VOLUME OF LEACHATE TRANSPORTED DISCHARGED OFF SITE

A leachate drainage ditch has been constructed along the southern boundary of the landfill, laid to a nominal invert of 3.65 m (this being the level of the highest tide recorded in Dundalk). The base of the trench is lined with bentonite matting over which a 150 mm diameter perforated pipe is placed and the trench is then backfilled with clean stone. Any leachate/runoff entering the trench drains to the perforated pipe and from there drains via a manhole/ monitoring point to the foul sewer.

The trench is connected to the foul sewer running along the western boundary of the site. The in situ flow meter has been removed as agreed with the EPA. No flow has been observed in this trench during inspections.

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

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

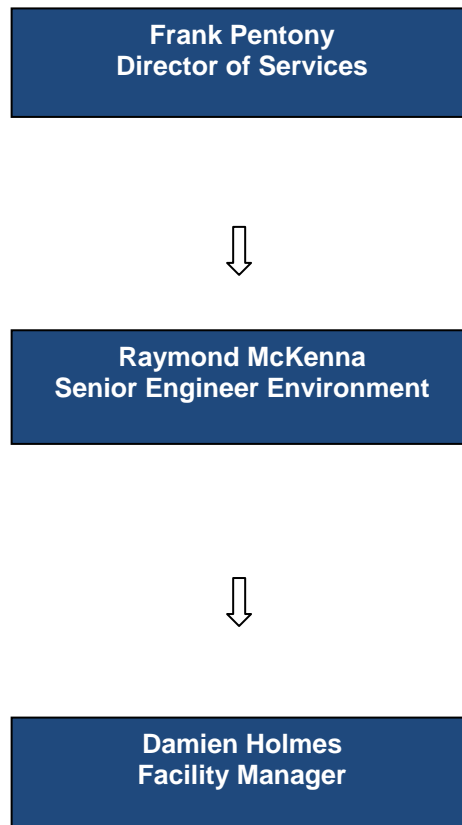


Figure 14.1 Management Structure at Dundalk Landfill Site

14.1 STAFFING STRUCTURE

The recycling facility is being operated by third party (V & W recycling) on behalf of Dundalk Town Council. There is currently 14 staff members employed at the recycling facility. This consists of:

- managers
- supervisors
- general operatives

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

15.0 ANNUAL BUDGET AND SITE RUNNING COSTS

The recycling facility is operated by third party (V & W Recycling) on behalf of Dundalk Town Council. A €2.00 entrance charge is applicable to all users of the site except for the disposal of electrical goods.

The budget for 2014 for landfill site is €65,000.

APPENDIX A

WATER BALANCE CALCULATION

WATER BALANCE CALCULATION

Year	Active Phase	Active Area A(m ²)	Waste Input t/month	Rainfall mm	Active Area Infiltration AR(A)(m ³)	Temp Restored area	Temp Restored area(Temp) RCA(m ²)	Restored area(Temp) infiltration IRCA(m ³)	Permanently Restored area	Restored area RCA(m ²)	Total Water	Cumulative Water	Absorptive Capacity aW(m ³)	Cumulative Absorptive Capacity	Cumulative Leachate	Leachate produced Lo(m ³)
2013	Closed		0.00	763.9	0				79000	6035	6035	6035	0.00	0.00	6035	6035
Total			0.00	763.9	0			0		6035			0			6035

Assumptions

IRCA	Temporarily capped/restored area infiltration of rainfall estimated %	30%	%
	Permanent capped/restored area infiltration of rainfall estimated % (2-10%)	10%	%
Absorptive Capacity	waste density of 0.8 tonnes/m ³ . Estimated absorptive capacity (water per tonne waste before leachate is produced) t/m ³	0.06	t/m ³
Restored Area	Area	79,000	m ²
Rainfall	Rainfall taken from Dublin Airport	763.9	mm

APPENDIX B

PRTR REPORTING



Environmental Protection Agency

| PRTR# : W0034 | Facility Name : Dundalk Landfill & Civic Waste Facility | Filename : W0034_ PRTR 2013.xls | Return Year : 2013 |

[Guidance to completing the PRTR workbook](#)

AER Returns Workbook

Version 1.1.18

REFERENCE YEAR	2013
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1. FACILITY IDENTIFICATION

Parent Company Name	Dundalk Town Council
Facility Name	Dundalk Landfill & Civic Waste Facility
PRTR Identification Number	W0034
Licence Number	W0034-02

Waste or IPPC Classes of Activity

No.	class name
4.2	Recycling or reclamation of organic substances which are not used as solvents (including composting and other biological transformation processes).
3.11	Blending or mixture prior to submission to any activity referred to in a preceding paragraph of this Schedule.
3.12	Repackaging prior to submission to any activity referred to in a preceding paragraph of this Schedule.
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.
4.3	Recycling or reclamation of metals and metal compounds.
4.4	Recycling or reclamation of other inorganic materials.
Address 1	Newry Road
Address 2	Dundalk
Address 3	Co. Louth
Address 4	
	Louth
Country	Ireland
Coordinates of Location	-6.39622 54.0147
River Basin District	GBNIIENB
NACE Code	3832
Main Economic Activity	Recovery of sorted materials
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	086 6097315
AER Returns Contact Fax Number	041 6851623
Production Volume	20000.0
Production Volume Units	
Number of Installations	0
Number of Operating Hours in Year	0

Number of Employees	6
User Feedback/Comments	
Web Address	

2. PRTR CLASS ACTIVITIES

Activity Number	Activity Name
50.1	General
5(c)	Installations for the disposal of non-hazardous waste
50.1	General

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

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

4. WASTE IMPORTED/ACCEPTED ONTO SITE

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

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

5. ONSITE TREATMENT & OFFSITE TRANSFERS OF WASTE

| PRTR# : W0034 | Facility Name : Dundalk Landfill & Civic Waste Facility | Filename : W0034_PRTR 2013.xls | Return Year : 2013 |

17/04/2014 11:17

Please enter all quantities on this sheet in Tonnes

0

Transfer Destination	European Waste Code	Hazardous	Quantity (Tonnes per Year)	Description of Waste	Waste Treatment Operation	Method Used		Location of Treatment	Haz Waste : Name and Licence/Permit No of Next Destination Facility Haz Waste : Name and Licence/Permit No of Recover/Disposer	Haz Waste : Address of Next Destination Facility Non Haz Waste: Address of Recover/Disposer	Name and License / Permit No. and Address of Final Recoverer / Disposer (HAZARDOUS WASTE ONLY)	Actual Address of Final Destination i.e. Final Recovery / Disposal Site (HAZARDOUS WASTE ONLY)
						M/C/E	Method Used					
Within the Country	13 02 05	Yes	6.54	mineral-based non-chlorinated engine, gear and lubricating oils	R9	M	Weighed	Offsite in Ireland	Enva ,WO184-01	Clonminam Industrial Estate,Portlaoise,Co. Laois ,Ireland	Enva,W0184-01,Clonminam ,Industrial,Estate,Portlaois,Ireland	Enva,Clonminam ,Industrial,Portlaois,Ireland
To Other Countries	15 01 01	No	1238.0	paper and cardboard packaging	R3	M	Weighed	Abroad	Peute Europe,nl 6000076	Baahoekweg 4,LA Dordrecht,,Netherlands		
Within the Country	15 01 02	No	557.0	plastic packaging	R3	M	Weighed	Offsite in Ireland	Shrabra Plastic IRL,Licence No 15/5	Castleblayey,Co Monaghan,,Ireland		
Within the Country	15 01 03	No	446.0	wooden packaging	D1	M	Weighed	Offsite in Ireland	Whiteriver Landfill Site ,W0060-03	Townland,Dunleer,,Co Louth,Ireland		
To Other Countries	15 01 04	No	325.0	metallic packaging	R4	M	Weighed	Abroad	John Tinnelly & Sons,WSEX 20/01	Newtowncloughogue,Newry, Co Down,BT38 8LZ,United Kingdom		
To Other Countries	15 01 07	No	415.0	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	8.0	lead batteries	R4	M	Weighed	Offsite in Ireland	Rilta Environmental Ltd,Licence No W0192-02	Block 402 Grants Drive,Greenogue Business Park,Rathcoole ,Co Dublin,Ireland	Rilta Env,W0192-02,Block 402,Grant Drive,Greenogue,Rathcoole,Ireland	Rilta Env,Block 402,Grant Drive,Greenogue,Ireland
Within the Country	17 01 07	No	1067.0	mixture of concrete, bricks, tiles and ceramics other than those mentioned in 17 01 06	R5	M	Weighed	Offsite in Ireland	Whiteriver Landfill Site ,W0060-03	Townland,Dunleer,,Co Louth,Ireland		
To Other Countries	20 01 11	No	23.0	textiles	R3	M	Weighed	Abroad	Cookstown NI WMEX 01/11,Cookstown NI WMEX 01/11	36 Magheralane Road,Randalstown,County Antrim,,United Kingdom		
Within the Country	20 01 28	No	3.86	paint, inks, adhesives and resins other than those mentioned in 20 01 27	R3	M	Weighed	Offsite in Ireland	Enva ,WO184-01	Clonminam Industrial Estate,Portlaoise,Co. Laois ,Ireland		
Within the Country	20 01 38	No	510.0	wood other than that mentioned in 20 01 37	R3	M	Weighed	Offsite in Ireland	Whiteriver Landfill Site ,W0060-03	Townland,Dunleer,,Co Louth,Ireland		
Within the Country	20 02 01	No	2607.0	biodegradable waste	R3	M	Weighed	Onsite of generati V& W Recycling	,W0034-02	Road,Dundalk,,Ireland		
Within the Country	20 03 01	No	318.0	mixed municipal waste	D1	M	Weighed	Offsite in Ireland	Whiteriver Landfill Site ,W0060-03	Townland,Dunleer,,Co Louth,Ireland		

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

4.3 RELEASES TO WASTEWATER OR SEWER

[Link to previous years emissions data](#)

| PRTR# : W0034 | Facility Name : Dundalk Landfill & Civic Waste Facility | Filename : W0034_PRTR

17/04/2014 11:16

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			
No. Annex II	Name	M/C/E	Method Used		S1				
			Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year	
06	Ammonia (NH3)	C	OTH		0.0	0.0	0.0	0.0	
					0.0	0.0	0.0	0.0	
					320.0	320.0	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			
Pollutant No.	Name	M/C/E	Method Used		S1				
			Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year	
303	BOD	C	OTH		0.0	0.0	0.0	0.0	
306	COD	C	OTH		8112.0	8112.0	0.0	0.0	
240	Suspended Solids	C	OTH		24000.0	24000.0	0.0	0.0	
343	Sulphate	C	OTH		1804.0	1804.0	0.0	0.0	
					488.0	488.0	0.0	0.0	

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

4.1 RELEASES TO AIR

[Link to previous years emissions data](#)

| PRTR# : W0034 | Facility Name : Dundalk Landfill & Civic Waste Facility | Filename : W0034_PRTR 2013.xls | Return Year : 2013 |

17/04/2014 11:16

SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS

POLLUTANT		METHOD		Please enter all quantities in this section in KGs				
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
01	Methane (CH4)	M	OTH		0.0	0.0	0.0	0.0
					0.0	75822.0	0.0	75822.0

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

SECTION B : REMAINING PRTR POLLUTANTS

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

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

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

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

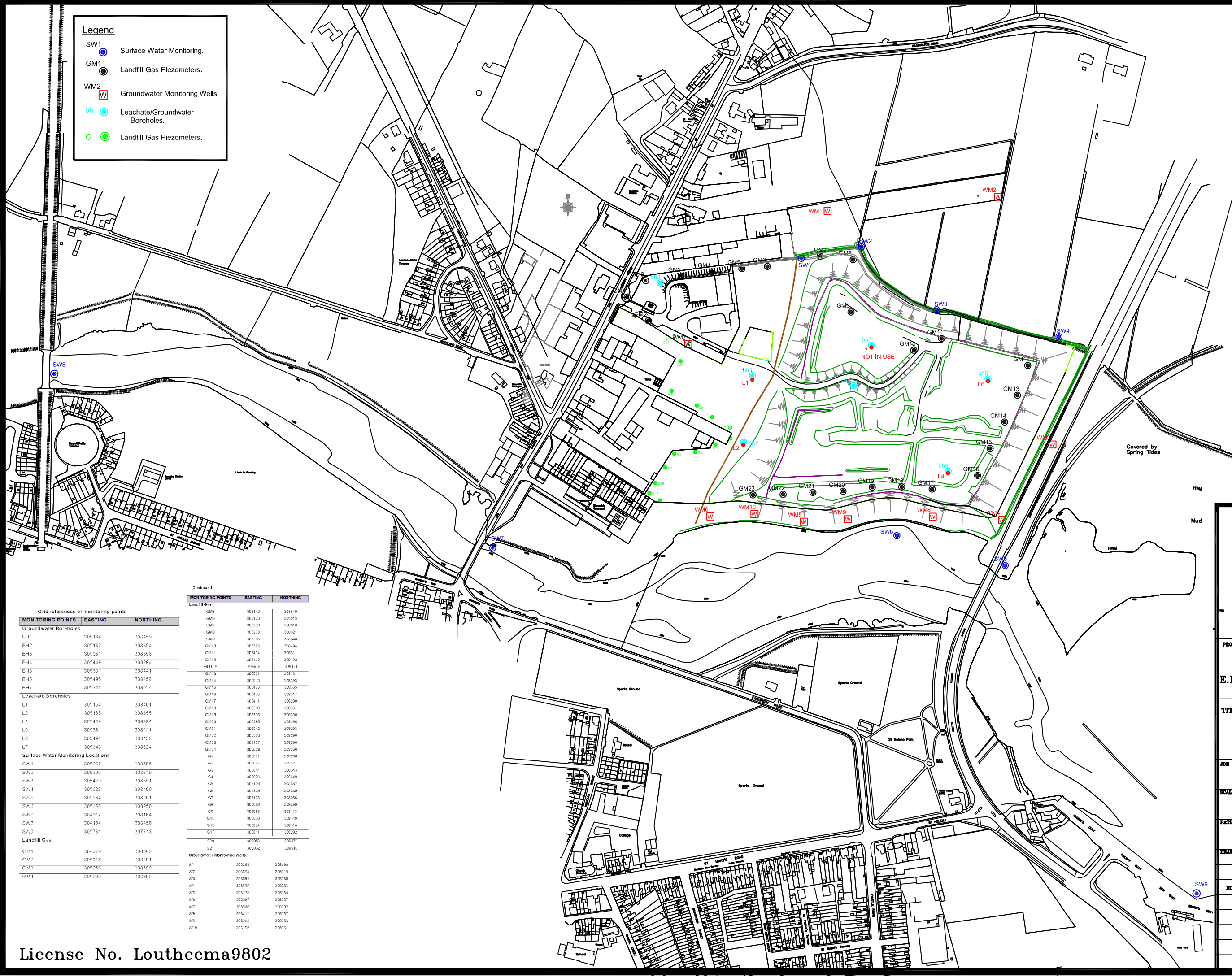
Landfill:	Dundalk Landfill & Civic Waste Facility				
Please enter summary data on the quantities of methane flared and / or utilised	T (Total) kg/Year	M/C/E	Method Used		Facility Total Capacity m3 per hour
Total estimated methane generation (as per site model)	262043.0	C	Gassim Curve		N/A
Methane flared	186221.0	M	Flare records		0.0 (Total Flaring Capacity)
Methane utilised in engine/s	0.0				0.0 (Total Utilising Capacity)
Net methane emission (as reported in Section A above)	75822.0				N/A

APPENDIX C

MONITORING POINTS DRAWING

Legend

- SW1 Surface Water Monitoring.
- GM1 Landfill Gas Piezometers.
- WM2 Groundwater Monitoring Wells.
- bh Leachate/Groundwater Boreholes.
- G Landfill Gas Piezometers.



Grid references of monitoring points

MONITORING POINTS	EASTING	NORTHING
Groundwater Boreholes		
LH11	305164	308459
BH2	305132	308354
BH3	305031	308308
BH4	305449	308394
BH5	305531	308441
BH5	305495	308458
BH7	305344	308324
Leachate Boreholes		
L1	305164	308461
L2	305138	308355
L1	305419	308391
L5	305531	308411
L6	305494	308458
L7	305343	308324
Surface Water Monitoring Locations		
SW1	305037	308608
SW2	305305	308640
SW3	305423	308501
SW4	305625	308400
SW5	305534	308201
SW6	305465	308350
SW7	305917	308164
SW8	304164	308456
SW9	305781	307718
Landfill Gas		
GM1	304973	308169
GM7	305015	308191
GM3	305068	308199
GM4	305099	308505

Continued

MONITORING POINTS	EASTING	NORTHING
Landfill Gas		
GM5	305142	308610
GM6	305170	308615
GM7	305220	308616
GM8	305273	308621
GM9	305296	308648
GM10	305385	308494
GM11	305424	308511
GM12	305482	308492
GM12A	305616	308471
GM13	305531	308451
GM14	305570	308395
GM15	305585	308355
GM16	305475	308317
GM17	305411	308298
GM18	305398	308301
GM19	305226	308300
GM20	305385	308295
GM21	305242	308293
GM22	305200	308290
GM23	305197	308290
GM24	305209	308250
G1	305574	308396
G2	305534	308377
G3	305541	308343
G4	305576	308348
G6	305108	308362
G6	305128	308360
G7	305123	308386
G8	305238	308399
G8	305283	308413
G10	305230	308449
G16	305224	308310
G17	305511	308292
G20	305555	308479
G21	305552	308516
Groundwater Monitoring Wells		
WM1	305263	308690
WM2	305504	308710
WM3	305581	308330
WM4	305559	308233
WM5	305229	308250
WM6	305097	308257
WM7	305096	308302
WM8	305412	308257
WM9	305292	308253
WM10	305159	308251

**COMHAIRLE BHAILE
DUN DEALGAN**

DUNDALK TOWN COUNCIL
Phoib (2002) 2000075 Part (2002) 2000001

TOWN ENGINEER:- C. DUFF

PROJECT:- Landfill Site
Newry Road.
E.P.A. LICENCE No.WL 34-2

TITLE:-
Location Map

JOB NO:- NO.2	DRN.NO:- 1
SCALE:- 1 / 2500	DATE:- 14/06/05

PATH:-
N:\Landfill\Landfill drawings\
Monitoring Locations.dwg

DRAWING BY:-
P Mulligan

DRN. No. REVISION

NO	DATE	DETAILS

APPENDIX D

LEACHATE RESULTS



Dundalk Landfill Site
LEACHATE QUALITY

Monitoring Point:		LH1											
PARAMETERS	Units	RESULTS											
		Date											
		25-Jan-11	11-Apr-11	11-Jul-11	03-Oct-11	16-Jan-12	23-Apr-12	23-Jul-12	08-Oct-12	30-Jan-13	15-Apr-13	22-Jul-13	07-Oct-13
Alkalinity	mg/l CaCO3												
Aluminium	µg/l		5.3				6.5				<5		
Ammonia	mg/l N	104.63	102.03	101.78	90.83	93.87	107.62	99.60	101.22	113.65	100.89	11.54	102.62
Antimony	µg/l						<0.5				<0.5		
Arsenic	µg/l						0.76				<0.5		
Barium	µg/l						465.9				500.4		
Beryllium	µg/l						<0.5				<0.5		
B.O.D.	mg/l O2	20.2	21.6	10.8	15	11.7	24.1	14.0	9.6	19.6	16.6	17.8	<10
Boron	µg/l		1249.9				1594.7				1150.7		
Cadmium	µg/l		<0.1				<0.1				<0.1		
Calcium	mg/l Ca		180.02				204.92				161.65		
C.O.D.	mg/l O2	83	95	100	107	102	80	82	104	120	95	32	109
Chloride	mg/l Cl	161	154	203	231	195	159	195	182	146	114	50	154
Chromium	µg/l		9.7				7.4				7.5		
Cobalt (µg/l)	µg/l						2.2				3.2		
Conductivity	µS/cm @ 25	2600	2710	2560	2630	2660	2480	2580	2690	2750	2450	1062	2590
Copper	µg/l		<0.5				<0.5				0.7		
Cyanide	mg/l CN	<0.01	nm	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
D.O.	% Saturation												
Fluoride	mg/l		<0.150				<0.150				<0.150		
Iron	µg/l		19811.7				30384.3				102.3		
Lead	µg/l		<0.5				<0.5				<0.5		
Magnesium	mg/l Mg		62.84				66.33				54.11		
Manganese	µg/l		565.6				647.2				520.1		
Mercury	µg/l		<0.05				<0.05				<0.05		
Molybdenum	µg/l						0.5				5.5		
Nickel	µg/l		<0.5				1.2				8.5		
o-Phosphate	mg/l P	<0.02	<0.02	<0.02	0.12	0.17	<0.02	<0.02	0.02	0.13	<0.02	<0.02	<0.02
pH		6.8	6.9	6.7	6.8	6.9	6.9	7.0	6.7	6.8	6.8	7.2	6.8
Potassium	mg/l		62.55				70.91				55.18		
Residue on Evaporation													
Sampling Depth (m)	m												
Selenium	µg/l						<0.5				<0.5		
Silver	µg/l						nm				nm		
Sodium	mg/l		111.5				130.76				99.43		
Strontium	µg/l						1169.14				956.28		
Sulphate	mg/l SO4		2.2				4.1				<2.0		
Suspended Solids	mg/l												
Temp	°C	11.1	nm	18.2	16.1	10.8	10.5	18.2	12.8	9.1	12.1	11.3	13.1
Thallium	µg/l						<0.1				<0.1		
Time Sampled		11:15	0.454861	11:00	10:15	11:10	10:30	10:20	10:45	09:30	10:35	12:25	10:30
Tin (µg/l)	µg/l						<1				nm		
T.O.C.	mg/l												
T.O.N	mg/l N	0.18	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	7.32	<0.08
Total S Solids	mg/l												
Uranium	µg/l						<0.1				<0.1		
Vanadium	µg/l						1.07				0.7		
Zinc	µg/l		5				2.4				57.6		



Dundalk Landfill Site
LEACHATE QUALITY

Monitoring Point:		LH2											
		RESULTS											
PARAMETERS	Units	Date											
		25-Jan-11	11-Apr-11	11-Jul-11	03-Oct-11	16-Jan-12	23-Apr-12	23-Jul-12	08-Oct-12	30-Jan-13	15-Apr-13	22-Jul-13	07-Oct-13
Alkalinity	mg/l CaCO3												
Aluminium	µg/l		63.8				5				<5		
Ammonia	mg/l N	81.31	101.56	100.18	25.18	56.09	104.8	8.40	76.78	22.51	93.57	11.54	12.19
Antimony	µg/l						<0.5				0.63		
Arsenic	µg/l						1.23				0.88		
Barium	µg/l						393.3				707.7		
Beryllium	µg/l						<0.5				<0.5		
B.O.D.	mg/l O2	144.4	26	7.1	24.2	10.1	15.8	nm	18.5	15.4	16	17.8	<10
Boron	µg/l		1401.9				1858.9				1162.5		
Cadmium	µg/l		0.1				<0.1				<0.1		
Calcium	mg/l Ca		226.83				260.08				228.26		
C.O.D.	mg/l O2	222	168	100	38	77	148	21	144	92	107	32	49
Chloride	mg/l Cl	78	112	108	27	78	114	11	79	39	85	50	76
Chromium	µg/l		17.6				2.7				6.6		
Cobalt (µg/l)	µg/l						2.6				5		
Conductivity	µS/cm @ 25	2300	2810	2610	1148	2110	2700	685	2320	1424	2660	1062	1212
Copper	µg/l		4				0.5				3.5		
Cyanide	mg/l CN	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
D.O.	% Saturation												
Fluoride	mg/l		<0.150				0.15				<0.150		
Iron	µg/l		54713.6				10759.3				178.8		
Lead	µg/l		3.8				<0.5				<0.5		
Magnesium	mg/l Mg		73.28				86.04				67.69		
Manganese	µg/l		784.4				855.8				639.4		
Mercury	µg/l		<0.05				<0.05				<0.05		
Molybdenum	µg/l						1.6				5.5		
Nickel	µg/l		1.5				2.2				11.1		
o-Phosphate	mg/l P	0.10	0.15	0.03	0.16	0.16	0.03	0.04	0.19	0.02	<0.02	<0.02	0.02
pH		6.9	6.9	6.8	6.9	6.9	7.1	7.2	6.8	6.8	6.9	7.2	7.2
Potassium	mg/l		73.94				92.07				63.17		
Residue on Evaporation													
Sampling Depth (m)	m												
Selenium	µg/l						<0.5				<0.5		
Silver	µg/l						nm				nm		
Sodium	mg/l		102.15				124.94				90.9		
Strontium	µg/l						1043.19				931.56		
Sulphate	mg/l SO4		<2.0				4.1				77.3		
Suspended Solids	mg/l												
Temp	°C	10.0	nm	17.9	16.7	10	10.7	17.9	13.0	8.1	11.9	11.3	12.6
Thallium	µg/l						<0.1				<0.1		
Time Sampled		11:45	11:20	11:25	10:35	11:25	10:45	10:35	11:00	09:55	11:00	12:25	10:40
Tin (µg/l)	µg/l						<1				nm		
T.O.C.	mg/l												
T.O.N	mg/l N	<0.08	<0.08	0.16	<0.08	<0.08	0.3	0.13	0.98	0.11	0.3	7.32	4.08
Total S Solids	mg/l												
Uranium	µg/l						0.1				0.46		
Vanadium	µg/l						0.7				0.83		
Zinc	µg/l		31.7				23				110.6		



Dundalk Landfill Site
LEACHATE QUALITY

Monitoring Point:		LH4											
PARAMETERS	Units	RESULTS											
		Date											
		25-Jan-11	11-Apr-11	11-Jul-11	03-Oct-11	16-Jan-12	23-Apr-12	23-Jul-12	08-Oct-12	30-Jan-13	15-Apr-13	22-Jul-13	07-Oct-13
Alkalinity	mg/l CaCO3												
Aluminium	µg/l		68				9.5				8.3		
Ammonia	mg/l N	195.90	1.95	196.2	154.17	1.64	1.63	154.03	114.18	121.22	106.56	132.12	117.27
Antimony	µg/l						<0.5				<0.5		
Arsenic	µg/l						2.6				0.71		
Barium	µg/l						185.2				117.9		
Beryllium	µg/l						<0.5				<0.5		
B.O.D.	mg/l O2	16.1	24.8	11	19	44.4	71.1	1121.0	33.8	72.1	30.2	142.8	82
Boron	µg/l		1713.5				2319.3				1045.3		
Cadmium	µg/l		<0.1				<0.1				<0.1		
Calcium	mg/l Ca		159.24				194.66				135.03		
C.O.D.	mg/l O2	174	180	266	140	249	265	2450	176	197	218	217	275
Chloride	mg/l Cl	168	211	397	187	181	185	34	132	129	95	130	234
Chromium	µg/l		6				1.3				3.7		
Cobalt (µg/l)	µg/l						4.6				3.2		
Conductivity	µS/cm @ 25	3450	3810	4410	3360	3890	3570	1690	2790	2650	2350	2660	3310
Copper	µg/l		1.3				<0.5				4.8		
Cyanide	mg/l CN	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
D.O.	% Saturation												
Fluoride	mg/l		<0.150				<0.150				<0.150		
Iron	µg/l		15907.8				29832.9				2079.2		
Lead	µg/l		0.5				<0.5				<0.5		
Magnesium	mg/l Mg		88.67				100.14				51.61		
Manganese	µg/l		786				1060				1154.5		
Mercury	µg/l		<0.05				<0.05				<0.05		
Molybdenum	µg/l						<0.5				<0.5		
Nickel	µg/l		1.7				3.8				4.6		
o-Phosphate	mg/l P	0.38	0.23	0.07	0.36	1.24	0.57	<0.02	0.16	0.44	1.02	0.1	<0.02
pH		6.9	7	6.9	6.9	6.9	7	7.2	6.8	6.8	6.8	6.8	6.9
Potassium	mg/l		136.66				157.91				75.82		
Residue on Evaporation													
Sampling Depth (m)	m												
Selenium	µg/l						0.5				<0.5		
Silver	µg/l						nm				nm		
Strontium	µg/l						203.55				93.03		
Sodium	mg/l		188.7				1101				749.32		
Sulphate	mg/l SO4		<2.0				2.2				4.2		
Suspended Solids	mg/l												
Temp	°C	13.6	nm	18.1	15.8	12.4	12.1	18.1	13.7	7.5	12.2	11.8	12.7
Thallium	µg/l						<0.1				<0.1		
Time Sampled		12:10	12:00	12:00	10:50	12:15	11:10	11:45	11:25	10:30	11:35	10:45	10:55
Tin (µg/l)	µg/l						<1				nm		
T.O.C.	mg/l												
T.O.N	mg/l N	<0.08	<0.08	<0.08	0.08	<0.08	<0.08	<0.08	0.89	<0.08	0.55	0.18	<0.08
Total S Solids	mg/l												
Uranium	µg/l						<0.1				0.1		
Vanadium	µg/l						2.51				1.12		
Zinc	µg/l		13				13.8				71.4		




Dundalk Landfill Site
LEACHATE QUALITY

Monitoring Point:		LH6											
PARAMETERS	Units	RESULTS											
		Date											
		25-Jan-11	11-Apr-11	11-Jul-11	03-Oct-11	16-Jan-12	23-Apr-12	23-Jul-12	08-Oct-12	30-Jan-13	15-Apr-13	22-Jul-13	07-Oct-13
Alkalinity	mg/l CaCO3												
Aluminium	µg/l		2554.8				17.5				6.7		
Ammonia	mg/l N	461.24	0.49	508.6	71.67	1.4	16.75	10.11	14.17	1.74	5.85	33.79	66.68
Antimony	µg/l						0.91				<0.5		
Arsenic	µg/l						4.53				1.03		
Barium	µg/l						103.4				50		
Beryllium	µg/l						<0.5				<0.5		
B.O.D.	mg/l O2	30.0	51.3	24	36	56.1	163.4	141.2	21.7	9	33.6	246.5	75
Boron	µg/l		2696.1				98.3				63.2		
Cadmium	µg/l		0.4				<0.1				<0.1		
Calcium	mg/l Ca		184.46				257.21				91.45		
C.O.D.	mg/l O2	424	785	684	275	557	757	819	255	58	92	1041	802
Chloride	mg/l Cl	341	570	484	164	334	40	31	28	12	26	53	69
Chromium	µg/l		16.4				<0.5				<0.5		
Cobalt (µg/l)	µg/l						1.9				1.5		
Conductivity	µS/cm @ 25	5760	7550	6910	2350	5080	1657	1096	1681	427	729	1727	2040
Copper	µg/l		20.6				<0.5				1.1		
Cyanide	mg/l CN	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	nm	<0.05	<0.05	<0.05	<0.05	<0.05
D.O.	% Saturation												
Fluoride	mg/l		<0.150				<0.150				<0.150		
Iron	µg/l		30512.2				32084.8				2325.8		
Lead	µg/l		16.6				<0.5				<0.5		
Magnesium	mg/l Mg		111.45				41.08				11.59		
Manganese	µg/l		1276.8				4272.6				2015.8		
Mercury	µg/l		<0.05				<0.05				<0.05		
Molybdenum	µg/l						<0.5				<0.5		
Nickel	µg/l		91.6				1.8				2.8		
o-Phosphate	mg/l P	0.42	1.13	1.74	<0.02	0.96	<0.02	0.03	<0.02	0.06	0.09	nr	0.37
pH		7.0	7.2	7	6.8	7	7.1	7.0	6.7	7.1	6.8	6.8	6.8
Potassium	mg/l		341.6				17.36				6.7		
Residue on Evaporation													
Sampling Depth (m)	m												
Selenium	µg/l						0.6				<0.5		
Silver	µg/l						nm				nm		
Strontium	µg/l						101.34				27.96		
Sodium	mg/l		526.92				653.49				245.66		
Sulphate	mg/l SO4		28.3				4.5				5.2		
Suspended Solids	mg/l												
Temp	°C	16.9	nm	18	18.4	16	12.2	18.0	14.7	6.9	10.1	11.6	14.2
Thallium	µg/l						<0.1				<0.1		
Time Sampled		12:35	12:30	12:20	11:10	12:45	11:30	12:10	11:50	10:50	11:55	11:30	11:20
Tin (µg/l)	µg/l						<1				nm		
T.O.C.	mg/l												
T.O.N	mg/l N	<0.08	<0.08	<0.08	0.17	<0.08	<0.08	<0.08	<0.08	0.08	<0.08	<0.08	<0.08
Total S Solids	mg/l												
Uranium	µg/l						1.38				0.3		
Vanadium	µg/l						3.56				0.82		
Zinc	µg/l		390.9				3.1				31.8		

APPENDIX E

GROUNDWATER RESULTS

		S.I. No. 9/2010 — European Communities Environmental Objectives (Groundwater)	EPA Interim guideline values (IGV)	EC (Drinking water) Regulations 2007 (SI .no 278 of 2007)	EC (Quality of Surface Water Intended for the Abstraction of Drinking Water) Regulations 1989 S.I. No.294/1989	WFD	European Communities Environmental Objectives (Surface Water) Regulations 2009 Environmental quality standard (EQS)	
PARAMETERS	UNITS						Annual Mean	95%ile
Alkalinity	mg/l CaCO3		NAC					
Aluminium	µg/l	150	0.2 mg/l	200				
Ammonia	mg/l N	65-175 µg/l N-	0.15 mg/l (0.11 mg/l N)	0.3 mg/l (0.23 mg/l N)	A1- 0.2 or 0.16 mg/l N) (A2- 1.5) (A3- 4)		0.065 good 0.040 high	0.140 good 0.090 high
Antimony	µg/l			5		0.4		
Arsenic	µg/l	7.5		10			25	25
Barium	mg/l		0.1		(A1- 0.1) (A2- 1)	75		
Beryllium	µg/l							
B.O.D.	mg/l				(A1- 5) (A2- 5), (A3- 7)		1.50 good 1.30 high	2.60 good 2.20 high
Boron	µg/l	750	1000	1000	2000	6.5		
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	0.3		
Calcium	µg/l					0.2		
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) mg/l	0.5	5 or 30	5 or 30
Cyanide	µg/l	37.5	0.01 mg/l	50	50		10	10
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)	1000	500	500
Iron	µg/l		200	200	(A1- 200) (A2- 2000)			
Lead	µg/l	18.75	10	25	50		7.2 AA EQS	
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	0.05
Molybdenum	µg/l	35				4.3		
Nickel	µg/l	15	20	20			20 AA EQS	
o-Phosphate	mg/l P		0.03				0.035 good 0.025 high	0.075 good 0.045 high
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/l CaCO3 Hard Water 6.0< pH < 9.0 Water hardness > 100 mg/l CaCO3	
Phenol	mg/l		0.0005		(A1- 0.5) (A2- 5) (A3- 100)		8 AA EQS 46 MAC EQS	
Potassium	mg/l		5					
Selenium	µg/l			10		5.3		
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						0.2		
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							
Total S Solids	mg/l				50			
Uranium	µg/l					0.9		
Vanadium	µg/l							
Zinc	µg/l		100		(A1- 3000) (A2- 5000)	2.3	8 or 50 or 100 AA EQS	

AA-EQS means that for each representative monitoring point within the waterbody, the arithmetic mean of the concentrations measured over a twelve month monitoring period does not exceed the standard.
EQS-MAC means that the measured concentration at any representative monitoring point within the water body must not exceed the standard.



GROUNDWATER QUALITY
WM1

Monitoring Point:

RESULTS

Date

PARAMETERS	Units	21-Sep-11	03-Oct-11	07-Nov-11	12-Dec-11	16-Jan-12	06-Feb-12	12-Mar-12	23-Apr-12	14-May-12	06-Jun-12	23-Jul-12	13-Aug-12	10-Sep-12	08-Oct-12	05-Nov-12	10-Dec-12	30-Jan-13	11-Feb-13	25-Mar-13	15-Apr-13	07-May-13	10-Jun-13	22-Jul-13	06-Aug-13	16-Sep-13	#####	#####	#####		
Alkalinity	mg/l CaCO3								396												436										
Aluminium	µg/l								<5												<5										
Ammonia	mg/l N	0.87	0.05	0.04	0.17	0.05	0.07	<0.03	<0.03	<0.03	0.06	0.04	<0.03	0.05	0.04	0.03	0.06	0.06	0.11	<0.03	0.09	<0.03	<0.03	<0.03	0.06	0.09	0.13	0.3	0.15		
Antimony	µg/l								<0.5												<0.5										
Arsenic	µg/l								<0.5												0.57										
Barium	µg/l								87.9												96.4										
Beryllium	µg/l								<0.5												<0.5										
B.O.D.	mg/l O2																														
Boron	µg/l								421.7												390.8										
Cadmium	µg/l								<0.1												<0.1										
Calcium	mg/l Ca								102.99												100.82										
C.O.D.	mg/l O2																														
Chloride	mg/l Cl	393	459	520	398	524	553	471	512	486	464	435	435	436	463	483	482	454	469	467	495	480	459	475	434	417	433	418	401		
Chromium	µg/l								<0.5												<0.5										
Cobalt	µg/l								<0.5												<0.5										
Conductivity	µS/cm @ 25	2310	2700	2700	2090	2890	2760	2680	2680	2620	16860	2600	2730	2700	2720	3090	2560	2580	2590	2670	2800	2750	2700	2700	2630	2590	2590	2560	2480		
Copper	µg/l								<0.5												0.7										
Cyanide	mg/l CN								<0.05												<0.05										
D.O.	% Saturation		34			26			22			27			18			40			29		17				31				
Fluoride	mg/l		<0.150						<0.60												0.2										
Iron	µg/l								<10												<10										
Lead	µg/l								<0.5												<0.5										
Magnesium	mg/l Mg								54.92												48.83										
Manganese	µg/l								9.7												2.5										
Mercury	µg/l								<0.05												<0.05										
Molybdenum	µg/l								1.9												2										
Nickel	µg/l								<0.5												0.9										
p-Phosphate	mg/l P		0.02						0.03												<0.02										
pH			7.3			7.5			7.6			7.4			7.3			7.4			7.5		7.4				7.4				
Potassium	mg/l								23												21.43										
Residue on Evaporation	mg/l								1654												1723										
Sampling Depth	m	2.5		nm	1.9	2.8	1.2	nm	2.9	3	nm	2.9	2.3	2.9	2.9	2.9	2.9	2.6	2.5	2.8	3.1	2.8	3.1	2.9	2.9	3.1	2.9	2.9	nm		
Selenium	µg/l								<0.5												<0.5										
Silver	µg/l								nm												nm										
Sodium	mg/l								461.43												399.21										
Strontium	µg/l								567.58												531.62										
Sulphate	mg/l SO4		225						249.4												292.5										
Suspended Solids	mg/l																														
Temp	°C		16.6			9.4			12.1			16			15.5			7.9			12.8			16.8			14.8				
Thallium	µg/l								<0.1												<0.1										
Time Sampled		10:45	11:00	11:15	16:10	12:05	10:40	10:10	10:05	11:15	10:40	10:30	10:05	10:00	11:40	09:15	9:30	11:30	10:20	10:55	10:35	10:15	09:50	10:10	13:10	10:05	11:00	11:50	10:15		
Tin	µg/l								<1												nm										
T.O.C.	mg/l					108			111.5						3			3.1			2.3			2.7			3.1				
T.O.N	mg/l N		1.8						0.97												0.37										
Total S Solids	mg/l																														
Uranium	µg/l								1.08												1.53										
Vanadium	µg/l								0.59												<0.5										
Zinc	µg/l								<0.5												2.2										
Water Level m OD	4.77	2.27	4.77		2.87	1.97	3.57		1.87	1.77		1.87	2.47	1.87	1.87	1.87	1.87	2.17	2.27	1.97	1.67	1.97	1.67	1.87	1.87	1.67	1.87	1.87			

GROUNDWATER QUALITY
WM4

RESULTS

PARAMETERS	Units	Date																													
		21-Sep-11	03-Oct-11	07-Nov-11	12-Dec-11	16-Jan-12	06-Feb-12	12-Mar-12	23-Apr-12	14-May-12	06-Jun-12	23-Jul-12	13-Aug-12	10-Sep-12	08-Oct-12	05-Nov-12	10-Dec-12	30-Jan-13	11-Feb-13	25-Mar-13	15-Apr-13	07-May-13	10-Jun-13	22-Jul-13	06-Aug-13	16-Sep-13	#####	#####	#####		
Alkalinity	mg/l CaCO3							1020													913										
Aluminium	µg/l							<5													<5										
Ammonia	mg/l N	27.71	27.17	11.91	20.5	25.52	14.98	0.06	30.36	22.42	17.25	36.98	39.89	31.47	17.56	40.52	35	24.8	24.79	14.42	25.5		28.27	32.37	44.15	16.68	45.45	40	38		
Antimony	µg/l							<0.5													<0.5										
Arsenic	µg/l							<5													1.18										
Barium	µg/l							31.3													28.5										
Beryllium	µg/l							<0.5													<0.5										
B.O.D.	mg/l O2																														
Boron	µg/l							1879.5													1381.4										
Cadmium	µg/l							<0.1													<0.1										
Calcium	mg/l Ca							229.75													166.68										
C.O.D.	mg/l O2																														
Chloride	mg/l Cl	3575	5427	6878	5039	3395	2844	473	3670	4750	5943	3669	3145	2909	4441	3424	3581	3638	3186	3031	3157		3027	3872	3370	5664	3705	4490	5020		
Chromium	µg/l							<0.5													2.2										
Cobalt	µg/l							2													1.9										
Conductivity	µS/cm @ 25	12330	18630	20900	14130	12180	10320	2670	12500	14390	7960	13400	11550	11520	14710	13790	10750	11540	10580	9980	11110	10300	10710	12460	11350	18430	12410	14640	11600		
Copper	µg/l							<0.5													<0.5										
Cyanide	mg/l CN							<0.05													18										
D.O.	% Saturation		23			21		20				35			17				17					17				18			
Fluoride	mg/l							<0.60													0.2										
Iron	µg/l							814.5													1173.2										
Lead	µg/l							<0.5													<0.5										
Magnesium	mg/l Mg							319.23													215.58										
Manganese	µg/l							926.1													870										
Mercury	µg/l							<0.05													<0.05										
Molybdenum	µg/l							2.3													2.2										
Nickel	µg/l							1.9													3.3										
o-Phosphate	mg/l P							0.49													0.65										
pH			7			7.2		7.1				7.2			6.9				7					7				7.1			
Potassium	mg/l							146.12													110.59										
Residue on Evaporation	mg/l							8423													7377										
Sampling Depth	m	4	4.7	nm	1.2	5	1.3	nm	4.6	4.5	nm	3.5	4	4.1	5	4.6	5	2.5	3.2	4.5	5.5	3.6	4.4	3.8	3.9	4	4.4	4	4.1		
Selenium	µg/l							6.4													4.1										
Silver	µg/l							nm													nm										
Sodium	mg/l							2498.04													1599.81										
Strontium	µg/l							2293.52													1599.91										
Sulphate	mg/l SO4							486.2													26										
Suspended Solids	mg/l																														
Temp	°C		17.5			9.9		11.9				18			15.4				10.1		12.6			16.6				14.5			
Thallium	µg/l							<0.1													<0.1										
Time Sampled		11:45	11:30	11:45	16:45	13:00	13:35	13:15	11:15	12:00	12:20	12:45	15:30	13:10	13:10	11:50	11:00	12:40	13:10	12:20	12:40	11:45	10:55	12:15	14:35	14:00	11:20	12:35	13:10		
Tin	µg/l							<1													nm										
T.O.C.	mg/l		21.1			221		225							17.6			18.2			20.3			19.8				21.9			
T.O.N	mg/l N							0.16													<0.08										
Total S Solids	mg/l																														
Uranium	µg/l							0.49													0.55										
Vanadium	µg/l							1.24													0.75										
Zinc	µg/l							<0.5													4.1										
Water Level m OD		5.12	1.12	0.42		3.92		3.82		0.52	0.62		1.62	1.12	1.02	0.12	0.52	0.12	2.62	1.92	0.62	-0.38	1.52	0.72	1.32	1.22	1.12	0.72	1.12	1.02	

PARAMETERS		Dundalk Landfill Site																											
		GROUNDWATER QUALITY WMS																											
Monitoring Point:		RESULTS																											
Units		Date																											
		21-Sep-11	03-Oct-11	07-Nov-11	12-Dec-11	16-Jan-12	06-Feb-12	12-Mar-12	23-Apr-12	14-May-12	06-Jun-12	23-Jul-12	13-Aug-12	10-Sep-12	08-Oct-12	05-Nov-12	10-Dec-12	30-Jan-13	11-Feb-13	25-Mar-13	15-Apr-13	07-May-13	10-Jun-13	22-Jul-13	06-Aug-13	16-Sep-13	#####	#####	#####
Alkalinity	mg/l CaCO3							1360													1000								
Aluminium	µg/l							5.8													<5								
Ammonia	mg/l N	30.12	33.26	51.34	10.31	75.68	87.15	30.2	28.48	25.88	20.56	37.04	14.34	33.82	27.59	42.91	44.31	60.2	38.34	33.45	59.59	41.93	26.23	22.67	26.04	26.67	39.61	50	43
Antimony	µg/l							<0.5													<0.5								
Arsenic	µg/l							3.81													1.15								
Barium	µg/l							221.3													157.7								
Beryllium	µg/l							<0.5													<0.5								
B.O.D.	mg/l O2																												
Boron	µg/l							2055.3													1038.4								
Cadmium	µg/l							<0.1													<0.1								
Calcium	mg/l Ca							194.49													142.78								
C.O.D.	mg/l O2																												
Chloride	mg/l Cl	2496	2792	3574	1214	2542	1789	1783	1970	2158	2192	2504	1556	2700	3289	2869	2569	180	186	190	246	305	365	481	595	778	1190	1190	1320
Chromium	µg/l							0.8													3.1								
Cobalt	µg/l							2.3													2.3								
Conductivity	µS/cm @ 25	9750	11080	12230	4880	10130	7300	7360	7720	8260	2510	10080	6890	10810	12000	12270	8710	2410	2380	2460	2890	2910	3240	3880	4360	5250	6240	5780	6250
Copper	µg/l							0.5													<0.5								
Cyanide	mg/l CN							<0.05													<0.05								
D.O.	% Saturation		17			15		15				16					16			16				12				16	
Fluoride	mg/l		<0.150					<0.60													21								
Iron	µg/l							6968.1													1408.7								
Lead	µg/l							<0.5													<0.5								
Magnesium	mg/l Mg							215.18													77.43								
Manganese	µg/l							718.9													561.5								
Mercury	µg/l							<0.05													<0.05								
Molybdenum	µg/l							<0.5													<0.5								
Nickel	µg/l							2.6													3.2								
o-Phosphate	mg/l P		2.48					0.93													0.14								
pH			7.1			7.1		7.1				7.1						6.8			7			7.1				7.1	
Potassium	mg/l							110.26													66.01								
Residue on Evaporation	mg/l							474.7									5888				1610								
Sampling Depth	m	6.3		nm	3.7	5.3	2.4	nm	4.7	5.1	nm	4.7	4.2	5.1	5.3	4.8	5.3	4.4	3.4	4.8	5.3	4	4.5	3.7	4.1	4.5	5.1	4	4.2
Selenium	µg/l							<0.5													0.5								
Silver	µg/l							nm													nm								
Sodium	mg/l							1402.7													192.44								
Strontium	µg/l							1505.19													845.06								
Sulphate	mg/l SO4		318					209.9													24.8								
Suspended Solids	mg/l																												
Temp	°C		17.4			12.4		12.7				15.5								9.4				16.2				14.9	
Thallium	µg/l							<0.1													<0.1								
Time Sampled		13:35	11:45	13:40	17:30	13:50	12:30	12:45	11:30	12:20	13:40	11:50	14:40	12:05	12:50	13:15	12:55	11:45	12:00	08:30	12:25	13:40	12:35	11:25	12:00	12:00	12:10	11:25	11:55
Tin	µg/l							<1													nm								
T.O.C.	mg/l					294.5		318.4								52.5				43.4				22.1				20.5	
T.O.N	mg/l N		<0.08					0.16													1.95								
Total S Solids	mg/l							<0.1													<0.1								
Uranium	µg/l							1.53													1.1								
Vanadium	µg/l							4.3													4.1								
Zinc	µg/l							0.87	0.47												0.87								
Water Level m OD	5.57	-0.73	5.57		1.87	0.27	3.17		0.87	0.47		0.87	1.37	0.47	0.27	0.77	0.27	1.17	2.17	0.77	0.27	1.57	1.07	1.87	1.47	1.07	0.47	1.57	1.37

	Dundalk Landfill Site																														
	GROUNDWATER QUALITY																														
	WM6																														
	RESULTS																														
	Date																														
PARAMETERS	Units	21-Sep-11	03-Oct-11	07-Nov-11	12-Dec-11	16-Jan-12	06-Feb-12	12-Mar-12	23-Apr-12	14-May-12	06-Jun-12	23-Jul-12	13-Aug-12	10-Sep-12	08-Oct-12	05-Nov-12	10-Dec-12	30-Jan-13	11-Feb-13	25-Mar-13	15-Apr-13	07-May-13	10-Jun-13	22-Jul-13	06-Aug-13	16-Sep-13	#####	#####	#####		
Alkalinity	mg/l CaCO3							1040													1120										
Aluminium	µg/l							<5													<5										
Ammonia	mg/l N	75.79	78.39	65.05	71.02	67.11	59.59	56.17	55.37	50.5	50.81	58.74	54.01	67.27	77.64	54.54	56.22	51.94	57.99	79.17	77.35	80.24	75.83	97.43	86.81	80.68	28.99	75	92		
Antimony	µg/l							<0.5													<0.5										
Arsenic	µg/l							3.24													1.83										
Barium	µg/l							124													132.1										
Beryllium	µg/l							<0.5													<0.5										
B.O.D.	mg/l O2							1736.2													1217.6										
Boron	µg/l							<0.1													<0.1										
Cadmium	µg/l							122.15													132.83										
Calcium	mg/l Ca																														
C.O.D.	mg/l O2																														
Chloride	mg/l Cl	349	331	371	345	335	352	336	326	343	334	309	298	294	290	295	299	293	296	273	305	319	357	221	268	252	2271	301	283		
Chromium	µg/l							1.2													3.5										
Cobalt	µg/l							2.8													3.4										
Conductivity	µS/cm @ 25	3060	3060	2930	2620	3080	2720	2800	2690	2710	8420	2970	2890	2850	3140	3100	2760	2720	2720	2810	2940	2990	3140	2930	3000	2900	8530	2940	2870		
Copper	µg/l							4.5													6.2										
Cyanide	mg/l CN							<0.05													<0.05										
D.O.	% Saturation		<10			15			17			15			15			15					12				17				
Fluoride	mg/l							<0.60													0.25										
Iron	µg/l							353.9													89.7										
Lead	µg/l							<0.5													<0.5										
Magnesium	mg/l Mg							73.07													69.72										
Manganese	µg/l							188.1													305.5										
Mercury	µg/l							<0.05													<0.05										
Molybdenum	µg/l							1.3													2.9										
Nickel	µg/l							4.8													7.1										
o-Phosphate	mg/l P							0.03													<0.02										
pH			7.1			7.3			7.4			7.3			7.1			7.1					7					7.2			
Potassium	mg/l							103.76													87.39										
Residue on Evaporation	mg/l							1489													1545										
Sampling Depth	m	5	4.8 nm		3.9	4.9	2.5	nm	4.9	5	nm	4.9	4.3	5	5	4.8	5	4.3	3.7	3.5	4.7	4.3	4.8	4.4	4.5	4.8	4.7	4.2	4.6		
Selenium	µg/l							<0.5													0.5										
Silver	µg/l							nm													nm										
Sodium	mg/l							301.84													232.55										
Strontium	µg/l							771.63													804.54										
Sulphate	mg/l SO4							10.2													28.2										
Suspended Solids	mg/l																														
Temp	°C		17.2			12.6			12.7			16			15.8			9			14.1			15.4				14.7			
Thallium	µg/l							<0.1													<0.1										
Time Sampled		14:10	12:00	13:15	17:50	14:15	12:05	11:00	11:40	12:35	13:05	12:25	13:30	11:15	11:55	13:35	12:15	12:10	12:45	08:50	11:50	12:05	13:10	12:50	11:15	12:15	11:40	12:50	11:20		
Tin	µg/l							<1													nm										
T.O.C.	mg/l		94.5			247			241						30.7			23.1			72.5			>100			14.4				
T.O.N	mg/l N								3.47												0.39										
Total S Solids	mg/l																														
Uranium	µg/l								0.14												0.21										
Vanadium	µg/l								0.87												0.87										
Zinc	µg/l								9.9												10.1										
Water Level m OD	5.87	0.87	1.07		1.97	0.97	3.37		0.97	0.87		0.97	1.57	0.87	0.87	1.07	0.87	1.57	2.17	2.37	1.17	1.57	1.07	1.47	1.37	1.07	1.17	1.67	1.27		



Dundalk Landfill Site

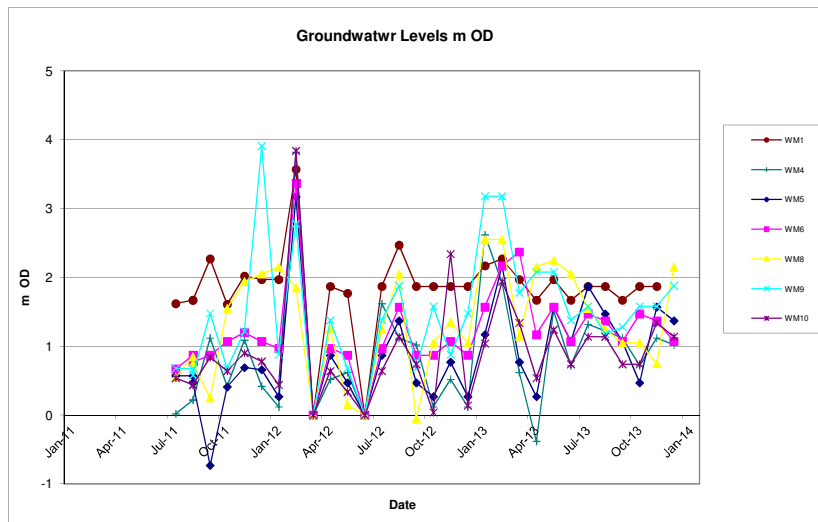
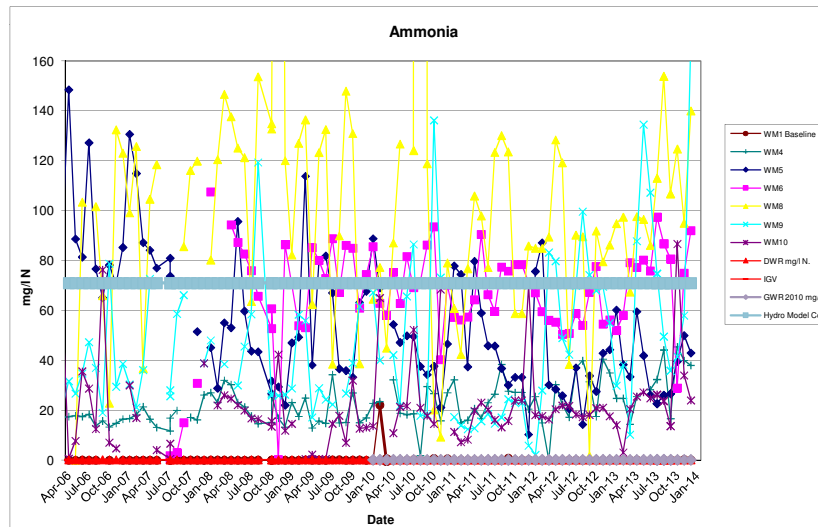
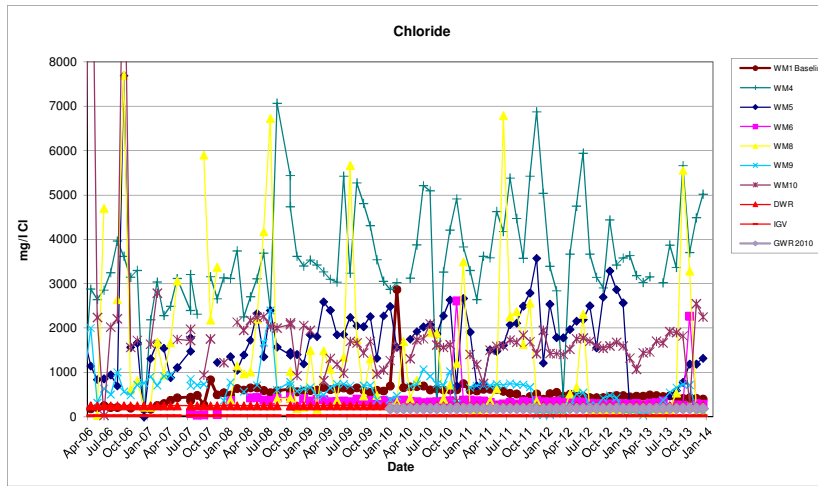
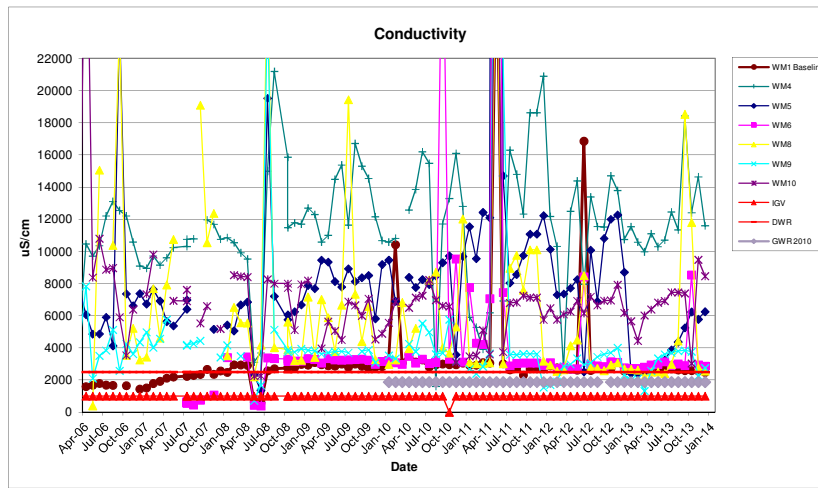
GROUNDWATER QUALITY
W/M8

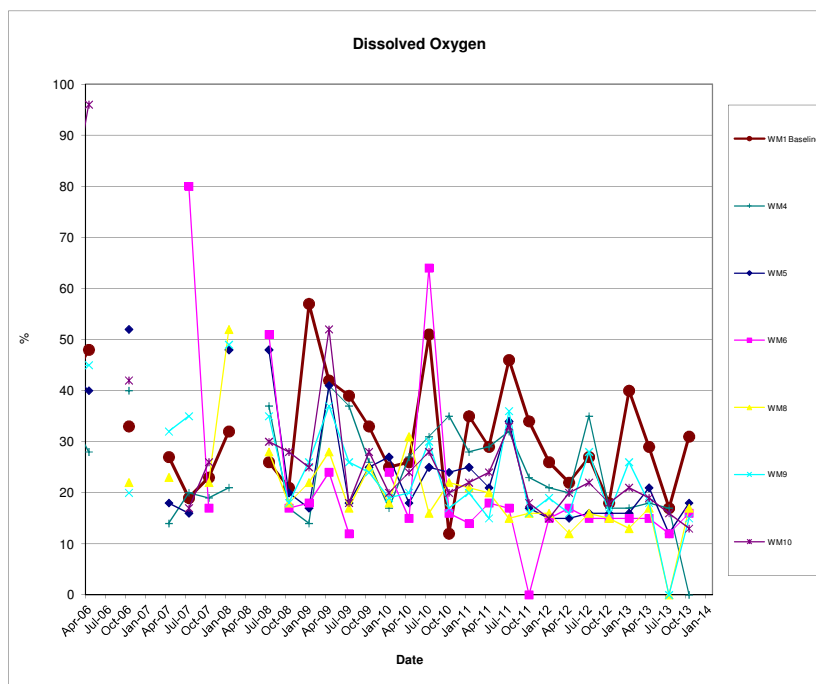
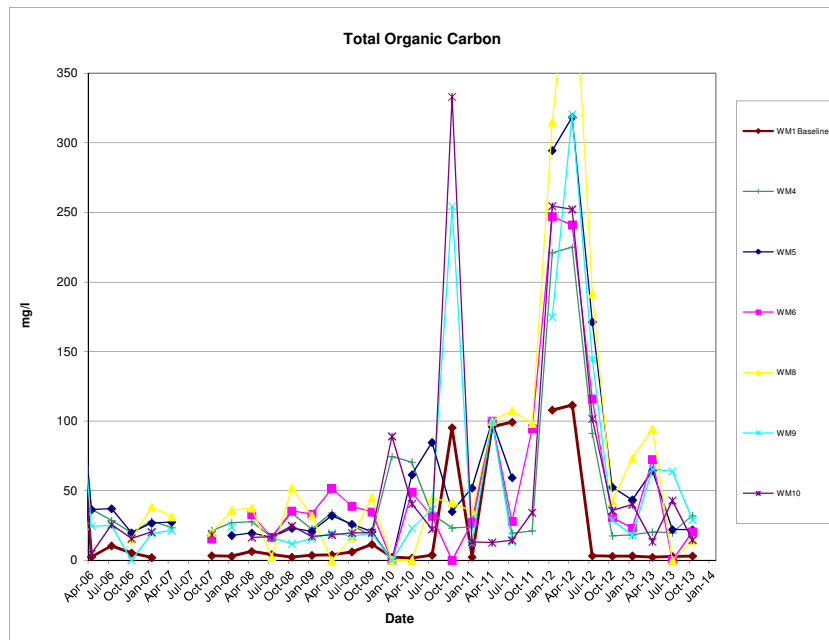
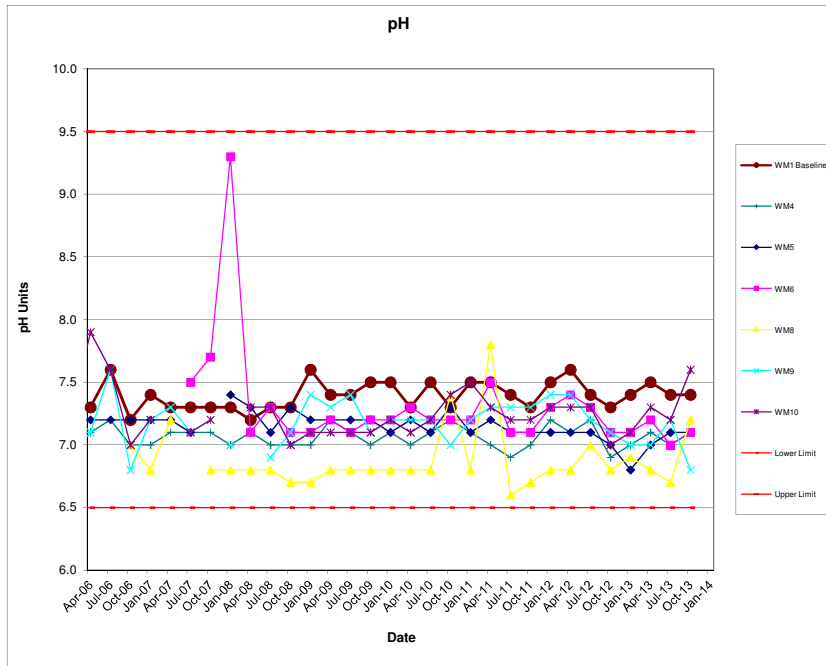
Monitoring Point:		RESULTS																											
PARAMETERS	Units	Date																											
		21-Sep-11	03-Oct-11	07-Nov-11	12-Dec-11	16-Jan-12	06-Feb-12	12-Mar-12	23-Apr-12	14-May-12	06-Jun-12	23-Jul-12	13-Aug-12	10-Sep-12	08-Oct-12	05-Nov-12	10-Dec-12	30-Jan-13	11-Feb-13	25-Mar-13	15-Apr-13	07-May-13	10-Jun-13	22-Jul-13	06-Aug-13	16-Sep-13	#####	#####	#####
Alkalinity	mg/l CaCO3							1400													1230								
Aluminium	µg/l							8.6													6.4								
Ammonia	mg/l N	123.59	58.76	6.28	85.86	84.99	84.9	89.46	128.39	119.24	38.38	90.22	89.57	1.69	91.91	79.52	86.29	94.88	97.41	67.35	97.65	96.56	86.17	113.02	153.87	106.83	124.71	95	140
Antimony	µg/l								<0.5																				
Arsenic	µg/l								1.22													1.8							
Barium	µg/l								232.8													156.8							
Beryllium	µg/l								<0.5													<0.5							
B.O.D.	mg/l O2																												
Boron	µg/l								2895.5													2053.6							
Cadmium	µg/l								<0.1													<0.1							
Calcium	mg/l Ca								269.27													201.99							
C.O.D.	mg/l O2																												
Chloride	mg/l Cl	1632	2556	361	174	130	123	107	516	662	2315	112	116	91	168	147	177	157	146	83	89	92	90	158	536	5557	3287	98	101
Chromium	µg/l								1.1												4.7								
Cobalt	µg/l								4.5													4.5							
Conductivity	µS/cm @ 25	7590	10100	3180	2640	2930	2540	2640	4130	4500	8490	2770	2720	2590	2940	3070	2700	2670	2620	2200	2510	2500	2400	2980	4430	18540	11800	2760	2560
Copper	µg/l								0.6													<0.5							
Cyanide	mg/l CN								<0.05													<0.05							
D.O.	% Saturation		16			16			12			16			15			13			17			<10			15		
Fluoride	mg/l								<0.60													<0.150							
Iron	µg/l								20497.2													23247.4							
Lead	µg/l								<0.5													<0.5							
Magnesium	mg/l Mg								111.42													48.4							
Manganese	µg/l								2919.9													2231.7							
Mercury	µg/l								<0.05													<0.05							
Molybdenum	µg/l								2.8													0.7							
Nickel	µg/l								22.9													11.3							
o-Phosphate	mg/l P								0.57													<0.02							
pH			6.7			6.8			6.8			7			6.8			6.9						6.7			6.8		
Potassium	mg/l								108.05													61.72							
Residue on Evaporation	mg/l								2257													1282							
Sampling Depth	m	4.9	3.6	nm	2.9	3	3.3	nm	3.9	5	nm	3.9	3.1	5.2	4.1	3.8	4.1	2.6	2.6	4	3	2.9	3.1	3.6	3.9	4.1	4.1	4.4	3
Selenium	µg/l								<0.5													<0.5							
Silver	µg/l								nm													nm							
Sodium	mg/l								390.79													96.38							
Strontium	µg/l								1376.28													843.78							
Sulphate	mg/l SO4								38													5.1							
Suspended Solids	mg/l																												
Temp	°C		17.2			12.4			13.4				17.2						10.1			14.5			16.1			14.9	
Thallium	µg/l								<0.1													<0.1							
Time Sampled		14:50	12:20	12:55	17:00	14:00	13:15	11:25	12:00	13:00	14:15	12:10	15:15	12:40	12:10	12:35	13:35	13:20	11:00	09:35	12:50	12:55	11:45	12:50	12:45	12:40	12:35	13:50	12:50
Tin	µg/l								<1													nm							
T.O.C.	mg/l		98.4			314.8			456.4										42.6			94.4			>100			29.1	
T.O.N	mg/l N								0.26													0.08							
Total S Solids	mg/l																												
Uranium	µg/l								<0.1													0.19							
Vanadium	µg/l								3.37													1.7							
Zinc	µg/l								17.5													9							
Water Level m OD		5.15	0.25	1.55		2.25	2.15	1.85	1.25	0.15		1.25	2.05	-0.05	1.05	1.35	1.05	2.55	2.55	1.15	2.15	2.25	2.05	1.55	1.25	1.05	1.05	0.75	2.15

GROUNDWATER QUALITY
WMS

RESULTS

PARAMETERS	Units	Date																												
		21-Sep-11	03-Oct-11	07-Nov-11	12-Dec-11	16-Jan-12	06-Feb-12	12-Mar-12	23-Apr-12	14-May-12	06-Jun-12	23-Jul-12	13-Aug-12	10-Sep-12	08-Oct-12	05-Nov-12	10-Dec-12	30-Jan-13	11-Feb-13	25-Mar-13	15-Apr-13	07-May-13	10-Jun-13	22-Jul-13	06-Aug-13	16-Sep-13	#####	#####	#####	
Alkalinity	mg/l CaCO3							1385													1140									
Aluminium	µg/l							8													<5									
Ammonia	mg/l N	24.5	22.95	2.51	5.85	2.17	27.97	83.28	79.79	48.99	42.36	69.89	99.62	74.24	67.99	69.6	54.97	29.89	38.28	10.26	87.79	134.52	107.26	74.76	49.57	35.88	41.51	58	170	
Antimony	µg/l								1.11												<0.5									
Arsenic	µg/l								1.14												1.44									
Barium	µg/l								122.9												150.9									
Beryllium	µg/l								<0.5												<0.5									
B.O.D.	mg/l O2																													
Boron	µg/l								1907.2												1042.6									
Cadmium	µg/l								0.4												<0.1									
Calcium	mg/l Ca								224.02												198.23									
C.O.D.	mg/l O2																													
Chloride	mg/l Cl	725	672	39	43	44	69	141	244	516	546	258	249	420	484	431	98	97	102	37	113	184	374	552	660	733	720	93	113	
Chromium	µg/l								<0.5												3.2									
Cobalt	µg/l								7.8												3.4									
Conductivity	µS/cm @ 25	3630	3620	1539	1559	1697	1903	2860	2960	3350	2960	3070	3440	3600	3700	4010	2310	2000	2090	1316	2590	3350	3600	3700	3800	3840	3770	2270	2750	
Copper	µg/l								91.4												3.5									
Cyanide	mg/l CN								<0.05												<0.05									
D.O.	% Saturation		16			19			16			28						26			18			<10			13			
Fluoride	mg/l		0.18						<0.150												<0.150									
Iron	µg/l								64.3												2013.4									
Lead	µg/l								<0.5												<0.5									
Magnesium	mg/l Mg								102.01												67.72									
Manganese	µg/l								1127.2												1175.1									
Mercury	µg/l								<0.05												<0.05									
Molybdenum	µg/l								4.6												1									
Nickel	µg/l								18												5.6									
o-Phosphate	mg/l P		0.11						0.04												0.16									
pH			7.3			7.4			7.4			7.2			7.1			7			7			7.2			7.6			
Potassium	mg/l								101.86												65.56									
Residue on Evaporation	mg/l								1726												1398									
Sampling Depth	m	4.3		nm	2.9	4.9	3	nm	4.4	5.1	nm	4.4	3.9	5.1	4.2	4.9	4.3	3.5	3.7	4.9	3.7	3.7	4.4	4.2	4.6	4.5	4.2	4.2	3.9	
Selenium	µg/l								0.7												<0.5									
Silver	µg/l								nm												nm									
Sodium	mg/l								250.64												106.82									
Strontium	µg/l								990.11												840.95									
Sulphate	mg/l SO4		107.1						128.8												92.2									
Suspended Solids	mg/l																													
Temp	°C		17.1			13.8			13.5			16.2			17			9.6		14.7				16.7			15.3			
Thallium	µg/l								0.21												<0.1									
Time Sampled		14:35	12:45	12:30	17:10	13:10	12:50	11:55	12:20	13:15	14:00	12:55	15:00	12:55	12:30	12:55	13:15	13:00	11:20	09:10	12:35	12:40	12:10	13:15	12:20	13:00	12:25	13:25	12:25	
Tin	µg/l								<1												nm									
T.O.C.	mg/l					174.7			320.4						28.9			18.1		65.7			63.8			14.6				
T.O.N	mg/l N		0.1						1.92												<0.08									
Total S Solids	mg/l								1.1												1.05									
Uranium	µg/l								1.42												1.62									
Vanadium	µg/l								88.7												29.6									
Zinc	µg/l								88.7												29.6									
Water Level m OD		5.78	1.48	5.78		2.88	0.88	2.78		1.38	0.68		1.38	1.88	0.68	1.58	0.88	1.48	2.28	2.08	0.88	2.08	2.08	1.38	1.58	1.18	1.28	1.58	1.58	1.88





APPENDIX F

SURFACE WATER RESULTS

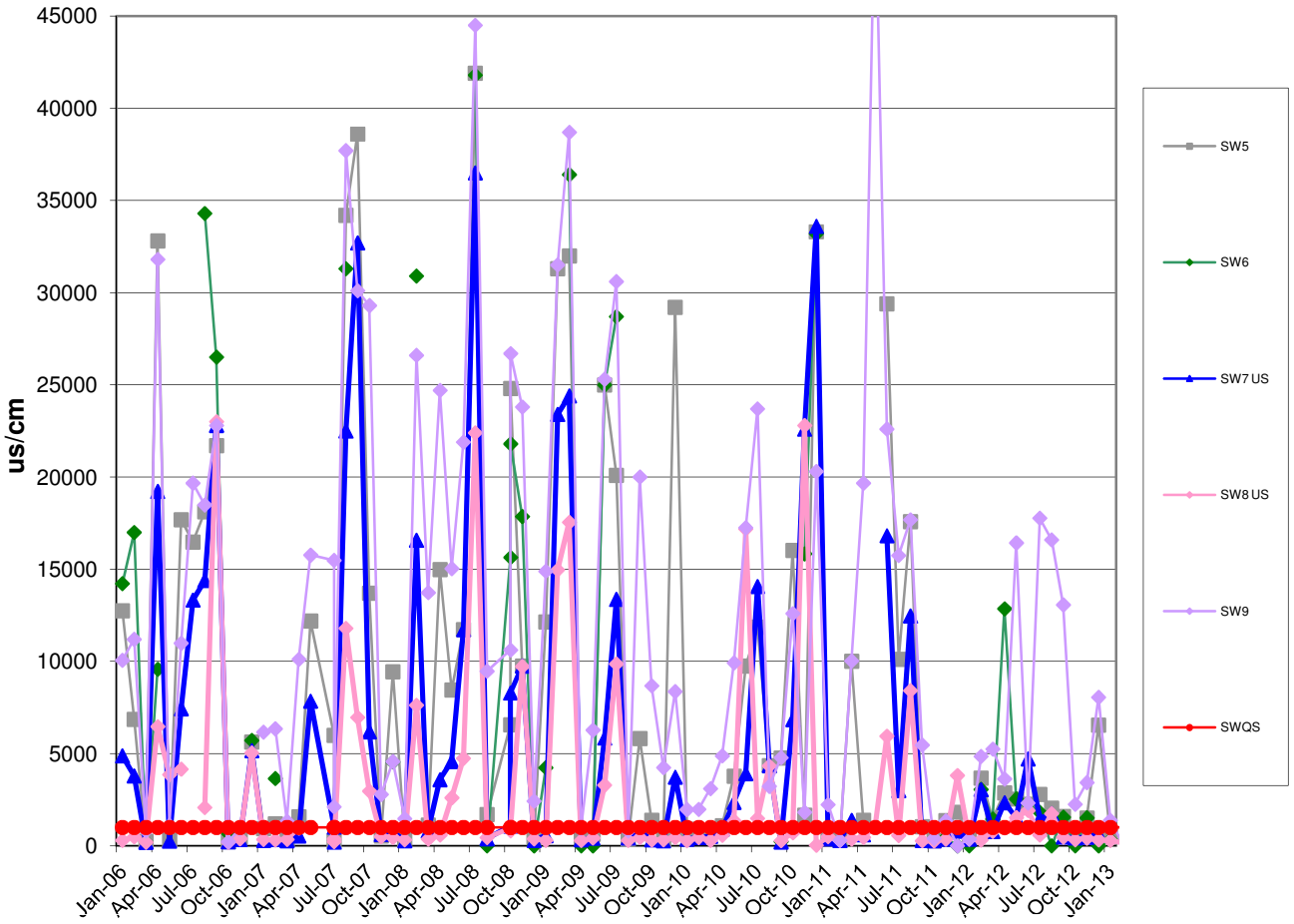
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		SURFACE WATER QUALITY																																					
Monitoring Point:		SW3																																					
PARAMETERS	Units	Date																																					
		25-Jan-11	14-Feb-11	28-Mar-11	11-Apr-11	09-May-11	13-Jun-11	11-Jul-11	08-Aug-11	21-Sep-11	03-Oct-11	07-Nov-11	12-Dec-11	16-Jan-12	06-Feb-12	12-Mar-12	23-Apr-12	14-May-12	06-Jun-12	23-Jul-12	13-Aug-12	10-Sep-12	08-Oct-12	05-Nov-12	10-Dec-12	30-Jan-13	11-Feb-13	25-Mar-13	15-Apr-13	07-May-13	10-Jun-13	22-Jul-13	06-Aug-13	16-Sep-13	07-Oct-13	18-Nov-13	02-Dec-13		
Alkalinity	mg/l CaCO3				730																																		
Aluminium	µg/l				152.8																																		
Ammonia	mg/l N	5.03	3.56	26.10	21.39	19.66	16.11	0.67	0.52	0.09	0.62	1.14	2.81	4.98	18.07	9.84	1.96	3.44	0.67	2.21	1.83	3.57	0.76	0.42	1.56	18.07	4.82	5.52	2.9	3.68	1.77	1.97	1.93	1.48	0.2	0.12	0.38		
Antimony																																							
Arsenic																																							
Barium																																							
Beryllium																																							
B.O.D.	mg/l O2	1.9			8.4			2.1																															
Boron	µg/l																																						
Cadmium	µg/l																																						
Calcium	mg/l Ca																																						
C.O.D.	mg/l O2	37			99			49																															
Chloride	mg/l Cl	84	65	242	301	314	283	115	239	146	76	163	103	157	141	221	161	198	149	164	199	237	203	204	135	96	54	89	93	213	301	388	163	323	138	93	221		
Chromium	µg/l				2.4																																		
Cobalt (µg/l)	µg/l																																						
Conductivity	µS/cm @ 25	1121		2330	2420	22400	1996	1182	1451	1383	1227	1509	1128	1634	1529	1917	1321	1549	925	1629	1719	1967	1666	1820	1374	1176	777	1159	1011	1788	2060	2160	1321	1568	1291	958	1852		
Copper	µg/l				1.9																																		
Cyanide	mg/l CN																																						
D.O.	% Saturation	64			129			66																															
Fluoride	mg/l																																						
Iron	µg/l				2023.8																																		
Lead	µg/l				1																																		
Magnesium	mg/l Mg				62.46																																		
Manganese	µg/l				840.9																																		
Mercury	µg/l				<0.05																																		
Molybdenum	µg/l																																						
Nickel	µg/l				4.7																																		
o-Phosphate	mg/l P				<0.02																																		
pH					7.7			7.4																															
Potassium	mg/l				48.56																																		
Residue on Evaporation	mg/l																																						
Sampling Depth	m																																						
Selenium	µg/l																																						
Silver	µg/l																																						
Sodium	mg/l				199.1																																		
Strontium	µg/l																																						
Sulphate	mg/l SO4				104.7																																		
Suspended Solids	mg/l																																						
Temp	°C	7.1			14			17.8						6.6																									
Thallium	µg/l																																						
Time Sampled		11:35	nt	10:25	11:40	10:10	09:50	11:25	09:55	11:20	12:25	10:35	16:20	11:15	11:10	09:35	10:45	10:40	11:10	11:10	10:40	09:35	11:05	9:50	10:05	10:35	09:50	11:30	11:10	10:55	10:20	09:45	13:30	10:40	10:40	09:40	10:35		
Tin	µg/l																																						
T.O.C.	mg/l																																						
T.O.N	mg/l N	2.17			4.18			0.64					1.07				3.97				0.85																		
Total S Solids	mg/l	9			32			14					6				8																						
Uranium	µg/l																																						
Vanadium	µg/l																																						
Zinc	µg/l				3																																		

Dry
Unable to access

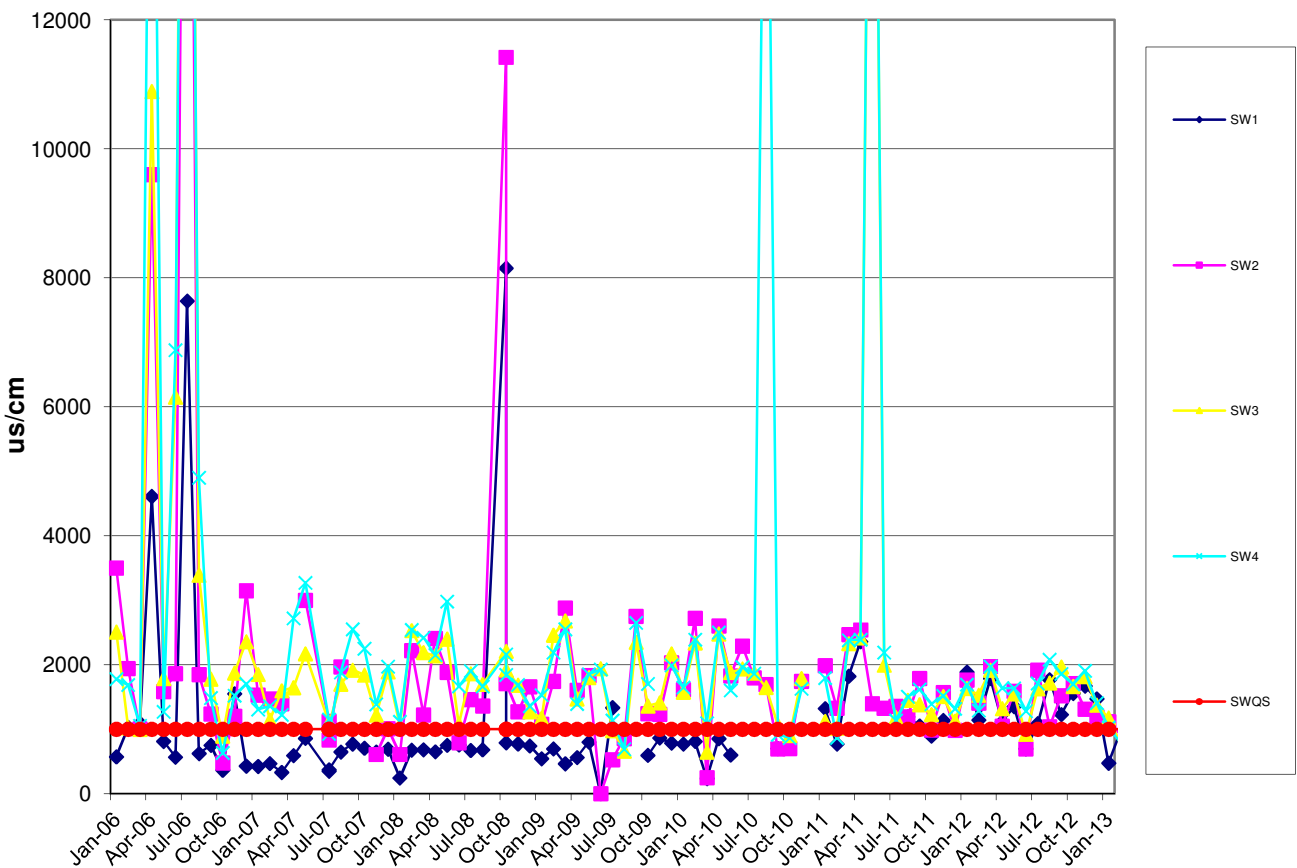
		Dundalk Landfill Site																																						
		SURFACE WATER QUALITY																																						
Monitoring Point:		SW8																																						
		Date																																						
PARAMETERS	Units	25-Jan-11	14-Feb-11	28-Mar-11	11-Apr-11	09-May-11	13-Jun-11	11-Jul-11	08-Aug-11	21-Sep-11	03-Oct-11	07-Nov-11	12-Dec-11	16-Jan-12	06-Feb-12	12-Mar-12	23-Apr-12	14-May-12	06-Jun-12	23-Jul-12	13-Aug-12	10-Sep-12	08-Oct-12	05-Nov-12	10-Dec-12	30-Jan-13	11-Feb-13	25-Mar-13	15-Apr-13	07-May-13	10-Jun-13	22-Jul-13	05-Aug-13	16-Sep-13	07-Oct-13	18-Nov-13	02-Dec-13			
Alkalinity	mg/l CaCO3				158												107																							
Aluminium	µg/l				716.3												18.5																							
Ammonia	mg/l N	0.09	0.12	0.03	0.27	0.09	0.06	0.08	0.04	0.03	0.05	<0.03	0.07	0.06	0.04	<0.03	0.04	0.04	<0.03	0.07	0.04	<0.03	0.17	0.04	0.08	0.07	0.05	0.06	0.17	0.15	0.04	1.05	0.22	0.2	0.05	0.11	0.041			
Antimony																	<0.5																							
Arsenic																	0.96																							
Barium																	29.2																							
Beryllium																	<0.5																							
B.O.D.	mg/l O2	<1.5			2.3			<1.5			2.6			<1.5			nm			1.5			1.5			<1.5							5.4			1.6				
Boron	µg/l																63.2																							
Cadmium	µg/l				0.1												<0.1																							
Calcium	mg/l Ca				51.09												43.43																							
C.D.D.	mg/l O2	22			36						47						26			<10			28			12														
Chloride	mg/l Cl	50	28	23	47	1650	217	94	2538	24	21	22	1020	21	23	145	214	380	537	51	44	35	18	28	20	18	13	28	31	1636	1440	13047	2957	3603	67	919	286			
Chromium	µg/l				1.3												<0.5																							
Cobalt (µg/l)	µg/l																<0.5																							
Conductivity	µS/cm @ 25	499		374	459	5950	1035	564	8420	274	260	362	3820	364	321	781	969	1535	1919	585	1745	474	333	416	324	295	172	403	320	5490	5170	37500	9240	11590	447	3300	1695			
Copper	µg/l				4.6												1.9																							
Cyanide	mg/l CN																																							
D.O.	% Saturation	91			111			86				91		92			91			103			97			87			105				68			95				
Fluoride	µg/l				1539.3												243.5																							
Lead	µg/l				3.5												<0.5																							
Magnesium	mg/l Mg				11.52												20.6																							
Manganese	µg/l				165.7												64.8																							
Mercury	µg/l				<0.05												<0.05																							
Molybdenum	µg/l																<0.5																							
Nickel	µg/l				2												2.1																							
o-Phosphate	mg/l P				0.07												0.03																							
pH		7.9			8.4			7.8					7.9				8.1			7.8			7.9			7.5														
Potassium	mg/l				4.03												7.65																							
Residue on Evaporation	mg/l																																							
Sampling Depth	m																																							
Selenium	µg/l																<0.5																							
Silver	nm																nm																							
Sodium	mg/l				28.72												139.05																							
Strontium	µg/l																210.88																							
Sulphate	mg/l SO4				18.5												44.8																							
Suspended Solids	mg/l				15			17.3									11.3			20			14.6			6.6												31		
Temp	°C	8.8															11.3																							
Thallium	µg/l																<0.1																							
Time Sampled		14:00	nt	12:15	13:30	12:00	13:45	13:15	12:10	12:35	13:30	14:15	17:50	13:25	15:50	14:45	12:05	14:15	15:00	13:50	12:15	10:45	13:20	10:20	11:50	12:30	14:00	13:55	13:30	11:30	11:25	14:00	10:35	11:40	12:05	10:50	14:45			
Tin	µg/l																<1																							
T.O.C.	mg/l																																							
T.O.N	mg/l N	2.97			2.25			1.25			1.44			2.65			1.29			1.38			1.87			1.98														
Total S Solids	mg/l	24			93			<5			20			<5			6			<5			<5			13														
Uranium	µg/l																0.31																							
Vanadium	µg/l																0.59																							
Zinc	µg/l				17.6												3.1																							

Dry
Unable to access

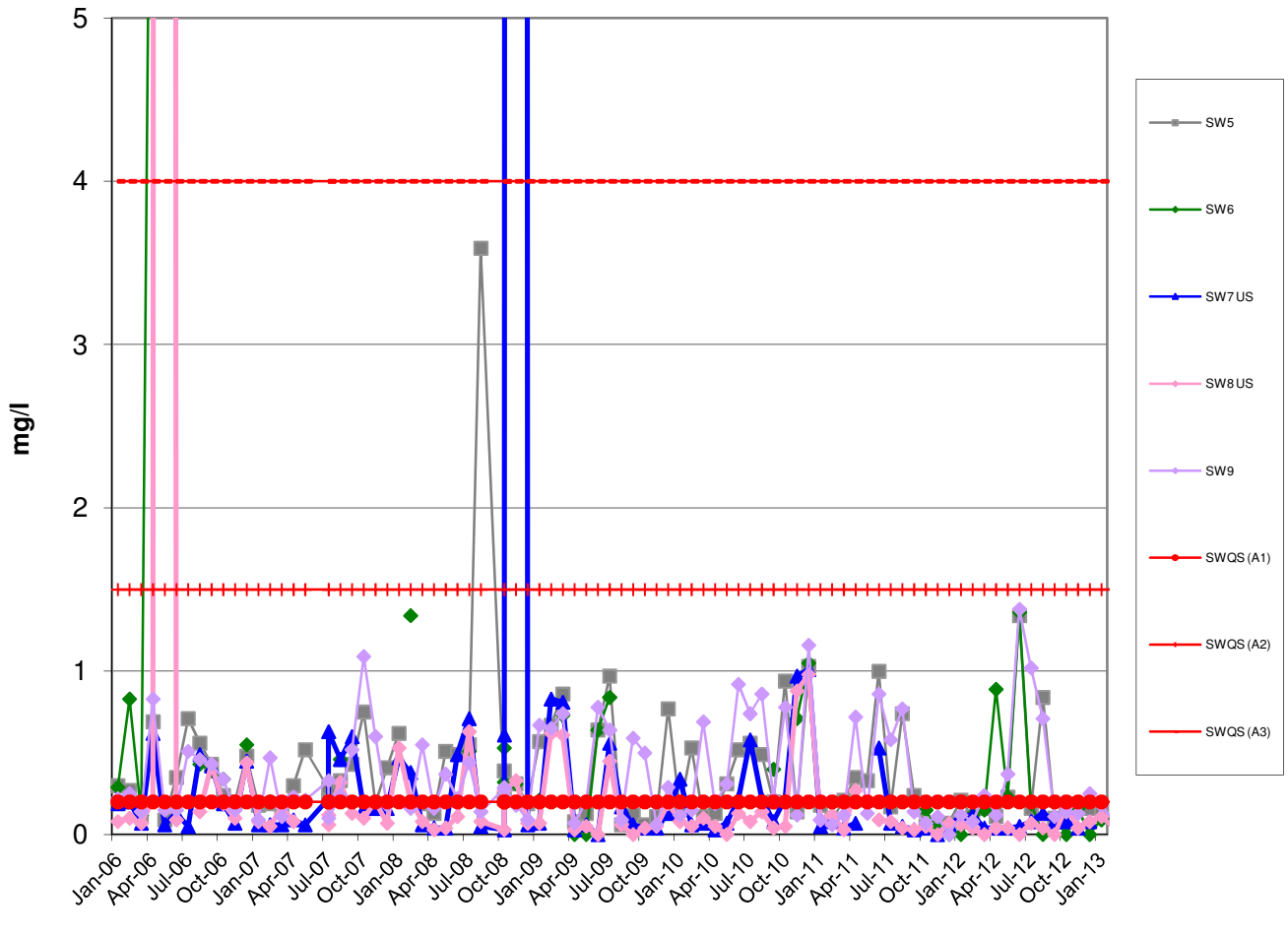
Conductivity (Estuary)



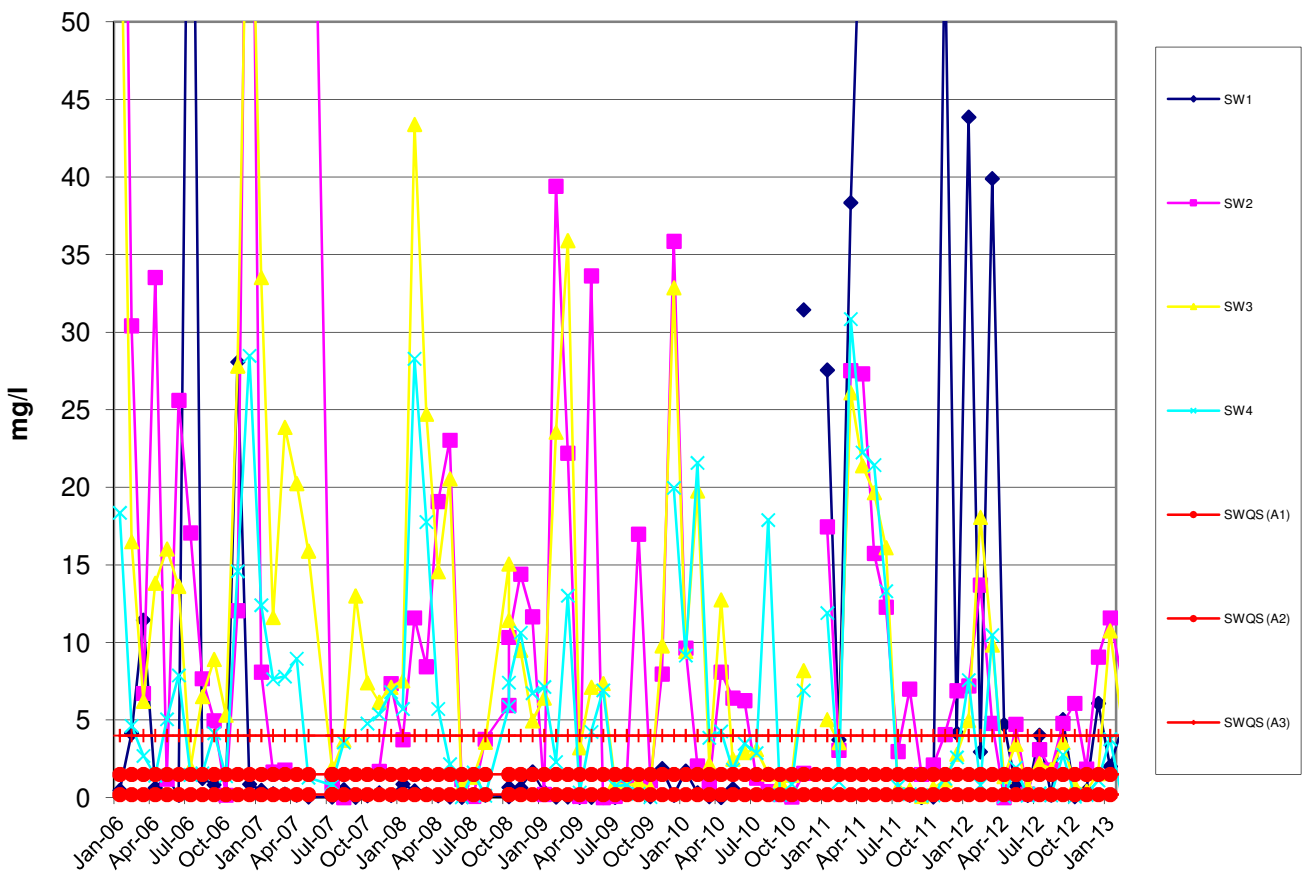
Conductivity (Stream)



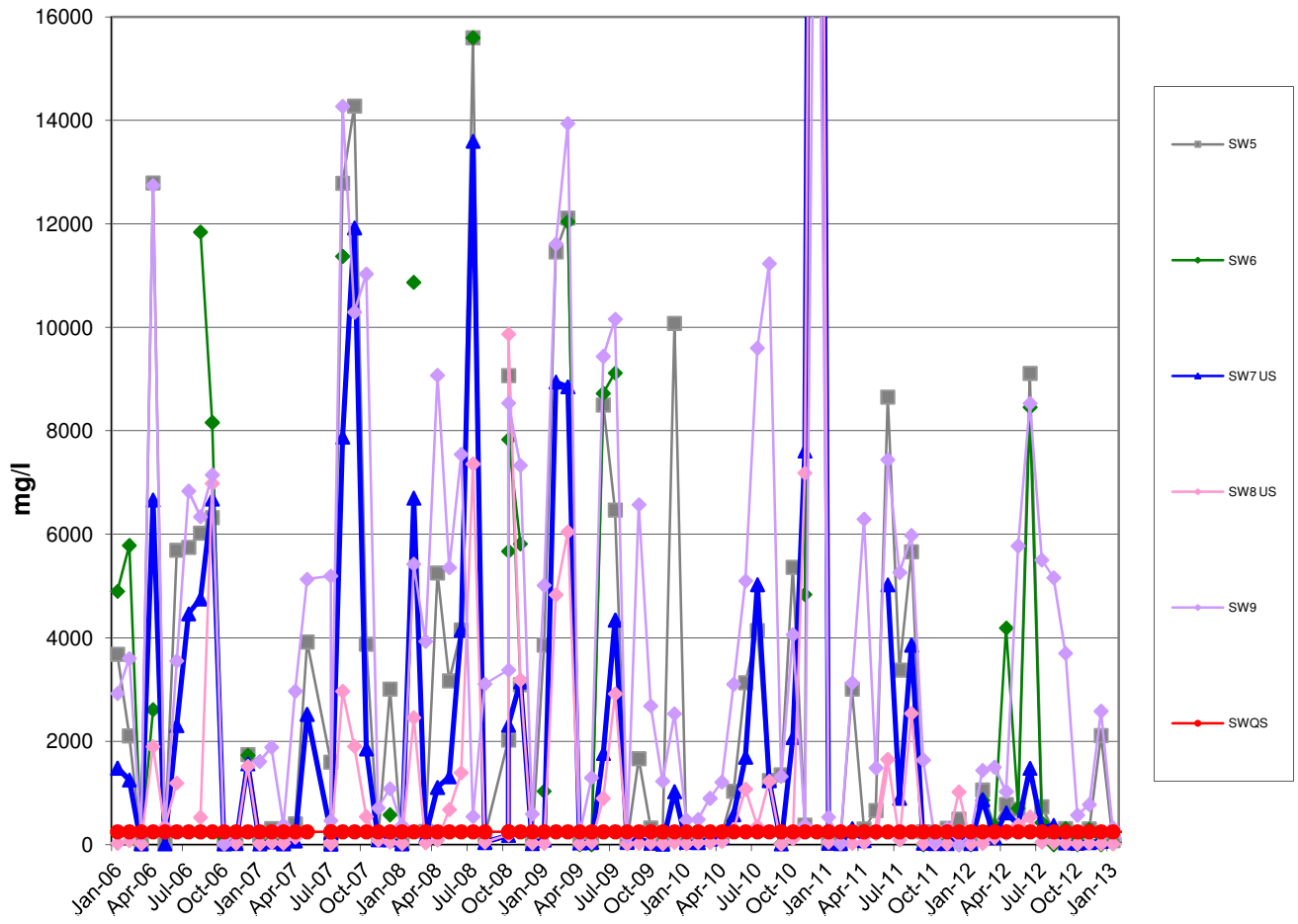
Ammonia (Estuary)



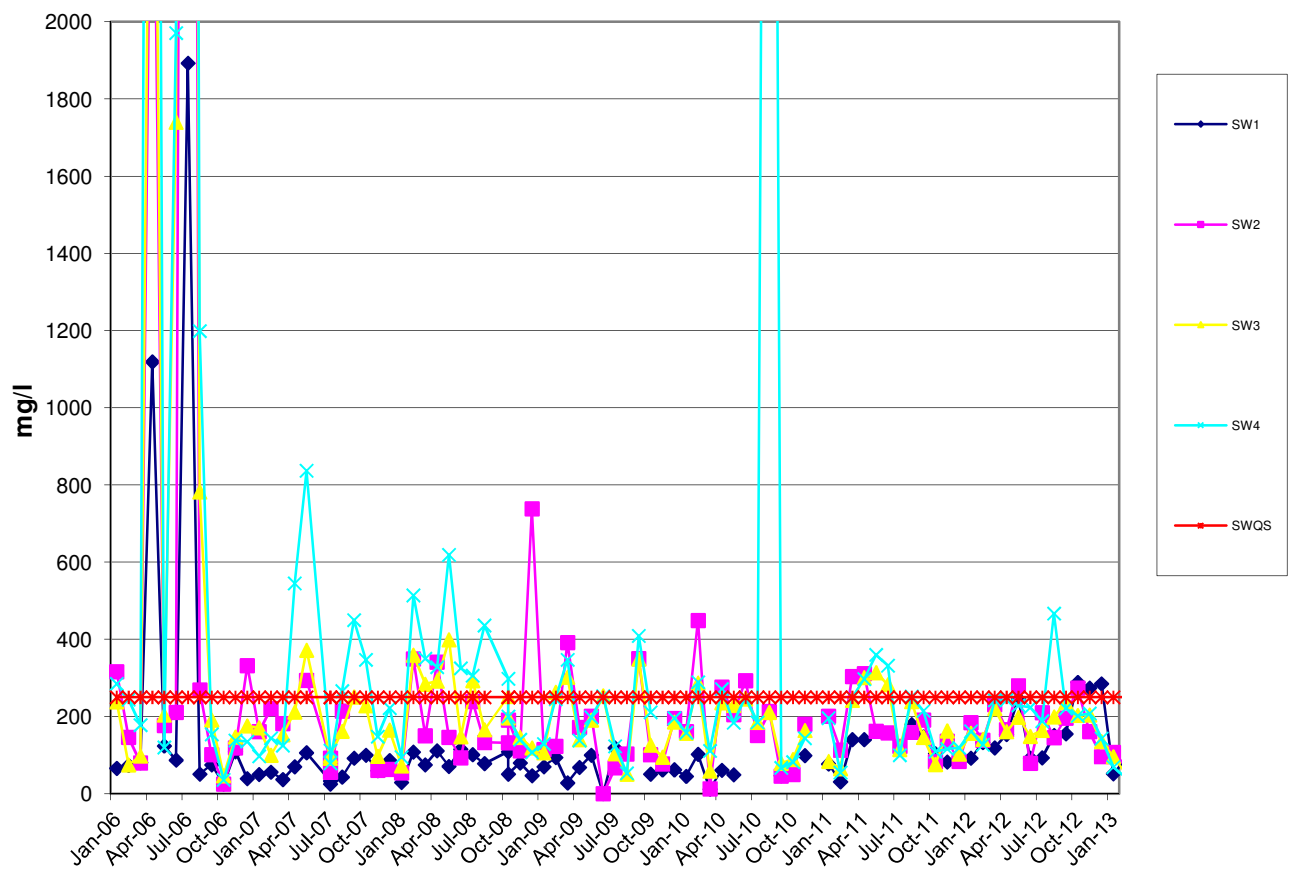
Ammonia (Stream)

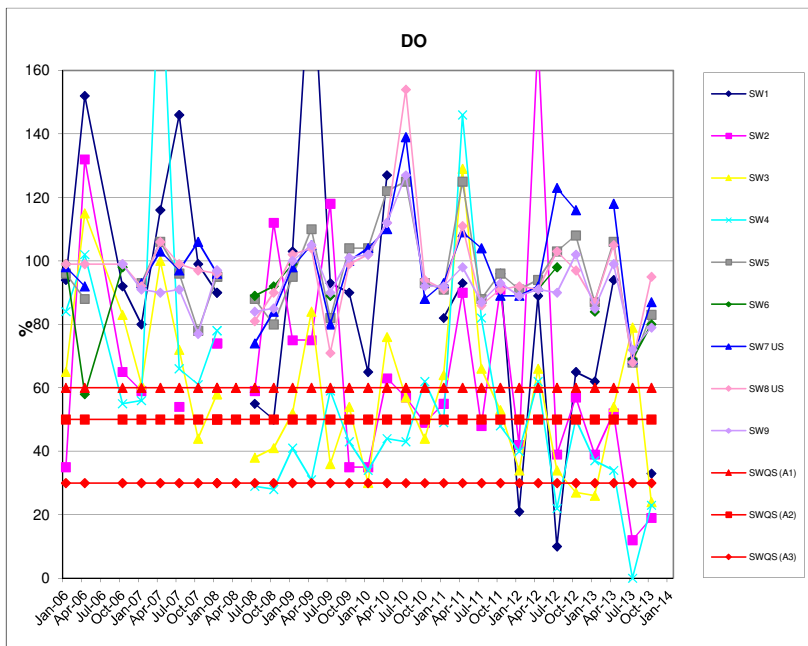
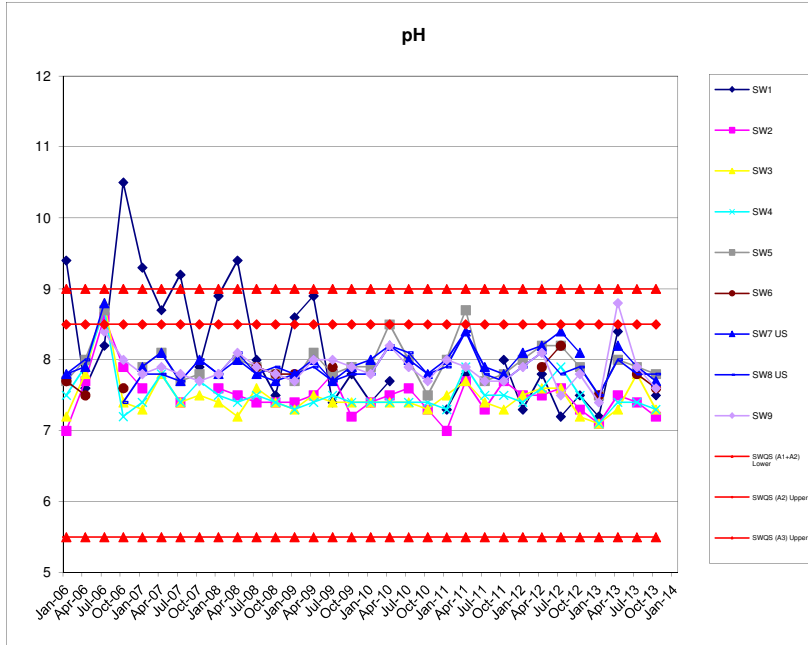
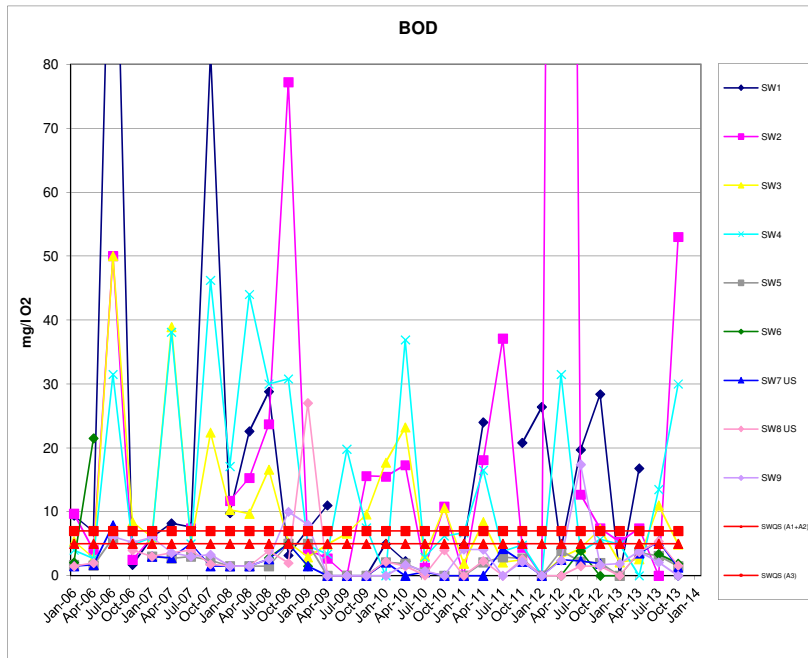


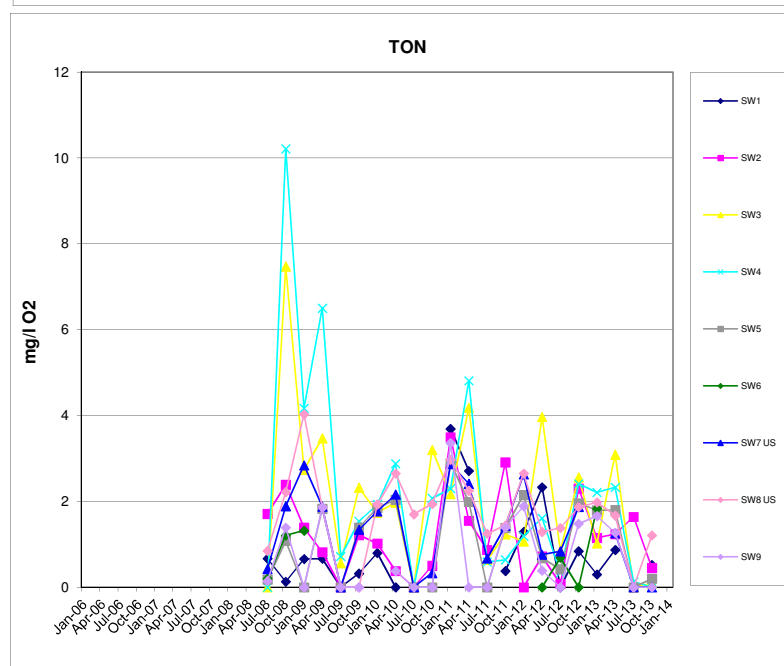
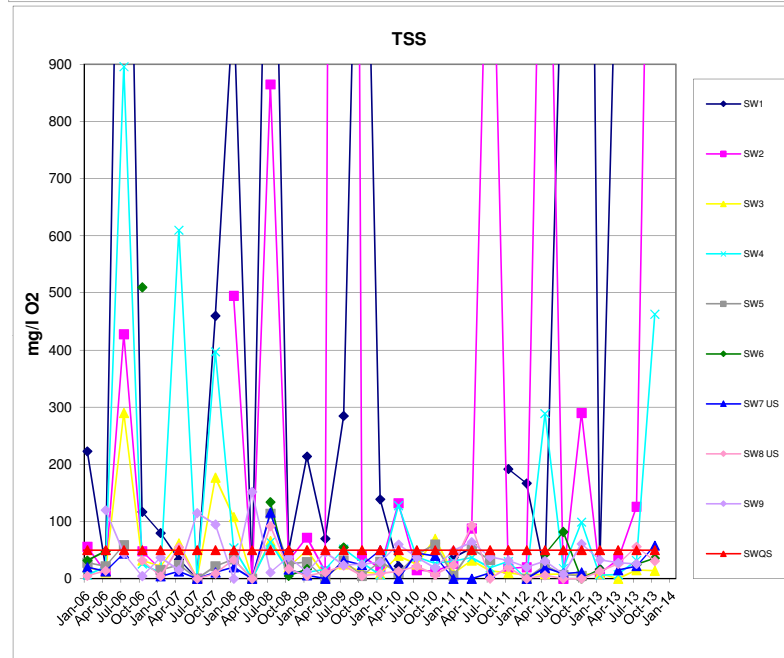
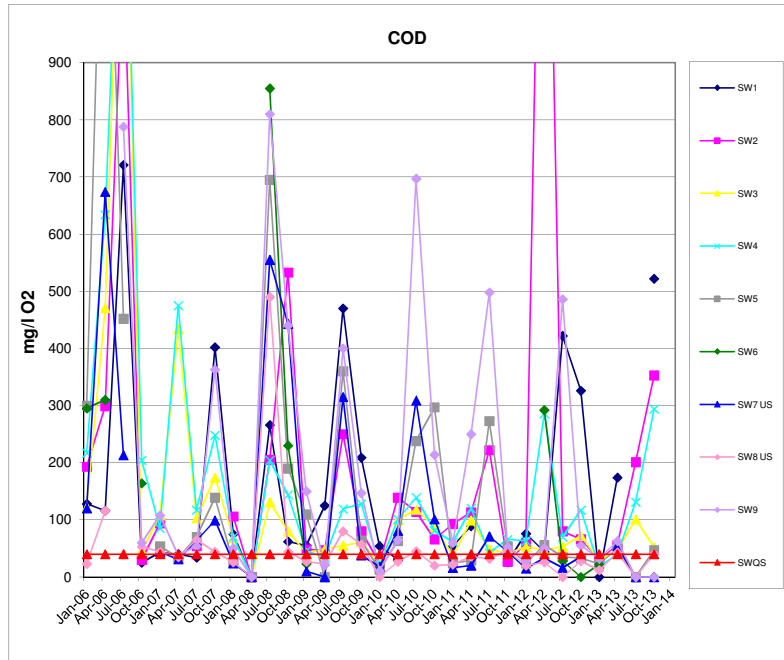
Chloride (Estuary)



Chloride (Stream)







APPENDIX G

DISCHARGE TO SEWER

APPENDIX H

LANDFILL GAS MONITORING RESULTS

LANDFILL GAS MONITORING

LANDFILL GAS MONITORING FORM							(Baseline <input type="checkbox"/> Ambient <input 3"="" type="checkbox/>)</th> </tr> </thead> <tbody> <tr> <td colspan="/> Site Name: DUNDALK LANDFILL <td colspan="4">Site Address: NEWRY ROAD, DUNDALK</td>	Site Address: NEWRY ROAD, DUNDALK			
Operator: DUNDALK TOWN COUNCIL			National Grid Reference: 1632-12								
Site Status: Closed			Date 30-01-13		Time: 16:00 pm						
Instrument used: GA2000		Normal Analytical Range:		Date Next Calibration: August 2013							
Monitoring Personnel: J.O'N			Weather: Rain and drizzle		Barometric pressure: 995mb						
Results											
Sample Station Number	Borehole/ spike/other	Survey Depth	CH ₄ (% v/v)	CO ₂ (% v/v)	O ₂ (% v/v)	Comments					
G1	PIEZO		0.1	0.1	20.1						
G2	PIEZO		0.1	0.1	20.2						
G3	PIEZO		0	0.2	19.7						
G4	PIEZO		0.2	0.6	19.8						
G5	PIEZO		0	0.2	20.8						
G6	PIEZO		0.1	0.3	19.5						
G7	PIEZO		0.1	0.2	20.5						
G8	PIEZO		0.1	0.2	18.8						
G9	PIEZO		0.1	0.1	19.8						
G10	PIEZO		0.1	0.1	19.2						
G16	PIEZO		0.1	0.2	18.9						
G17	PIEZO		0.1	0.3	20.7						
G20	PIEZO		0.2	0.2	19.9						
G21	PIEZO		0.1	0.3	19.8						
GM1	PIEZO		0.1	0.3	18.9						
GM2	PIEZO		0	0.2	20.2						
GM3	PIEZO		0.1	0.3	20.1						
GM4	PIEZO		0	0.3	19.4						
GM5	PIEZO		0	0.2	19.2						
GM6	PIEZO		0.1	0.2	19.2						
GM24	PIEZO		0.1	0.3	20.4						

LANDFILL GAS MONITORING

LANDFILL GAS MONITORING FORM							(Baseline <input type="checkbox"/> Ambient <input type="checkbox"/>)
Site Name: DUNDALK LANDFILL			Site Address: NEWRY ROAD, DUNDALK				
Operator: DUNDALK TOWN COUNCIL			National Grid Reference: 1632-12				
Site Status: Closed			Date: 7-02-13		Time: 16:00 pm		
Instrument used: GA2000		Normal Analytical Range:		Date Next Calibration: August 2013			
Monitoring Personnel: J.O'N			Weather: drizzle		Barometric pressure: 984mb		
Results							
Sample Station Number	Borehole/spike/other	Survey Depth	CH ₄ (% v/v)	CO ₂ (% v/v)	O ₂ (% v/v)	Comments	
G1	PIEZO		0.0	0.5	18.5		
G2	PIEZO		0.2	0.4	18.2		
G3	PIEZO		0	0.6	19.3		
G4	PIEZO		0.1	0.3	18.8		
G5	PIEZO		0	0.6	20.8		
G6	PIEZO		0.1	0.6	19.5		
G7	PIEZO		0.1	0.3	19.5		
G8	PIEZO		0.2	0.5	18.8		
G9	PIEZO		0.1	0.1	19.8		
G10	PIEZO		0.1	0.1	19.2		
G16	PIEZO		0.1	0.2	18.9		
G17	PIEZO		0.1	0.4	19.8		
G20	PIEZO		0.1	0.2	18.8		
G21	PIEZO		0.1	0.4	19.5		
GM1	PIEZO		0.1	0.5	18.5		
GM2	PIEZO		0	0.2	19.2		
GM3	PIEZO		0.1	0.5	19.5		
GM4	PIEZO		0	0.4	19.1		
GM5	PIEZO		0	0.1	19.0		
GM6	PIEZO		0.1	0.4	18.8		
GM24	PIEZO		0.1	0.5	19.7		

LANDFILL GAS MONITORING

LANDFILL GAS MONITORING FORM							(Baseline <input type="checkbox"/> Ambient <input 3"="" type="checkbox/>)</th> </tr> </thead> <tbody> <tr> <td colspan="/> Site Name: DUNDALK LANDFILL <td colspan="4">Site Address: NEWRY ROAD, DUNDALK</td>	Site Address: NEWRY ROAD, DUNDALK			
Operator: DUNDALK TOWN COUNCIL			National Grid Reference: 1632-12								
Site Status: Closed			Date: 15-03-13		Time: 16:00 pm						
Instrument used: GA2000		Normal Analytical Range:		Date Next Calibration: August 2013							
Monitoring Personnel: J.O'N			Weather: showers		Barometric pressure: 1002mb						
Results											
Sample Station Number	Borehole/ spike/other	Survey Depth	CH ₄ (% v/v)	CO ₂ (% v/v)	O ₂ (% v/v)	Comments					
G1	PIEZO		0.0	0.5	18.5						
G2	PIEZO		0.2	0.4	18.2						
G3	PIEZO		0	0.6	19.3						
G4	PIEZO		0.1	0.3	18.8						
G5	PIEZO		0	0.6	20.8						
G6	PIEZO		0.1	0.6	19.5						
G7	PIEZO		0.1	0.3	19.5						
G8	PIEZO		0.2	0.5	18.8						
G9	PIEZO		0.1	0.1	19.8						
G10	PIEZO		0.1	0.1	19.2						
G16	PIEZO		0.1	0.2	18.9						
G17	PIEZO		0.1	0.4	19.8						
G20	PIEZO		0.1	0.2	18.8						
G21	PIEZO		0.1	0.4	19.5						
GM1	PIEZO		0.1	0.5	18.5						
GM2	PIEZO		0	0.2	19.2						
GM3	PIEZO		0.1	0.5	19.5						
GM4	PIEZO		0	0.4	19.1						
GM5	PIEZO		0	0.1	19.0						
GM6	PIEZO		0.1	0.4	18.8						
GM24	PIEZO		0.1	0.5	19.7						

LANDFILL GAS MONITORING

LANDFILL GAS MONITORING FORM							(Baseline <input type="checkbox"/> Ambient <input type="checkbox"/>)
Site Name: DUNDALK LANDFILL			Site Address: NEWRY ROAD, DUNDALK				
Operator: DUNDALK TOWN COUNCIL			National Grid Reference: 1632-12				
Site Status: Closed			Date: 26:04:2013		Time: 16.00 pm		
Instrument used: GA2000		Normal Analytical Range:		Date Next Calibration: August 2013			
Monitoring Personnel: J.O'N			Weather: Drizzle		Barometric pressure: 1000mb		
Results							
Sample Station Number	Borehole/ spike/other	Survey Depth	CH ₄ (% v/v)	CO ₂ (% v/v)	O ₂ (% v/v)	Comments	
G1	PIEZO		0.1	0	19.8		
G2	PIEZO		0.1	0.1	19.4		
G3	PIEZO		0.1	0	19.1		
G4	PIEZO		0.1	0	19.8		
G5	PIEZO		0.1	0	19.2		
G6	PIEZO		0.1	0.1	19.4		
G7	PIEZO		0.1	0	19.9		
G8	PIEZO		0.1	0	19.7		
G9	PIEZO		0.1	0.6	9.5		
G10	PIEZO		0.1	0	19.9		
G16	PIEZO		0.1	0	18.1		
G17	PIEZO		0.1	0	19.8		
G20	PIEZO		0.1	0.5	12.9		
G21	PIEZO		0.1	0.6	19.3		
GM1	PIEZO		0	0.4	18.9		
GM2	PIEZO		0	0.6	18.5		
GM3	PIEZO		0	0.5	18.8		
GM4	PIEZO		0	0.4	19.2		
GM5	PIEZO		0	0.3	18.4		
GM6	PIEZO		0	0.4	18.4		
GM24	PIEZO		0	0.4	18.3		

LANDFILL GAS MONITORING

LANDFILL GAS MONITORING FORM				(Baseline <input type="checkbox"/> Ambient <input type="checkbox"/>)		
Site Name: DUNDALK LANDFILL			Site Address: NEWRY ROAD, DUNDALK			
Operator: DUNDALK TOWN COUNCIL			National Grid Reference: 1632-12			
Site Status: Closed			Date: 20:05:2013		Time: 16.00 pm	
Instrument used: GA2000		Normal Analytical Range:		Date Next Calibration: August 2013		
Monitoring Personnel: J.O'N			Weather: Dry		Barometric pressure: 1022mb	
Results						
Sample Station Number	Borehole/ spike/other	Survey Depth	CH ₄ (% v/v)	CO ₂ (% v/v)	O ₂ (% v/v)	Comments
G1	PIEZO		0.1	0	19.1	
G2	PIEZO		0.1	0.1	19.2	
G3	PIEZO		0.1	0.1	19.3	
G4	PIEZO		0.1	0.1	18.5	
G5	PIEZO		0	0	18.7	
G6	PIEZO		0.1	0.1	18.9	
G7	PIEZO		0.1	0	19.2	
G8	PIEZO		0.2	0	19.5	
G9	PIEZO		0.1	0.4	9.5	
G10	PIEZO		0.2	0	19.2	
G16	PIEZO		0.1	0	19.5	
G17	PIEZO		0.1	0	19.8	
G20	PIEZO		0.2	0.6	19.1	
G21	PIEZO		0	0.5	18.9	
GM1	PIEZO		0	0.4	19.9	
GM2	PIEZO		0	0.5	17.6	
GM3	PIEZO		0	0.3	18.8	
GM4	PIEZO		0	0.2	19.5	
GM5	PIEZO		0	0.3	18.9	
GM6	PIEZO		0	0.3	19.2	
GM24	PIEZO		0	0.4	18.5	

LANDFILL GAS MONITORING

LANDFILL GAS MONITORING FORM							(Baseline <input type="checkbox"/> Ambient <input type="checkbox"/>)
Site Name: DUNDALK LANDFILL			Site Address: NEWRY ROAD, DUNDALK				
Operator: DUNDALK TOWN COUNCIL			National Grid Reference: 1632-12				
Site Status: Closed			Date: 21:06:2013		Time: 16.00 pm		
Instrument used: GA2000		Normal Analytical Range:		Date Next Calibration: August 2013			
Monitoring Personnel: J.O'N			Weather: Dry /Warm		Barometric pressure: 1008mb		
Results							
Sample Station Number	Borehole/ spike/other	Survey Depth	CH ₄ (% v/v)	CO ₂ (% v/v)	O ₂ (% v/v)	Comments	
G1	PIEZO		0.1	0.1	18.9		
G2	PIEZO		0.1	0.1	18.8		
G3	PIEZO		0.1	0.1	19.6		
G4	PIEZO		0.1	0.2	18.5		
G5	PIEZO		0.1	0.1	18.6		
G6	PIEZO		0.1	0.9	18.5		
G7	PIEZO		0.1	0.2	20.1		
G8	PIEZO		0.2	0.1	19.3		
G9	PIEZO		0.1	5.5	18.4		
G10	PIEZO		0.2	0.1	19.2		
G16	PIEZO		0.1	0.1	19.5		
G17	PIEZO		0.1	0.1	18.9		
G20	PIEZO		0.2	3.9	18.2		
G21	PIEZO		0.1	0.4	19.5		
GM1	PIEZO		0	0.4	18.9		
GM2	PIEZO		0.1	0.6	19.4		
GM3	PIEZO		0	0.5	18.5		
GM4	PIEZO		0	0.4	18.8		
GM5	PIEZO		0	0.5	19.4		
GM6	PIEZO		0	0.6	19.1		
GM24	PIEZO		0	0.5	18.7		

LANDFILL GAS MONITORING

LANDFILL GAS MONITORING FORM				(Baseline <input type="checkbox"/> Ambient <input type="checkbox"/>)		
Site Name: DUNDALK LANDFILL			Site Address: NEWRY ROAD, DUNDALK			
Operator: DUNDALK TOWN COUNCIL			National Grid Reference: 1632-12			
Site Status: Closed			Date: 12:07:2013		Time: 16:00 pm	
Instrument used: GA2000		Normal Analytical Range:		Date Next Calibration:		
Monitoring Personnel: J.O'N			Weather: Dry/Very Warm		Barometric pressure: 1024mb	
Results						
Sample Station Number	Borehole/spike/other	Survey Depth	CH ₄ (% v/v)	CO ₂ (% v/v)	O ₂ (% v/v)	Comments
G1	PIEZO		0.1	0.1	19.9	
G2	PIEZO		0.1	0.1	19.7	
G3	PIEZO		0.1	0.1	19.8	
G4	PIEZO		0.1	0.1	18.9	
G5	PIEZO		0.1	0.1	19.7	
G6	PIEZO		0.1	0.2	19.8	
G7	PIEZO		0.1	0.2	19.5	
G8	PIEZO		0.1	0.2	19.2	
G9	PIEZO		0.1	0.5	19.7	
G10	PIEZO		0.1	0.1	19.6	
G16	PIEZO		0.1	0.1	19.7	
G17	PIEZO		0.1	0.4	19.5	
G20	PIEZO		0.1	0.6	18.9	
G21	PIEZO		0.1	0.4	19.6	
GM1	PIEZO		0.1	0.3	18.8	
GM2	PIEZO		0.1	0.6	19.4	
GM3	PIEZO		0.1	0.4	19.6	
GM4	PIEZO		0	0.4	19.0	
GM5	PIEZO		0	0.3	19.4	
GM6	PIEZO		0	0.4	19.5	
GM24	PIEZO		0	0.4	18.8	

LANDFILL GAS MONITORING

LANDFILL GAS MONITORING FORM							(Baseline <input type="checkbox"/> Ambient <input 3"="" type="checkbox/>)</th> </tr> </thead> <tbody> <tr> <td colspan="/> Site Name: DUNDALK LANDFILL <td colspan="4">Site Address: NEWRY ROAD, DUNDALK</td>	Site Address: NEWRY ROAD, DUNDALK			
Operator: DUNDALK TOWN COUNCIL			National Grid Reference: 1632-12								
Site Status: Closed			Date: 16:08:2013		Time: 4:00 pm						
Instrument used: GA2000		Normal Analytical Range:		Date Next Calibration:							
Monitoring Personnel: J.O'N			Weather: Hot/Dry		Barometric pressure: 1013mb						
Results											
Sample Station Number	Borehole/ spike/other	Survey Depth	CH ₄ (% v/v)	CO ₂ (% v/v)	O ₂ (% v/v)	Comments					
G1	PIEZO		0.1	0.3	19.9						
G2	PIEZO		0.2	0.1	18.5						
G3	PIEZO		0	0.3	18.6						
G4	PIEZO		0	0.4	19.3						
G5	PIEZO		0	0.3	19.9						
G6	PIEZO		0.1	0.2	19.6						
G7	PIEZO		0.1	0.2	19.9						
G8	PIEZO		0.2	0.2	19.5						
G9	PIEZO		0.1	0.2	19.9						
G10	PIEZO		0.1	0.7	20						
G16	PIEZO		0.1	0	20.1						
G17	PIEZO		0	0.3	20						
G20	PIEZO		0.2	0.4	18.9						
G21	PIEZO		0.1	0.5	20.0						
GM1	PIEZO		0.1	0.5	18.9						
GM2	PIEZO		0	0.6	18.7						
GM3	PIEZO		0	0.3	18.9						
GM4	PIEZO		0	0.2	19.5						
GM5	PIEZO		0	0.3	19.2						
GM6	PIEZO		0	0.2	19.8						
GM24	PIEZO		0	0.4	19.8						

LANDFILL GAS MONITORING

LANDFILL GAS MONITORING FORM				(Baseline <input type="checkbox"/> Ambient <input type="checkbox"/>)		
Site Name: DUNDALK LANDFILL			Site Address: NEWRY ROAD, DUNDALK			
Operator: DUNDALK TOWN COUNCIL			National Grid Reference: 1632-12			
Site Status: Closed			Date: 27:09:2013		Time: 11am	
Instrument used: GA2000		Normal Analytical Range:		Date Next Calibration:		
Monitoring Personnel: J.O'N			Weather: Dry/Warm		Barometric pressure: 1012mb	
Results						
Sample Station Number	Borehole/ spike/other	Survey Depth	CH ₄ (% v/v)	CO ₂ (% v/v)	O ₂ (% v/v)	Comments
G1	PIEZO		0.1	0.1	18.9	
G2	PIEZO		0.1	0.2	19.1	
G3	PIEZO		0	0.1	19.7	
G4	PIEZO		0.1	0.4	19.8	
G5	PIEZO		0	0.2	19.6	
G6	PIEZO		0.2	0.1	19.8	
G7	PIEZO		0	0.2	19.5	
G8	PIEZO		0.3	0.3	18.9	
G9	PIEZO		0.2	0.2	19.8	
G10	PIEZO		0.3	0.4	19.7	
G16	PIEZO		0	0.1	19.4	
G17	PIEZO		0	0.2	19.1	
G20	PIEZO		0.1	0.5	19.1	
G21	PIEZO		0	0.4	19.9	
GM1	PIEZO		0	0.3	18.8	
GM2	PIEZO		0.1	0.3	18.9	
GM3	PIEZO		0	0.2	18.5	
GM4	PIEZO		0	0.3	19.6	
GM5	PIEZO		0.1	0.2	19	
GM6	PIEZO		0	0.2	18.9	
GM24	PIEZO		0	0.3	19.7	

LANDFILL GAS MONITORING

LANDFILL GAS MONITORING FORM				(Baseline <input type="checkbox"/> Ambient <input 3"="" type="checkbox/>)</th> </tr> </thead> <tbody> <tr> <td colspan="/> Site Name: DUNDALK LANDFILL <td colspan="4">Site Address: NEWRY ROAD, DUNDALK</td>			Site Address: NEWRY ROAD, DUNDALK			
Operator: DUNDALK TOWN COUNCIL			National Grid Reference: 1632-12							
Site Status: Closed			Date: 27:09:2013		Time: 11am					
Instrument used: GA2000		Normal Analytical Range:		Date Next Calibration:						
Monitoring Personnel: J.O'N			Weather: Dry/Warm		Barometric pressure: 1012mb					
Results										
Sample Station Number	Borehole/ spike/other	Survey Depth	CH ₄ (% v/v)	CO ₂ (% v/v)	O ₂ (% v/v)	Comments				
Pipe to flare monitor			27	8.5	2.8					
Landfill flare monitor			27	9	3					

LANDFILL GAS MONITORING

LANDFILL GAS MONITORING FORM				(Baseline <input type="checkbox"/> Ambient <input type="checkbox"/>)		
Site Name: DUNDALK LANDFILL			Site Address: NEWRY ROAD, DUNDALK			
Operator: DUNDALK TOWN COUNCIL			National Grid Reference: 1632-12			
Site Status: Closed			Date: 21:10:2013		Time: 10am	
Instrument used: GA2000		Normal Analytical Range:		Date Next Calibration:		
Monitoring Personnel: J.O'N			Weather: Showers		Barometric pressure: 994mb	
Results						
Sample Station Number	Borehole/ spike/other	Survey Depth	CH ₄ (% v/v)	CO ₂ (% v/v)	O ₂ (% v/v)	Comments
G1	PIEZO		0	0.4	18.9	
G2	PIEZO		0.2	0.5	18.8	
G3	PIEZO		0	0.4	18.9	
G4	PIEZO		0.2	0.5	19.2	
G5	PIEZO		0.1	0.3	19.5	
G6	PIEZO		0.2	0.1	18.8	
G7	PIEZO		0	0.1	18.9	
G8	PIEZO		0.2	0.1	19.2	
G9	PIEZO		0.3	0.1	17.7	
G10	PIEZO		0.3	0.2	19.1	
G16	PIEZO		0.1	0.2	19.1	
G17	PIEZO		0	0.4	19.3	
G20	PIEZO		0.2	0.4	18.6	
G21	PIEZO		0	0.4	17.3	
GM1	PIEZO		0	0.2	19.1	
GM2	PIEZO		0	0.2	18.5	
GM3	PIEZO		0	0.1	19.1	
GM4	PIEZO		0	0.1	18.2	
GM5	PIEZO		0	0.3	19.1	
GM6	PIEZO		0	0.3	17.2	
GM24	PIEZO		0	0.2	18.7	

LANDFILL GAS MONITORING

LANDFILL GAS MONITORING FORM							(Baseline <input type="checkbox"/> Ambient <input type="checkbox"/>)	
Site Name: DUNDALK LANDFILL				Site Address: NEWRY ROAD, DUNDALK				
Operator: DUNDALK TOWN COUNCIL				National Grid Reference: 1632-12				
Site Status: Closed				Date: 21:10:2013			Time: 10am	
Instrument used: GA2000		Normal Analytical Range:			Date Next Calibration:			
Monitoring Personnel: J.O'N				Weather: Raining			Barometric pressure: 994mb	
Results								
Sample Station Number	Borehole/spike/other	Survey Depth	CH ₄ (% v/v)	CO ₂ (% v/v)	O ₂ (% v/v)	Comments		
Pipe to flare monitor			47.9	27.5	4.8			
Landfill flare monitor			48	28	4.8			

LANDFILL GAS MONITORING

LANDFILL GAS MONITORING FORM				(Baseline <input type="checkbox"/> Ambient <input 3"="" type="checkbox/>)</th> </tr> </thead> <tbody> <tr> <td colspan="/> Site Name: DUNDALK LANDFILL <td colspan="4">Site Address: NEWRY ROAD, DUNDALK</td>			Site Address: NEWRY ROAD, DUNDALK			
Operator: DUNDALK TOWN COUNCIL			National Grid Reference: 1632-12							
Site Status: Closed			Date: 21:11:2013		Time: 10am					
Instrument used: GA2000		Normal Analytical Range:		Date Next Calibration:						
Monitoring Personnel: J.O'N			Weather: Dry/Cold		Barometric pressure: 1016mb					
Results										
Sample Station Number	Borehole/ spike/other	Survey Depth	CH ₄ (% v/v)	CO ₂ (% v/v)	O ₂ (% v/v)	Comments				
G1	PIEZO		0	0.5	19.3					
G2	PIEZO		0.1	0.4	18.7					
G3	PIEZO		0.1	0.4	19.4					
G4	PIEZO		0.2	0.4	19.8					
G5	PIEZO		0	0.5	19.3					
G6	PIEZO		0.2	0.4	19.5					
G7	PIEZO		0	0.2	18.9					
G8	PIEZO		0.2	0.2	19.1					
G9	PIEZO		0.2	0.2	19.6					
G10	PIEZO		0.1	0.5	18.9					
G16	PIEZO		0	0	19.1					
G17	PIEZO		0	0.2	19.7					
G20	PIEZO		0.1	0.3	19.5					
G21	PIEZO		0	0.4	19.2					
GM1	PIEZO		0.1	0.4	19.1					
GM2	PIEZO		0	0.5	18.7					
GM3	PIEZO		0.1	0.4	18.3					
GM4	PIEZO		0	0.3	18.5					
GM5	PIEZO		0.1	0.2	18.9					
GM6	PIEZO		0.1	0.4	19.2					
GM24	PIEZO		0	0.6	19.8					

LANDFILL GAS MONITORING

LANDFILL GAS MONITORING FORM				(Baseline <input type="checkbox"/> Ambient <input type="checkbox"/>)		
Site Name: DUNDALK LANDFILL			Site Address: NEWRY ROAD, DUNDALK			
Operator: DUNDALK TOWN COUNCIL			National Grid Reference: 1632-12			
Site Status: Closed			Date: 21:11:2013		Time: 10am	
Instrument used: GA2000		Normal Analytical Range:		Date Next Calibration:		
Monitoring Personnel: J.O'N			Weather: Dry/Cold		Barometric pressure: 1016mb	
Results						
Sample Station Number	Borehole/spike/other	Survey Depth	CH ₄ (% v/v)	CO ₂ (% v/v)	O ₂ (% v/v)	Comments
Pipe to flare monitor			37	21	4.2	
Landfill flare monitor			37.5	21	4.2	

LANDFILL GAS MONITORING

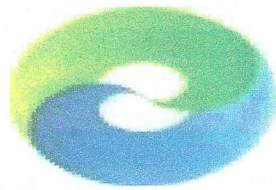
LANDFILL GAS MONITORING FORM							(Baseline <input type="checkbox"/> Ambient <input 3"="" type="checkbox/>)</th> </tr> </thead> <tbody> <tr> <td colspan="/> Site Name: DUNDALK LANDFILL <td colspan="4">Site Address: NEWRY ROAD, DUNDALK</td>	Site Address: NEWRY ROAD, DUNDALK			
Operator: DUNDALK TOWN COUNCIL			National Grid Reference: 1632-12								
Site Status: Closed			Date: 20:12:2013		Time: 11am						
Instrument used: GA2000		Normal Analytical Range:		Date Next Calibration:							
Monitoring Personnel: J.O'N			Weather: Afternoon/evening Rain		Barometric pressure: 1002mb						
Results											
Sample Station Number	Borehole/spike/other	Survey Depth	CH ₄ (% v/v)	CO ₂ (% v/v)	O ₂ (% v/v)	Comments					
G1	PIEZO		0	0.4	19.6						
G2	PIEZO		0.2	0.4	19.3						
G3	PIEZO		0	0.6	18.8						
G4	PIEZO		0.2	0.5	19.7						
G5	PIEZO		0	0.5	18.9						
G6	PIEZO		0.5	0.5	20.1						
G7	PIEZO		0	0.3	18.9						
G8	PIEZO		0.1	0.4	19.6						
G9	PIEZO		0.2	0.4	18.9						
G10	PIEZO		0.1	0.6	18.7						
G16	PIEZO		0	0.2	19.8						
G17	PIEZO		0	0.4	19.7						
G20	PIEZO		0.2	0.5	19.1						
G21	PIEZO		0	0.5	19.2						
GM1	PIEZO		0	0.2	19.3						
GM2	PIEZO		0	0.2	19.4						
GM3	PIEZO		0	0.3	19.1						
GM4	PIEZO		0	0.5	19.1						
GM5	PIEZO		0	0.4	18.6						
GM6	PIEZO		0.1	0.2	18.9						
GM24	PIEZO		0	0.3	19.6						

LANDFILL GAS MONITORING

LANDFILL GAS MONITORING FORM						(Baseline <input type="checkbox"/> Ambient <input 3"="" type="checkbox/>)</td> </tr> <tr> <td colspan="/> Site Name: DUNDALK LANDFILL	Site Address: NEWRY ROAD, DUNDALK			
Operator: DUNDALK TOWN COUNCIL			National Grid Reference: 1632-12							
Site Status: Closed			Date: 20:12:2013		Time: 11am					
Instrument used: GA2000		Normal Analytical Range:		Date Next Calibration:						
Monitoring Personnel: J.O'N			Weather: Afternoon/evening Rain		Barometric pressure: 1002mb					
Results										
Sample Station Number	Borehole/spike/other	Survey Depth	CH ₄ (% v/v)	CO ₂ (% v/v)	O ₂ (% v/v)	Comments				
Pipe to flare monitor			39.2	21.3	4.0					
Landfill flare monitor			38.9	21	4.0					

APPENDIX I

COMPOSTING MONITORING AND BIOFILTER RESULTS



ANUA
Bord na Mòna - with nature

*ANALYSIS OF COMPOSTED GREEN
MATERIAL FROM V&W RECYCLING
RECEIVED 05TH DECEMBER 2013*

REPORT NO: 43601

ATTENTION:

**V&W RECYCLING
NEWRY ROAD
DUNDALK
CO. LOUTH**

PREPARED BY:

Aoife Doyle
Team Leader
ANUA

DATE:

27 January 2014

(Ref: Sample received 5/12/13)

1 Introduction

One sample was received from V&W Recycling on the 05th of December 2013. No details of this sample are known; it was received in good condition and labelled as follows:

ANUA lab code	Client code
374166	Not known

The sample was analysed as requested by the client.

2 Results of Analysis

Compost Testing and Analysis Service

Report ref: 13-38050

Sample reference: 374166

Sample matrix: not known

Maturity Tests

Oxygen Uptake Rate

Sample no	Test Method	OUR Stability results (mmolO ₂ /kg OS/h)
374166	PrEN 16087-1	2.6

Self Heating

Sample no	Maximum Temperature reached (ambient 20°C)
374166	18

Plant Nutrient

Sample no	pH	EC μS.cm ⁻¹
374166	7.1	904
Test Method	I.S. EN13037	I.S. EN13038

CAT Soluble Nutrients

Sample no	NH ₄ -N mg.L ⁻¹	NO ₃ -N mg.L ⁻¹	PO ₄ -P mg.L ⁻¹	K mg.L ⁻¹
374166	709	8	35	3080
Test Method	I.S. EN 13652	I.S. EN 13652	I.S. EN 13652	I.S. EN 13652

Microbiological Analysis

Sample no	E. coli (cfu/g)	Salmonella (spp/25g)
374166	10	Not detected
Test Method	ISO 11866-2	I.S. EN ISO 6579

Physical Analysis

Sample no	H ₂ O %	Dry Matter %	Organic Matter %
374166	58	42	50
Test Method	I.S. EN 13041	I.S. EN 13041	I.S. EN 13039

Cress Germination Test

Sample no	Sample Diluted with 25% peat, to bring to correct EC	% Germination compared to control*	Root Index Compared to control (%)	MLVI compared to control (%)
374166	EC	97	79	80

* <80% = fail (method based on pr EN 16086-2)

Particle Size Analysis (Dry Wt. Basis)

<1mm %	1-2mm %	2-4mm %	4-8mm %	8-16.5mm %	16.5-31.5mm %	>31.5mm %
45	20	18	14	3	<0.01	<0.01

Contaminants (Dry Wt. Basis)

Sieve size	Stones %	Metals %	Plastic %	Glass %	Other %
<1mm	n/d	n/d	n/d	n/d	n/d
1-2mm	n/d	n/d	n/d	n/d	n/d
2-4mm	0.66	<0.01	<0.01	<0.01	<0.01
4-8mm	2.1	<0.01	<0.01	<0.01	<0.01
8-16mm	2.1	<0.01	<0.01	<0.01	<0.01
16-31.5mm	<0.01	<0.01	<0.01	<0.01	<0.01
>31.5mm	<0.01	<0.01	<0.01	<0.01	<0.01

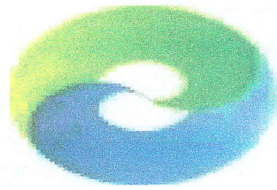
Heavy Metals (Dry Wt. Basis)

Sample no	Cd mg.kg ⁻¹	Cr mg.kg ⁻¹	Cu mg.kg ⁻¹	Hg mg.kg ⁻¹
374166	0.50	11.6	32.2	<0.05
Test Method	I.S. EN 13650	I.S. EN 13650	I.S. EN 13650	ISO 16772

Sample no	Ni mg.kg ⁻¹	Pb mg.kg ⁻¹	Zn mg.kg ⁻¹
374166	12.5	30.3	133
Test Method	I.S. EN 13650	I.S. EN 13650	I.S. EN 13650

Total Plant Nutrients (Dry Wt. Basis)

Sample no	N %	P %	K %
374166	2.44	0.37	0.83
Test Method	I.S. EN 13554-1	I.S. EN 13650	I.S. EN 13650



ANUA
Bord na Móna - with nature

*ANALYSIS OF COMPOSTED GREEN
MATERIAL FROM V&W RECYCLING
RECEIVED 25TH OCTOBER 2013*

REPORT NO: 43162

ATTENTION:

**V&W RECYCLING
NEWRY ROAD
DUNDALK
CO. LOUTH**

PREPARED BY: Shona Keogh
Team Leader
ANUA

DATE: 17th December 2013

1 Introduction

One sample was received from V&W Recycling on the 25th of October 2013. No details of this sample are known; it was received in good condition and labelled as follows:

ANUA lab code	Client code
371373	Not known

The sample was analysed as requested by the client.

2 Results of Analysis

Compost Testing and Analysis Service

Report ref: 13-37576

Sample reference: 371373
 Sample matrix: not known

Maturity Tests Oxygen Uptake Rate

Sample no	Test Method	OUR Stability results (mmolO ₂ /kg OS/h)
371373	PrEN 16087-1	3.0

Self Heating

Sample no	Maximum Temperature reached (ambient 23°C)
371373	24

Plant Nutrient

Sample no	pH	EC μS.cm ⁻¹
371373	6.6	1155
Test Method	I.S. EN13037	I.S. EN13038

CAT Soluble Nutrients

Sample no	NH ₄ -N mg.L ⁻¹	NO ₃ -N mg.L ⁻¹	PO ₄ -P mg.L ⁻¹	K mg.L ⁻¹
371373	<0.01	206	49	331
Test Method	I.S. EN 13652	I.S. EN 13652	I.S. EN 13652	I.S. EN 13652

Total Plant Nutrients (Dry Wt. Basis)

Sample no	N %	P %	K %
371373	2.87	0.46	0.82
Test Method	I.S. EN 13554-1	I.S. EN 13650	I.S. EN 13650

Microbiological Analysis

Sample no	E. coli (cfu/g)	Salmonella (spp/25g)
371373	<10	Not detected
Test Method	ISO 11866-2	I.S. EN ISO 6579

Heavy Metals (Dry Wt. Basis)

Sample no	Cd mg.kg ⁻¹	Cr mg.kg ⁻¹	Cu mg.kg ⁻¹	Hg mg.kg ⁻¹
371373	0.54	18.1	34.9	0.08
Test Method	I.S. EN 13650	I.S. EN 13650	I.S. EN 13650	ISO 16772

Sample no	Ni mg.kg ⁻¹	Pb mg.kg ⁻¹	Zn mg.kg ⁻¹
371373	17.1	33.5	151
Test Method	I.S. EN 13650	I.S. EN 13650	I.S. EN 13650

Physical Analysis

Sample no	H ₂ O %	Dry Matter %	Organic Matter %
371373	58	42	50
Test Method	I.S. EN 13041	I.S. EN 13041	I.S. EN 13039

Particle Size Analysis (Dry Wt. Basis)

<1mm %	1-2mm %	2-4mm %	4-8mm %	8-16.5mm %	16.5- 31.5mm %	>31.5 mm %
41	19	17	20	3	<0.01	<0.01

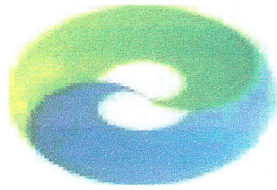
Contaminants (Dry Wt. Basis)

Sieve size	Stones %	Metals %	Plastic %	Glass %	Other %
<1mm	n/d	n/d	n/d	n/d	n/d
1-2mm	n/d	n/d	n/d	n/d	n/d
2-4mm	0.94	<0.01	<0.01	<0.01	<0.01
4-8mm	1.05	<0.01	<0.01	<0.01	<0.01
8-16mm	<0.01	<0.01	<0.01	<0.01	<0.01
16-31.5mm	<0.01	<0.01	<0.01	<0.01	<0.01
>31.5mm	<0.01	<0.01	<0.01	<0.01	<0.01

Cress Germination Test

Sample no	Sample Diluted with 50% peat, to bring to correct	% Germination compared to control*	Root Index Compared to control (%)	MLVI compared to control (%)
371373	EC	97	106	106

* <80% = fail (method based on pr EN 16086-2)



ANUA

Bord na Móna - with nature

*ANALYSIS OF COMPOSTED GREEN
MATERIAL FROM V&W RECYCLING*

RECEIVED 08TH OCTOBER 2013

REPORT NO: 42591

ATTENTION:

**V&W RECYCLING
NEWRY ROAD
DUNDALK
CO. LOUTH**

PREPARED BY:

Aoife Doyle
Team Leader
ANUA

DATE:

01 November 2013

1 Introduction

One sample was received from V&W Recycling on the 08th of October 2013. No details of this sample are known; it was received in good condition and labelled as follows:

ANUA lab code	Client code
369865	Not known

The sample was analysed as requested by the client.

2 Results of Analysis

Compost Testing and Analysis Service

Report ref: 13-37369

Sample reference: 369865
Sample matrix: not known

Maturity Tests

Oxygen Uptake Rate

Sample no	Test Method	OUR Stability results (mmolO ₂ /kg OS/h)
369865	PrEN 16087-1	4.0

Self Heating

Sample no	Maximum Temperature reached (ambient 24°C)
369865	22

Plant Nutrient

Sample no	pH	EC μS.cm ⁻¹
369865	6.4	1126
Test Method	I.S. EN13037	I.S. EN13038

CAT Soluble Nutrients

Sample no	NH ₄ -N mg.L ⁻¹	NO ₃ -N mg.L ⁻¹	PO ₄ -P mg.L ⁻¹	K mg.L ⁻¹
369865	<0.01	664	171	1140
Test Method	I.S. EN 13652	I.S. EN 13652	I.S. EN 13652	I.S. EN 13652

Total Plant Nutrients (Dry Wt. Basis)

Sample no	N %	P %	K %
369865	3.08	0.40	0.83
Test Method	I.S. EN 13554-1	I.S. EN 13650	I.S. EN 13650

Microbiological Analysis

Sample no	E. coli (cfu/g)	Salmonella (spp/25g)
369865	<10	Not detected
Test Method	ISO 11866-2	I.S. EN ISO 6579

Heavy Metals (Dry Wt. Basis)

Sample no	Cd mg.kg ⁻¹	Cr mg.kg ⁻¹	Cu mg.kg ⁻¹	Hg mg.kg ⁻¹
369865	0.41	9.72	28.4	0.07
Test Method	I.S. EN 13650	I.S. EN 13650	I.S. EN 13650	ISO 16772

Sample no	Ni mg.kg ⁻¹	Pb mg.kg ⁻¹	Zn mg.kg ⁻¹
369865	10.1	29.6	107
Test Method	I.S. EN 13650	I.S. EN 13650	I.S. EN 13650

Physical Analysis

Sample no	H ₂ O %	Dry Matter %	Organic Matter %
369865	54	46	50
Test Method	I.S. EN 13041	I.S. EN 13041	I.S. EN 13039

Particle Size Analysis (Dry Wt. Basis)

<1mm %	1-2mm %	2-4mm %	4-8mm %	8-16.5mm %	16.5- 31.5mm %	>31.5 mm %
42	17	15	21	5.6	<0.01	<0.01

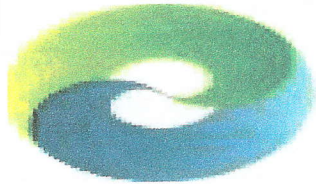
Contaminants (Dry Wt. Basis)

Sieve size	Stones %	Metals %	Plastic %	Glass %	Other %
<1mm	n/d	n/d	n/d	n/d	n/d
1-2mm	n/d	n/d	n/d	n/d	n/d
2-4mm	1.0	<0.01	<0.01	<0.01	<0.01
4-8mm	3.2	<0.01	<0.01	0.16	0.12
8-16mm	<0.01	<0.01	<0.01	<0.01	<0.01
16-31.5mm	<0.01	<0.01	<0.01	<0.01	<0.01
>31.5mm	<0.01	<0.01	<0.01	<0.01	<0.01

Cress Germination Test

Sample no	Sample Diluted with 50% peat, to bring to correct EC	% Germination compared to control*	Root Index Compared to control (%)	MLVI compared to control (%)
369865	EC	103	134	127

* <80% = fail (method based on pr EN 16086-2)



ANUA
Bord na Mòna - with nature

*ANALYSIS OF COMPOSTED GREEN
MATERIAL FROM V&W RECYCLING*


RECEIVED 09TH JULY 2013

REPORT NO: 41744

ATTENTION:

**V&W RECYCLING
NEWRY ROAD
DUNDALK
CO. LOUTH**

PREPARED BY:

Aoife Doyle 
Team Leader
ANUA

DATE:

02 September 2013

1 Introduction

1 sample was received from V&W Recycling on the 09th of July 2013. No details of this sample are known; it was received in good condition and labelled as follows:

ANUA lab code	Client code
363095	Not known

The sample was analysed as requested by the client.

2 Results of Analysis

Compost Testing and Analysis Service

Report ref: 13-36330

Sample reference: 363095

Sample matrix: not known

Maturity Tests

Oxygen Uptake Rate

Sample no	Test Method	OUR Stability results (mmolO ₂ /kg OS/h)
363095	PrEN 16087-1	6.8

Self Heating

Sample no	Maximum Temperature reached (ambient 23°C)
363095	22

Plant Nutrient

Sample no	pH	EC μS.cm ⁻¹
363095	7.8	1126
Test Method	I.S. EN13037	I.S. EN13038

CAT Soluble Nutrients

Sample no	NH ₄ -N mg.L ⁻¹	NO ₃ -N mg.L ⁻¹	PO ₄ -P mg.L ⁻¹	K mg.L ⁻¹
363095	<0.01	281	99	1550
Test Method	I.S. EN 13652	I.S. EN 13652	I.S. EN 13652	I.S. EN 13652

Total Plant Nutrients (Dry Wt. Basis)

Sample no	N %	P %	K %
363092	2.42	0.40	1.07
Test Method	I.S.EN 13554-1	I.S. EN 13650	I.S. EN 13650

Microbiological Analysis

Sample no	E. coli (cfu/g)	Salmonella (spp/25g)
363095	<10	Not detected
Test Method	ISO 11866-2	I.S. EN ISO 6579

Heavy Metals (Dry Wt. Basis)

Sample no	Cd mg.kg ⁻¹	Cr mg.kg ⁻¹	Cu mg.kg ⁻¹	Hg mg.kg ⁻¹
363095	0.53	14.8	36	0.11
Test Method	I.S. EN 13650	I.S. EN 13650	I.S. EN 13650	ISO 16772

Sample no	Ni mg.kg ⁻¹	Pb mg.kg ⁻¹	Zn mg.kg ⁻¹
363095	15.8	32.4	140
Test Method	I.S. EN 13650	I.S. EN 13650	I.S. EN 13650

Physical Analysis

Sample no	H ₂ O %	Dry Matter %	Organic Matter %
363095	60	40	50
Test Method	I.S. EN 13041	I.S. EN 13041	I.S. EN 13039

Particle Size Analysis (Dry Wt. Basis)

<1mm %	1-2mm %	2-4mm %	4-8mm %	8-16.5mm %	16.5- 31.5mm %	>31.5 mm %
35	16	18	19	12	0.27	0.41

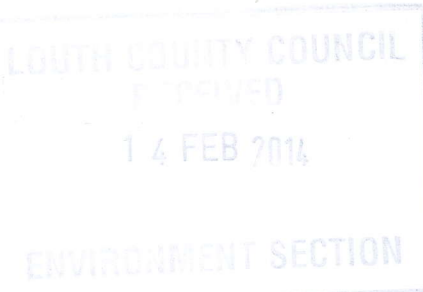
Contaminants (Dry Wt. Basis)

Sieve size	Stones %	Metals %	Plastic %	Glass %	Other %
<1mm	<0.01	<0.01	<0.01	<0.01	<0.01
1-2mm	0.14	<0.01	<0.01	<0.01	<0.01
2-4mm	0.27	<0.01	<0.01	<0.01	<0.01
4-8mm	<0.01	<0.01	0.12	<0.01	<0.01
8-16mm	<0.01	<0.01	<0.01	<0.01	<0.01
16-31.5mm	<0.01	<0.01	<0.01	<0.01	<0.01
>31.5mm	<0.01	<0.01	<0.01	<0.01	<0.01

Cress Germination Test

Sample no	Sample Diluted with 50% peat, to bring to correct EC	% Germination compared to control*	Root Index Compared to control (%)	MLVI compared to control (%)
363095	EC	97	106	107

* <80% = fail (method based on pr EN 16086-2)



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Customer	Manager	Lab Report Ref. No.	1143/017/01
	V & W Recycling	Date of Receipt	11/07/2013
	Newry Rd	Sampled On	11/07/2013
	Dundalk	Date Testing Commenced	11/07/2013
	Co. Louth	Received or Collected	Delivered by Customer
Customer PO		Condition on Receipt	Acceptable
Customer Ref	Biofilter 1	Date of Report	19/07/2013
Ref 2	Wood Chip Sample	Sample Type	Other

CERTIFICATE OF ANALYSIS

Test Parameter	SOP	Analytical Technique	Result	Units	Acc.
% Moisture Content	0	Drying @ 104 C	67.91	%	
Ammonia (Solid)	114	Colorimetry	233.42	mg/Kg as N	
pH (Solid)	110	Electrometry	7.7	pH Units	
TVC @ 22°C (Solid)	141	Incubation @ 22C/ 72H	12600000	cfu/g	
TVC @ 37°C (Solid)	141	Incubation @ 37C/ 48H	9400000	cfu/g	

Signed: 
Aoife Harmon - Technical Supervisor

Date: 19/07/2013

Acc. : Accredited Parameters by ISO 17025:2005

PVL - Parametric Value Limit as per EU Drinking water Regulations (SI 278 2007)

All organic results are analysed as received and all results are corrected for dry weight at 104 C

Results shall not be reproduced, except in full, without the approval of Fitz Scientific

Results contained in this report relate only to the samples tested

**The analytical result for this parameter may not be reflective of the concentration present at the time of sampling. The maximum recommended preservation time for this parameter has been exceeded.



Monitoring and Testing Services

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Customer	Manager	Lab Report Ref. No.	1143/017/02
	V & W Recycling	Date of Receipt	11/07/2013
	Newry Rd	Sampled On	11/07/2013
	Dundalk	Date Testing Commenced	11/07/2013
	Co. Louth	Received or Collected	Delivered by Customer
Customer PO		Condition on Receipt	Acceptable
Customer Ref	Biofilter 2	Date of Report	19/07/2013
Ref 2	Wood Chip Sample	Sample Type	Other

CERTIFICATE OF ANALYSIS

Test Parameter	SOP	Analytical Technique	Result	Units	Acc.
% Moisture Content	0	Drying @ 104 C	59.56	%	
Ammonia (Solid)	114	Colorimetry	249.10	mg/Kg as N	
pH (Solid)	110	Electrometry	7.5	pH Units	
TVC @ 22°C (Solid)	141	Incubation @ 22C/ 72H	17400000	cfu/g	
TVC @ 37°C (Solid)	141	Incubation @ 37C/ 48H	16700000	cfu/g	

Signed: A. Harmon
Aoife Harmon - Technical Supervisor

Date : 19/07/2013

Acc. : Accredited Parameters by ISO 17025:2005
 PVL - Parametric Value Limit as per EU Drinking water Regulations (SI 278 2007)
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Monitoring and Testing Services

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<i>Customer</i>	Manager	<i>Lab Report Ref. No.</i>	1143/020/01
	V & W Recycling	<i>Date of Receipt</i>	29/11/2013
		<i>Sampled On</i>	29/11/2013
	Newry Rd	<i>Date Testing Commenced</i>	29/11/2013
	Dundalk	<i>Received or Collected</i>	Delivered by Customer
	Co. Louth	<i>Condition on Receipt</i>	Acceptable
<i>Customer PO</i>		<i>Date of Report</i>	09/12/2013
<i>Customer Ref</i>	Biofilter 1	<i>Sample Type</i>	Other
<i>Ref 2</i>			

CERTIFICATE OF ANALYSIS

Test Parameter	SOP	Analytical Technique	Result	Units	Acc.
% Moisture Content	235	Drying @ 104 C	70.05	%	
Ammonia (Solid)	114	Colorimetry	250.53	mg/Kg as N	
pH (Solid)	110	Electrometry	7.5	pH Units	
TVC @ 22°C (Solid)	141	Incubation @ 22C/ 72H	650000	cfu/g	
TVC @ 37°C (Solid)	141	Incubation @ 37C/ 48H	820000	cfu/g	

Signed: 
Aoife Harmon - Technical Supervisor

Date : 09/12/2013

Acc. : Accredited Parameters by ISO 17025:2005

PVL - Parametric Value Limit as per EU Drinking water Regulations (SI 278 2007)

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