



ANNUAL ENVIRONMENTAL REPORT

January - December 2014

For

Dundalk Landfill Site

Co. Louth

Waste Licence Reference W0034-02

By

Louth County Council

To

Environmental Protection Agency



DUNDALK LANDFILL & RECYCLING CENTRE (W0034-02)

ANNUAL ENVIRONMENTAL REPORT

JANUARY – DECEMBER 2014

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1.0 INTRODUCTION

This Annual Environmental Report (AER) has been prepared to meet the requirements of 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 2014. 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 7,689 tonnes. The figures are taken from National Waste Report 2014 Survey.

240 tonnes of mixed residual waste arising from members of the public was accepted for disposal at the recycling facility. The remaining waste was recovered on or off site as listed in Table 3.2. 2,715 tonnes of garden and park waste from municipal sources (landscapers, householders etc.) was composted onsite. 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 CWF

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	240	Indaver Incinerator W0167-02	D
Garden	20 02 01	2,715	Dundalk town council W0034-02	R
Cardboard packaging	15 01 01	660	Peute Europe NL-6000076	R
Newspaper and magazines	20 01 01	278	Peute Europe NL-6000076	R
Glass packaging	15 01 07	389	Glasson NI LN/06/08	R
Metals	15 01 04	359	Tinnelly NI WMEX 20/01	R
Plastic packaging	15 01 02	502	Shabra Plastics Licence 15/5	R
Textiles, non-packaging	20 01 11	27	Cookstown N.I WMEX 01/11	R
Wood packaging	15 01 03	301	Thornton Waste W0195-02	R
Wood non-packaging	20 01 38	451	Thornton Waste W0195-02	R
Lead acid batteries and accumulators	16 06 01*	7	Rilta W0192-02	R
Waste mineral oils	13 02 05*	5	Envva Portlaoise (W0184-01)	R
Waste paint and varnish (including containers)	20 01 27	2	Envva Portlaoise (W0184-01)	R
Building Rubble	17 01 07	1,753	Scotch Corner Landfill W0020-01	R
Total		7,689		

4.0 SUMMARY REPORT ON EMISSIONS

There is no continuous wastewater (sewer), surface water or groundwater emissions monitoring at Dundalk landfill site. Periodic/non-continuous monitoring is carried out for sewer, groundwater, surface water and landfill gas.

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.

Periodic/non-continuous monitoring is carried out at S1. 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 1,465 m³ to 7,325 m³ of leachate produced.

4.3 EMISSIONS TO AIR

There is no continuous air emissions monitoring at Drogheda landfill site. Periodic/non-continuous monitoring is carried out on the flare. This is further discussed in Section 5.11.

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 44,081 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	217,962.0
Methane utilised in engine/s	0.0
Net Methane Emission	44,081.0

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
Aluminium	µg/l	4	<10.0	<10.0		
Ammonia	mg/l N	16	2.9	300	105	86
Antimony	µg/l	8	<1.0	1		
Arsenic	µg/l	8	<1.0	1.3		
Barium	µg/l	8	98	380	247	131

Parameters	Units	No. of Samples	Minimum	Maximum	Mean	Standard Deviation
Beryllium	µg/l	8	<1.0	<1.0		
B.O.D.	mg/l O2	16	4.8	120	37	33
Boron	µg/l	8	180	1900	1003	712
Cadmium	µg/l	8	<0.020	0.09	0	0
Calcium	mg/l Ca	8	140	200	173	25
C.O.D.	mg/l O2	16	48	1150	255	287
Chloride	mg/l Cl	16	20	235	115	70
Chromium	µg/l	8	1.5	8.4	6	3
Cobalt (µg/l)	µg/l	8	1.6	4.4	3	1
Conductivity	µS/cm @ 25	16	886	3880	2469	1074
Copper	µg/l	8	11	13	12	1
Cyanide	mg/l CN	16	<0.05	<0.05		
Fluoride	mg/l	8	<0.150	0.26	0	0
Iron	µg/l	8	160	620	363	206
Lead	µg/l	8	<1.0	<1.0		
Magnesium	mg/l Mg	8	23	90	54	28
Manganese	µg/l	8	690	1900	1070	566
Mercury	µg/l	8	<0.050	<0.050		
Molybdenum	µg/l	8	1.5	8.6	5	5
Nickel	µg/l	8	2.2	14	7	5
o-Phosphate	mg/l P	16	<1.0	0.94	0	0
pH	0	16	6.5	7	7	0
Potassium	mg/l	8	16	140	65	53
Selenium	µg/l	8	<1.0	<1.0		
Sodium	mg/l	8	41	180	99	61
Strontium	µg/l	8	400	900	710	237
Sulphate	mg/l SO4	8	<2.0	87	34	46

Parameters	Units	No. of Samples	Minimum	Maximum	Mean	Standard Deviation
Temp	°C	16	8.2	15.1	12	2
Thallium	µg/l	8	<1.0	<1.0		
T.O.N	mg/l N	16	1	1.8	1	1
Total S Solids	mg/l	4	0	0		
Uranium	µg/l	8	<1.0	<1.0		
Vanadium	µg/l	8	<1.0	<1.0		
Zinc	µg/l	4	29	44	38	7

Table 5.2 Raw Leachate Concentrations

Parameter	Dundalk Landfill Site		From 30 Samples from UK/Irish Landfills Accepting Domestic Waste		
	Min.Conc	Max.Conc	Results in mg/l		
			Min.Conc	Max.Conc	Mean
Ammonia (mg/N)	2.9	300	<0.2	1700	491
BOD	4.8	120	4.5	>4800	>834
COD	4.8	120	<10	33,700	3078
Chloride (mg/l)	20	235	27	3410	1256
Iron (µg/l)*	160	620	0.4	664	54.4
Potassium (mg/l)	16	140	2.7	1480	491
Sodium (mg/l)	41	180	12	3000	904
TON (mg/l N)	1	1.8	/	/	/
Conductivity (µS/cm)	886	3880	503	19,200	7789
pH (pH units)	6.5	7	6.4	8.0	7.2

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.

A hydrogeological risk assessment was undertaken in 2014 on foot of a technical amendment to the waste license as per a notification issued by the EPA on 15/01/13. This has been submitted to the

EPA under a separate cover. This report found there are no sustained upward trends in contaminant export from the site.

Groundwater was assessed against;

- EPA Interim guideline values³ (IGV),
- SI No 278 of 2007 EC (Drinking water) Regulations (DWR),
- SI No 9 of 2010 European Communities Environmental Objectives (Groundwater) Regulations 2010 as amended (GWR 2010).
- SI No 294 of 1989 European Communities (Quality of Surface Water Intended for the Abstraction of Drinking Water) Regulations (SWQS),and
- SI No 272 of 2009 European Communities Environmental Objectives (Surface Water) Regulations 2009 (EQS).

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) except in the last quarter. The highest concentration was 5.5 mg/l in October. 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 446 mg/l in November.

5.4.2 Quarterly Parameters

Dissolved Oxygen (DO) levels ranged from 25% to 43 % saturation. WM1 exhibits TOC values ranging from 3.1 mg/l to 9.7 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 7th of April 2014 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.

Aluminium, Antimony Arsenic, Barium, Boron, Cadmium, Chromium, Copper, Fluoride, Iron, Lead, Manganese, Mercury, Molybdenum, Nickel, Orthophosphate, Selenium, and Zinc are below the IGV,

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

DWR and GWR 2010 were applicable in all up-gradient borehole. Parameters concentrations above the IGW, DWR and GWR 2010 are:

- Magnesium 54 mg/l.
- Potassium 22 mg/l.
- Sodium 420 mg/l.
- Sulphate 299.8 mg/l.

Total Oxidised Nitrogen (TON) was 1.2 mg/l and TOC 3.1 mg/l.

Other parameters detected above the limit of detection were:

- Alkalinity 438 mg/l,
- Calcium 110 mg/l,
- Strontium 520 µg/l, and
- Uranium 1.5 µg/l⁴.

Beryllium, Cobalt and Thallium are below the lower limit of detection.

Analysis for Polycyclic Aromatic Hydrocarbons (total 16 EPA PAHs) was <0.344 µg/l. All parameters measured were less than the limit 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 IGW 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 <0.002 mg/l. This concentration is the limit of detection for the methodology used for Phenol however this is higher than the IGW of 0.5µg/l.

⁴ 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.

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 CaCO ₃	6	685	1050	827.00	133.82
Aluminium	µg/l	6	<10.0	10		
Ammonia	mg/l N	71	5	400	56.66	56.69
Antimony	µg/l	24	<1.0	<1.0		
Arsenic	µg/l	24	1.1	3.9	1.95	1.33
Barium	µg/l	24	27	530	242.83	222.54
Beryllium	µg/l	24	<1.0	<1.0		
Boron	µg/l	24	780	1800	1346.67	362.58
Cadmium	µg/l	24	<0.020	0.03		
Calcium	mg/l Ca	24	140	240	183.33	42.27
Chloride	mg/l Cl	71	50	6490	1299.37	1466.41
Chromium	µg/l	24	2.4	4	3.27	0.61
Cobalt	µg/l	24	1.5	3.3	2.20	0.62
Conductivity	µS/cm @ 25	71	1427	19770	5826.01	4260.53
Copper	µg/l	24	4.4	23	11.98	8.76
Cyanide	mg/l CN	24	<0.05	<0.05		
D.O.	% Saturation	36	10	25	17.43	4.41
Fluoride	mg/l	24	0.16	0.29	0.21	0.05
Iron	µg/l	24	41	15000	2810.67	5990.11
Lead	µg/l	24	<1.0	<1.0		
Magnesium	mg/l Mg	24	53	270	116.50	86.70
Manganese	µg/l	24	97	2300	934.50	937.89
Mercury	µg/l	24	<0.050	<0.050		

	Units	No. of Samples	Minimum	Maximum	Mean	Standard Deviation
Molybdenum	µg/l	24	<1.0	2.3		
Nickel	µg/l	24	1.9	10	4.63	2.88
o-Phosphate	mg/l P	24	<0.010	0.51	0.16	0.20
pH	0	36	6.6	7.3	7.03	0.21
Potassium	mg/l	24	42	140	81.50	35.65
Residue on Evaporation	mg/l	24	1158	6926	2760.17	2375.61
Sampling Depth	m	71	2.3	5.5		
Selenium	µg/l	24	<5	<5		
Sodium	mg/l	24	75	2100	677.83	861.18
Strontium	µg/l	24	720	1600	971.67	382.54
Sulphate	mg/l SO4	24	6.1	190.6	59.53	72.78
Temp	°C	36	9.7	15.6	12.75	1.79
Thallium	µg/l	24	<1.0	<1.0		
T.O.C.	mg/l	36	12.2	122.6	38.85	27.49
T.O.N	mg/l N	24	1.4	72	18.48	30.20
Uranium	µg/l	24	<1.0	1.2		
Vanadium	µg/l	24	<1.0	<1.0		
Zinc	µg/l	6	1.4	180	42.92	69.54

5.5.1 Monthly Parameters

Results from down gradient boreholes indicate elevated levels of Ammonia in the majority of boreholes. The highest Ammonia concentration recorded was 400 mg/l N in WM8 in July.

A hydrogeological risk assessment was undertaken in 2014. This report found that concentrations of ammonia in groundwater at the periphery of the landfill are somewhat similar to those currently observed in leachate. This would suggest that there is minimal attenuation of ammonia in the unsaturated zone between the waste cell and the gravel aquifer, and that up gradient groundwater moving below the source does not have a significant dilution effect on infiltrating leachate.

Electrical Conductivity exceeded the DWR and GWR in all boreholes. The highest level was recorded in WM4 (19,770 µS/c Chloride levels also exceeded the DWR throughout the monitoring period. The highest Chloride concentration recorded was 6,490 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. Conductivity range detected in groundwater is significantly higher than that reported in leachate.

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. The highest concentration was recorded in WM8 (122.6 mg/l) in April. DO concentrations ranged from 10% to 43 % saturation.

5.5.3 Annually

Annual analysis for metals and non-metals was undertaken on the 7th of April 2014 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, Cadmium, Chromium, Copper, Fluoride, Lead, Mercury, Molybdenum, Nickel, 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 were:

- Barium 100 to 530 ug/l
- Boron 1,100 to 1800 ug/l
- Iron 210 to 1,500 µg/l except WM4 (53 µg/l) and WM5 (41 µg/l)
- Magnesium 53 to 270 mg/l
- Manganese 120 to 2,800 µg/l
- Orthophosphate 0.037 mg/l to 0.51 mg/l
- Potassium 42 to 140 mg/l
- Sodium 180 to 2100 mg/l except at WM8 (92 mg/l)and WM9 (75 mg/l)
- Sulphate at WM9 (99.9 mg/l)and WM10 (190.6 mg/l)

Total Oxidised Nitrogen (TON) values down gradient range from <0.02 mg/l to 72 mg/l. TOC values down gradient range from 16.1 mg/l to 122.6 mg/l.

Other parameters detected above the limit of detection were:

- Alkalinity 685 mg/l to 1,050 mg/l

- Calcium 140 mg/l to 240 mg/l
- Cobalt 1.5 to 3.3
- Strontium 720 µg/l to 160 µg/l
- Uranium WM10 1.2 µg/l⁵

Beryllium and Thallium are below the lower limit of detection.

Analysis for Polycyclic Aromatic Hydrocarbons (total 16 EPA PAHs) was <0.344 µg/l. All parameters measured were less than the limit of detection except for Acenaphthene (0.0172 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.

Pesticide and herbicide and 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.

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.

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							
27/01/2014	2.17	1.22	0.77	1.47	2.45	1.78	3.04
17/02/2014	2.07	1.12	1.67	1.67	2.35	1.88	2.94
10/03/2014	2.17	1.12	1.37	1.37	1.35	1.68	3.04
07/04/2014	2.07	0.52	0.37	1.17	2.45	0.78	0.34

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.

13/05/2014	2.27	0.52	0.57	1.07	2.85		0.14
04/06/2014	1.87	0.42	0.27	0.97	1.95	0.78	0.14
14/07/2014							
26/08/2014	2.27	1.02	1.27	1.17	1.95	1.78	0.84
08/09/2014	1.77	1.52	1.77	1.57	1.05	2.08	1.04
15/10/2014	1.87	0.42	0.27	0.87	1.45	0.98	0.74
17/11/2014	2.47	0.92	0.67	1.67	2.45	1.48	1.44
08/12/2014	1.97	0.92	0.97	1.27	2.35	1.38	0.74

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 hydrogeological risk assessment was undertaken in 2014 on foot of a technical amendment to the waste license as per a notification issued by the EPA on 15/01/13. This has been submitted to the EPA under a separate cover. This report found there are no sustained upward trends in contaminant export from 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, WM6 and WM10 concentrations are below the maximum predicted concentration range. For the remaining boreholes:

- WM5 exceeds the maximum predicted concentration range for Ammoniacal Nitrogen in 4 of the 12 sampling
- WM8 (gravel aquifer) exceeds the maximum predicted concentration range for Ammoniacal Nitrogen in 8 of the 12 sampling rounds.
- WM9 exceeds the maximum predicted concentration range for Ammoniacal Nitrogen in 8 of the 12 sampling rounds.

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 2014 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	316	456	381	58
Aluminium	µg/l	4	<10.0	60		
Ammonia	mg/l N	48	0.044	68	7	12
Antimony	µg/l	16	<1.0	<1.0		
Arsenic	µg/l	16	1	1.6	1	0
Barium	µg/l	16	41	100	59	28
Beryllium	µg/l	16	<1.0	<1.0		
B.O.D.	mg/l O ₂	24	1.1	180	20	43
Boron	µg/l	16	190	310	243	50

	Units	No. of Samples	Minimum	Maximum	Mean	Standard Deviation
Cadmium	µg/l	16	<0.020	0.02		
Calcium	mg/l Ca	16	110	140	128	13
C.O.D.	mg/l O2	24	22	940	144	228
Chloride	mg/l Cl	48	60	736	181	117
Chromium	µg/l	16	1	1.6	1	0
Cobalt (µg/l)	µg/l	16	1.1	1.3	1	0
Conductivity	µS/cm @ 25	48	735	3070	1520	502
Copper	µg/l	16	1.4	2.6	2	1
D.O.	% Saturation	24	27	104	45	21
Fluoride	mg/l	12	0	0		
Iron	µg/l	16	35	180	111	66
Lead	µg/l	16	<1.0	<1.0		
Magnesium	mg/l Mg	16	16	30	25	7
Manganese	µg/l	16	160	920	508	400
Mercury	µg/l	16	<0.050	<0.050		
Molybdenum	µg/l	16	2.7	3.7	3	0
Nickel	µg/l	16	2.8	3.8	3	0
o-Phosphate	mg/l P	16	<0.010	0.062		
pH	0	24	7	7.6	7	0
Potassium	mg/l	16	19	25	22	3
Selenium	µg/l	16	<1.0	<1.0		
Sodium	mg/l	16	49	120	87	30
Strontium	µg/l	16	410	510	475	45
Sulphate	mg/l SO4	16	66.1	110.3	93	20
Suspended Solids	mg/l	24	8	11950	1089	3156
Temp	°C	24	6.5	15.9	12	3
Thallium	µg/l	16	<1.0	<1.0		

	Units	No. of Samples	Minimum	Maximum	Mean	Standard Deviation
T.O.N	mg/l N	24	0.26	5.7	2	2
Uranium	µg/l	16	<1.0	2	2	
Vanadium	µg/l	16	<1.0	3.1	3	
Zinc	µg/l	4	2.3	4.3	3	1

Table 5.9 Surface Water Parameters SW5 to SW9

	Units	No. of Samples	Minimum	Maximum	Mean	Standard Deviation
Alkalinity	mg/l CaCO ₃	5	94	101	98	3
Aluminium	µg/l	5	110	420	194	132
Ammonia	mg/l N	55	0.021	0.84	0	0
Antimony	µg/l	17	<1.0	<1.0		
Arsenic	µg/l	17	1.1	1.5	1	0
Barium	µg/l	17	36	42	38	3
Beryllium	µg/l	17	<1.0	<1.0		
B.O.D.	mg/l O ₂	26	1.1	8.1	3	2
Boron	µg/l	17	16	110	38	40
Cadmium	µg/l	17	0.03	0.06	0	0
Calcium	mg/l Ca	17	34	44	40	4
C.O.D.	mg/l O ₂	26	20	1300	261	447
Chloride	mg/l Cl	55	19	16100	3101	4781
Chromium	µg/l	17	<1.0	1.3		
Cobalt (µg/l)	µg/l	17	<1.0	<1.0		
Conductivity	µS/cm @ 25	55	284	45900	9893	13984
Copper	µg/l	17	3.1	4.3	4	1
D.O.	% Saturation	26	70	103	85	10
Fluoride	mg/l	12	0	0		
Iron	µg/l	17	370	1000	556	260
Lead	µg/l	17	1.6	1.6	2	
Magnesium	mg/l Mg	17	6.7	31	12	11
Manganese	µg/l	17	44	86	56	17
Mercury	µg/l	17	<0.050	<0.050		
Molybdenum	µg/l	17	<1.0	<1.0		

	Units	No. of Samples	Minimum	Maximum	Mean	Standard Deviation
Nickel	µg/l	17	2.5	3.7	3	1
o-Phosphate	mg/l P	17	0.033	0.04	0	0
pH	0	26	7.5	8.3	8	0
Potassium	mg/l	17	3.3	12	5	4
Selenium	µg/l	17	<1.0	<1.0		
Silver	µg/l	0	0	0		
Sodium	mg/l	17	12	230	60	95
Strontium	µg/l	17	100	250	134	65
Sulphate	mg/l SO4	17	12.3	13.8	13	1
Suspended Solids	mg/l	26	8	130	43	39
Temp	°C	27	5.7	16.9	12	4
Thallium	µg/l	17	<1.0	<1.0		
T.O.N	mg/l N	26	<0.20	3.3		
Uranium	µg/l	17	<1.0	<1.0		
Vanadium	µg/l	17	<1.0	1.9	2	0
Zinc	µg/l	5	4.9	200	80	83

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 68 mg/l N in SW2 and in the estuary was 0.84 mg/l N in SW9 (DS).

Electrical Conductivity and Chloride also exceeded the SWQS throughout the monitoring period. The highest Chloride concentration recorded was 16,100 mg/l in SW6. 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 7.1 to 8.3 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 180 mg/l in SW2 and in the estuary was 8.1 mg/l in SW8 (US). For COD the highest concentration was 940 mg/l in SW2 and in the estuary was 1,300 mg/l in SW5.

Total Suspended Solids exceeded the SWQS in all a number of surface water monitoring locations at times, the highest concentration recorded in the stream was 11,950 mg/l in SW2 and in the estuary was 130 mg/l in SW9 (DS).

The Total Organic Nitrogen (TON) showed no abnormal change throughout 2014, the highest concentration recorded in the stream was 5.7 mg/l in SW3 and in the estuary was 3.3 mg/l in SW9 (DS).

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 is currently being undertaken.

5.7.3 Annual Parameters

Annual analysis was undertaken on 7th April, 2014.

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

- Aluminium exceeded the DWR at a number of surface water locations in the stream.
- Barium exceeded the IGV at SW1
- Iron exceeded the DWR at a number of the estuarine locations.
- Manganese exceeded the IGV and DWR in surface water locations in the stream at a number of the estuarine locations.
- Potassium exceeded the IGV at all of surface water locations in the stream.
- Sulphate exceeded IGV at SW1.
- Sodium exceeded IGV at all of surface water locations in the stream and SW9.
- Zinc exceeded IGV at SW6 and SW9.

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

- Cobalt <1.0 µg/l to 1.3 µg/l.
- Molybdenum <1.0 µg/l to 3.7 µg/l.
- Strontium 100 µg/l to 510 µg/l
- Uranium <1.0 to 1.8 µg/l and
- Vanadium <1.0 to 3.1 µg/l

Beryllium and Thallium concentrations were below the limit of detection.

Total Suspended Solids in the stream surface water monitoring locations ranged from 8 mg/l to 11,950 mg/l (SW2). Total Suspended Solids in the estuarine stream surface water monitoring locations ranged from 8 mg/l to 130 mg/l.

Alkalinity concentrations range from 316 mg/l to 456 mg/l the stream surface water monitoring locations and from 94 mg/l to 101 mg/l in the estuarine water.

Ortho-phosphate concentrations in the stream ranged from <0.010 to 0.062 mg/l above the EQS MAC of 0.045 (High). Ortho-phosphate in the estuary ranged from <0.033 to 0.04 mg/l.

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 N⁶) in the estuary.

The highest concentration for the estuary is in SW9 (0.84 mg/l N) which is downstream of the site. SW5 and SW6 are adjacent to the site. Ammonia concentration ranged from 0.067 to 0.53 mg/l N in SW5 and 0.1 to 0.56 mg/l N in SW6.

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.

The following samples were not collected during the monitoring period;

- Landfill discharge monitoring location (S2) No flow.

Table 5.10 illustrates the parameters that were monitored in S1. All parameter were within the ELV.

⁶ ammonia to ammoniacal nitrogen then multiply the value by 14/17

Table 5.10 Parameters Monitored in S1

Parameter	28-Jan-14	07-Apr-14	14-Jul-14	15-Oct-14	Emission Limit Value (ELV)	
					S1: Civic Waste Facility Grab Sample (mg/l)	S2: Leachate from Landfill Grab Sample (mg/)
BOD	2.2	22	25	250	750	2000
COD	22	133	160	623	1000	9000
Suspended Solids	18	40.9	37	50	1000	2000
Sulphate	47.5	200	27.7	40	300	400
pH	6.9	7.3	7.2	7	6-9	6-9
Temperature	5.6	10.4	16.9	13.4	40°C	40°C

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

Landfill gas around the periphery of the site is indicated by piezometers as shown in Table 5.11 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 0.5% v/v during the monitoring period.

There were no exceedances of licence requirements of carbon dioxide greater than or equal to 1.5% v/v. The highest recording was 0.7 % v/v during the monitoring period.

5.11 FLUE GAS MONITORING

Flue gas monitoring was also undertaken on the permanent landfill gas flare. All monitoring was carried out in accordance with Environmental Protection Agency Office of Environmental Enforcement (OEE) Air Emission Monitoring Guidance Note 2 (AG2). This report 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.

5.12 ESTUARINE SOIL SAMPLES

Sediment sampling was undertaken at five locations in the estuary in November 2014. 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 4 locations and Copper at location SW8. The results are below the intervention value for those parameters comparable. 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	2014					Target Value (Dutch)	Inter - vention Value (Dutch)
	SW5	SW6	SW7	SW8	SW9		
Total Solids %	46	63	49	60	58		
Cadmium	0.313	0.427	0.146	0.58	0.317	0.8	1.2
Copper	34.7	34.3	24	39	33.7	36	190
Lead	48.3	41.5	33.9	44.3	41.5	85	530
Manganese	388	567	445	449	580		
Mercury	0.195	<0.14	<0.14	<0.14	<0.14	0.3	10
Zinc	221	225	139	242	216	140	720
Total cyanide	<1	<1	<1	<1	<1		

5.13 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
January	16.9	45.5	108.5
August	60.1	5.5	32.2
September	70.7	67.6	71.2
November	15.3	10.9	56.3

5.14 COMPOSTING MONITORING

V & W recycling compost hedge grass & hedge cuttings from Civic Amenity users. 2,715 tonnes was received for composting in 2014. 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) in accordance with Schedule F, Maturity test 4.

The three 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

- **12th September 2014**

Sample complied with Schedule F, Maturity tests 3 and 4. The oxygen uptake test was 1.3 mmolO₂/kgOS/h which is completely stable in accordance with Bord Na Mona Maturity Indicator Values.

Contaminants were <0.01 % for all sieve sizes from <1 mm to >31.5 mm except for stones in the 2-4mm (1.41%) and 4-8mm (2.88%) sieve size. Stones in the 2-4mm sieve size of 1.41% is not in compliance with the limit for impurities and gravel and stone >5mm of <5%.

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).

- **17th November 2014**

Sample complied with Schedule F, Maturity tests 3 and 4. The oxygen uptake test was 1.4 mmolO₂/kgOS/h which is completely stable in accordance with Bord Na Mona Maturity Indicator Values.

Contaminants were <0.01 % for all sieve sizes 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).

- **18th December 2014**

Sample complied with Schedule F, Maturity tests 3 and 4. The oxygen uptake test was 1.6 mmolO₂/kgOS/h which is completely stable in accordance with Bord Na Mona Maturity Indicator Values.

Contaminants were <0.01 % for all sieve sizes 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.

5.14.1 Bed Media

Moisture content, pH, Ammonia and Total viable counts were analysed for the bed media gases from Biofilter 1 and are provided in Appendix J. There are no limits in waste licence for these parameters.

5.15 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
2014	101.6	88.5	53.7	34.2	91.5	36.2	35.0	173.0	26.5	90.2	140.9	55.9	927.2

Mean Temperature in Degrees C. for Dublin Airport													
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2014	5.7	5.6	6.8	8.9	11.3	13.6	15.8	13.9	13.1	10.9	7.7	5.4	9.9

6.0 RESOURCE AND ENERGY CONSUMPTION SUMMARY

Consumption of resources for the reporting period is shown in Table 6.1 below. An energy efficiency audit has not been carried out at this facility as the landfill site is closed it is not a requirement of the licence.

Table 6.1 Consumption of Resources

Parameters	Unit	CWF 2013	CWF 2014	% difference +/-
Electricity	kWh	3,850	3,900	+1
Water	m ³	2,810	2,700	-4

7.0 DEVELOPMENT / INFRASTRUCTURAL WORKS IN PLACE AND PLANNED, TO PROCESS WASTE QUANTITIES PROJECTED

There is no additional development /infrastructural works planned for 2015 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

There are no proposed developments works (Environmental Objectives and Targets) to be carried out in 2015

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 in 2014. A compliance investigation is currently being undertaken in relation to elevated ammonia concentration in surface water along the northern boundary of the site.

12.0 REVIEW OF NUISANCE CONTROLS

12.1 DUST CONTROL

There were no breaches of the dust deposition limit in 2014. 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 Monday and Tuesday 24th – 25th November in accordance with the following environmental noise standards:

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

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

NSL 1: Daytime: LAeq (T 15 min) 70-68dBA;

Evening time: LAeq (T 15 min) constant at 66dBA;

Night time: LAeq (T 15 min) 65-62dBA

NSL 2: Daytime: LAeq (T 15min) 56-53dBA;

Evening time: LAeq (T 15 min) constant at 48dBA;

Night time: LAeq (T 15 min) 44-40dBA

NSL 3: Daytime: LAeq (T 15 min) 71-67dBA;

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

Night time: LAeq (T 15 min) 55-47dBA

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

Evening time: LAeq (T 15 min) constant at 59 dBA;

Night time: LAeq (T 15 min) 47-34 dBA

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;

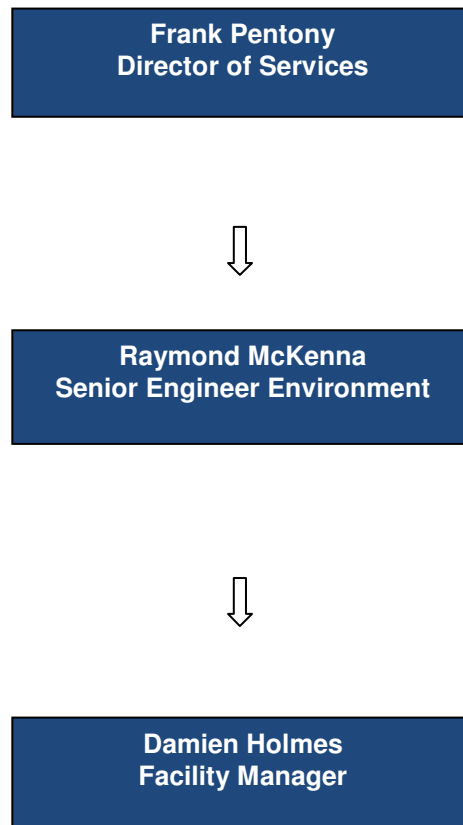


Figure 14.1 Management Structure at Dundalk Landfill Site

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 6 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.

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

An Environmental Liability Risk Assessment has not been carried out at this facility as the landfill site is closed it is not a requirement of the licence.

APPENDIX A

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)
2014	Closed		0.00	927.2	0				79000	7325	7325	7325	0.00	0.00	7325	7325
Total			0.00	927.2	0			0		7325			0			7325

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	927.2	mm

APPENDIX B

PRTR REPORTING



Environmental Protection Agency

[Guidance to completing the PRTR workbook](#)

AER Returns Workbook

Version 1.1.18

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

1. FACILITY IDENTIFICATION

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

Classes of Activity

No.	class_name
-	Refer to PRTR class activities below

Address 1	Newry Road
Address 2	Dundalk
Address 3	
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	Executive Scientist
AER Returns Contact Telephone Number	042 9392920
AER Returns Contact Mobile Phone Number	086 6097315
AER Returns Contact Fax Number	041 6851623
Production Volume	0.0
Production Volume Units	
Number of Installations	0
Number of Operating Hours in Year	0
Number of Employees	6
User Feedback/Comments	Concentrations of Ammonia, BOD, COD, Sus. Solids are significantly reduced from 2013 figures due to cleaning out of the sewer on site. This has resulted in lower loads of these parameters on the releases to sewer tab.
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) ?	
--	--

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

4.1 RELEASES TO AIR

[Link to previous years emissions data](#)

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	Gassim model		0.0	0.0	0.0
						44081.0	0.0	44081.0

* 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

* 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

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

Additional Data Requested from Landfill operators

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

Landfill: Please enter summary data on the quantities of methane flared and / or utilised	Dundalk Landfill & Civic Waste Facility - Dundalk Town Council				
	T (Total) kg/Year	M/C/E	Method Code	Designation or Description	Facility Total Capacity m3 per hour
Total estimated methane generation (as per site model)	262043.0	C	Gassim	Gas Curve	N/A
Methane flared	217962.0	M	Flare records	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)	44081.0	C	Calculation	Net emission calculation	N/A

4.3 RELEASES TO WASTEWATER OR SEWER

[Link to previous years emissions data](#)

| PRTR# : W0034 | Facility Name : Dundalk Landfill & Civic Waste Facility - Dundalk Town Council | File

02/04/2015 14:53

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	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year	
			Method Code	Designation or Description	Emission Point 1				
06	Ammonia (NH3)	C	OTH			44.5	44.5	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	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year	
			Method Code	Designation or Description	Emission Point 1				
303	BOD	C	OTH			332.86	332.86	0.0	0.0
306	COD	C	OTH			1043.0	1043.0	0.0	0.0
240	Suspended Solids	C	OTH			162.4	162.4	0.0	0.0
343	Sulphate	C	OTH			350.6	350.6	0.0	0.0

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

5. ONSITE TREATMENT & OFFSITE TRANSFERS OF WASTE

| PRTR# : W0034 | Facility Name : Dundalk Landfill & Civic Waste Facility - Dundalk Town Council | Filename : W0034_2014(2) PRTR.xls | Return Year : 2014 |

02/04/2015 14:53

Please enter all quantities on this sheet in Tonnes

15

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 : Address of Next Destination Facility	Name and License / Permit No. and Address of Final Recoverer / Disposer (HAZARDOUS WASTE ONLY)	Actual Address of Final Destination i.e. Final Recovery / Disposal Site (HAZARDOUS WASTE ONLY)
						M/C/E	Method Used		Haz Waste : Name and Licence/Permit No of Recoverer/Disposer	Non Haz Waste: Address of Recoverer/Disposer		
Within the Country	13 02 05	Yes	5.0	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	660.0	cardboard packaging	R3	M	Weighed	Abroad	Peute Europe,nl 6000076	Baahoekweg 4,LA Dordrecht,,Netherlands		
Within the Country	15 01 02	No	502.0	plastic packaging	R3	M	Weighed	Offsite in Ireland	Shrabra Plastic IRL,Licence No 15/5	,Castleblayey,Co Monaghan,,Ireland		
To Other Countries	15 01 04	No	359.0	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	389.0	glass packaging	R5	M	Weighed	Abroad	Glassdon ,NI licenceLN/06/08	Road,Toomebridge,Co Antrim,BT41 3SE,United Kingdom		
Within the Country	16 06 01	Yes	7.0	lead batteries mixture of concrete, bricks, tiles and ceramics other than those mentioned in 17	R4	M	Weighed	Offsite in Ireland	Rilta Environmental Ltd,Licence No W0192-02	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	1753.0	01 06	R5	M	Weighed	Offsite in Ireland	Scotch Corner Landfill,W0020-01	Annyalla,,Castleblayney,Co. Monaghan,Ireland		
To Other Countries	20 01 11	No	27.0	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	2.0	paint, inks, adhesives and resins other than those mentioned in 20 01 27	R3	M	Weighed	Offsite in Ireland	Enva ,WO184-01 Thornton Waste Disposal,Waste Licence	Clonminam Industrial Estate,Portlaoise,Co. Laois ,Ireland		
Within the Country	20 01 38	No	451.0	wood other than that mentioned in 20 01 37	R3	M	Weighed	Offsite in Ireland	W0195-02	Kimlainham wood,,Meath,Ireland		
Within the Country	20 02 01	No	2715.0	Biodegradable waste	R3	M	Weighed	Offsite in Ireland	Dundalk Town Council,W0034-02	Newry Road,,Dundalk Town Council,,Ireland		
Within the Country	20 03 01	No	240.0	mixed municipal waste	D1	M	Weighed	Offsite in Ireland	Indaver Ireland,W0167-02	Carranstown,Duleek,,Co. Meath,Ireland		
To Other Countries	15 01 01	No	278.0	newspapers and magazines	R3	M	Weighed	Abroad	Peute Europe,nl 6000076 Thornton Waste Disposal,Waste Licence	Baahoekweg 4,LA Dordrecht,,Netherlands		
Within the Country	15 01 01	No	301.0	paper and cardboard packaging	R3	M	Weighed	Offsite in Ireland	W0195-02	Kimlainham wood,,Meath,Ireland		

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

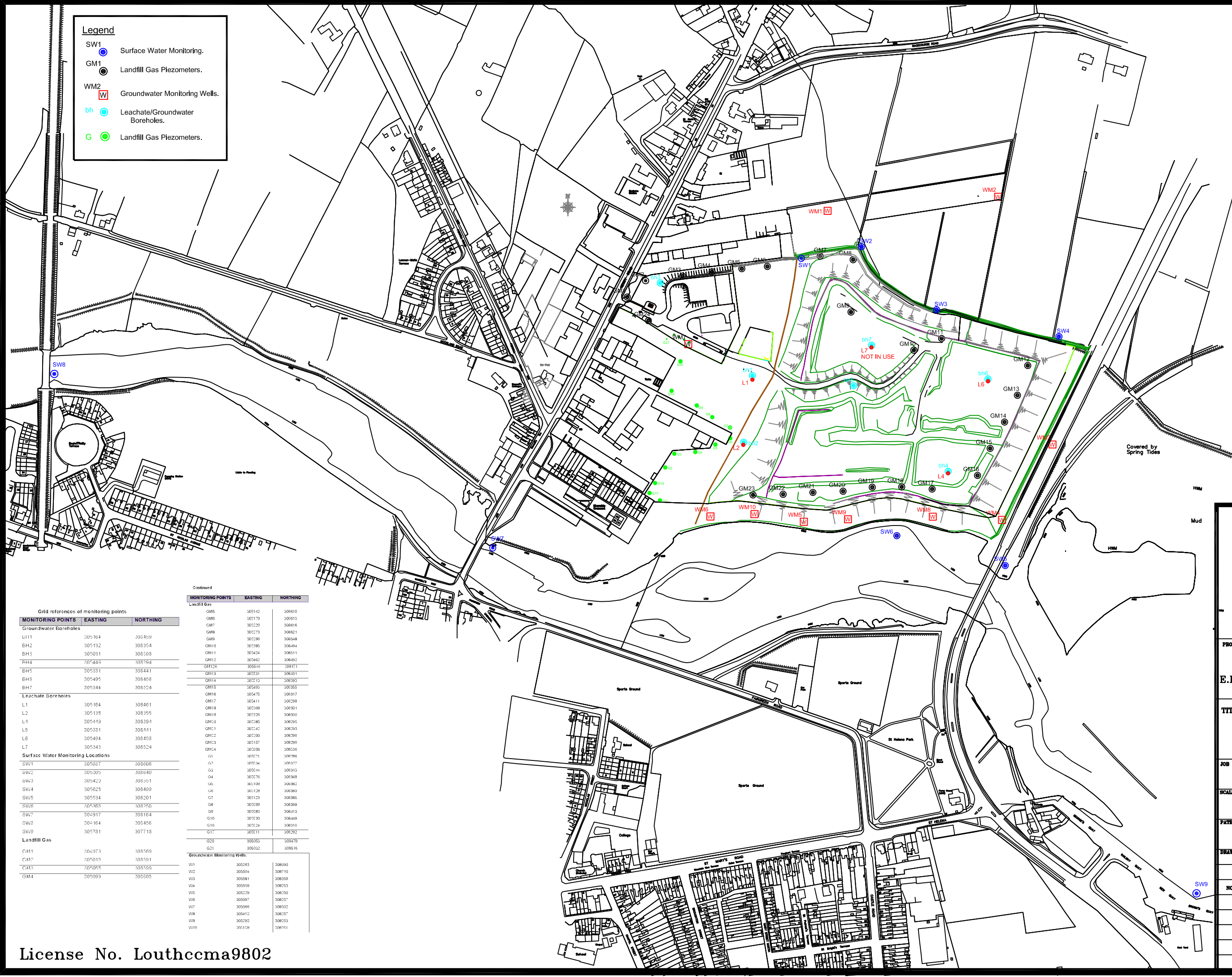
[Link to previous years waste data](#)
[Link to previous years waste summary data & percentage change](#)
[Link to Waste Guidance](#)

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	308409
SW5	305534	308201
SW6	305485	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	308369
G7	305123	308386
G8	305238	308399
G8	305283	308413
G10	305230	308449
G16	305224	308310
G17	305211	308292
G20	305255	308479
G21	305252	308516
Groundwater Monitoring Wells		
WM1	305263	308690
WM2	305504	308710
WM3	305581	308339
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
Phone (045) 855575 Fax (045) 855581

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											
		16-Jan-12	23-Apr-12	23-Jul-12	08-Oct-12	30-Jan-13	15-Apr-13	22-Jul-13	07-Oct-13	27-Jan-14	07-Apr-14	14-Jul-14	15-Oct-14
Alkalinity	mg/l CaCO3												
Aluminium	µg/l		6.5				<5				<10.0		
Ammonia	mg/l N	93.87	107.62	99.60	101.22	113.65	100.89	11.54	102.62	160	92	110	87
Antimony	µg/l		<0.5				<0.5				<1.0		
Arsenic	µg/l		0.76				<0.5				<1.0		
Barium	µg/l		465.9				500.4				380		
Beryllium	µg/l		<0.5				<0.5				<1.0		
B.O.D.	mg/l O2	11.7	24.1	14.0	9.6	19.6	16.6	17.8	<10	14	17	15	31
Boron	µg/l		1594.7				1150.7				1100		
Cadmium	µg/l		<0.1				<0.1				<0.020		
Calcium	mg/l Ca		204.92				161.65				180		
C.O.D.	mg/l O2	102	80	82	104	120	95	32	109	133	101	134	92
Chloride	mg/l Cl	195	159	195	182	146	114	50	154	126	123	104	106
Chromium	µg/l		7.4				7.5				7.9		
Cobalt (µg/l)	µg/l		2.2				3.2				2		
Conductivity	µS/cm @ 25	2660	2480	2580	2690	2750	2450	1062	2590	2700	2360	2450	2170
Copper	µg/l		<0.5				0.7				11		
Cyanide	mg/l CN	<0.05	<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		30384.3				102.3				620		
Lead	µg/l		<0.5				<0.5				<1.0		
Magnesium	mg/l Mg		66.33				54.11				56		
Manganese	µg/l		647.2				520.1				730		
Mercury	µg/l		<0.05				<0.05				<0.050		
Molybdenum	µg/l		0.5				5.5				<1.0		
Nickel	µg/l		1.2				8.5				2.2		
o-Phosphate	mg/l P	0.17	<0.02	<0.02	0.02	0.13	<0.02	<0.02	<0.02	<0.010	<0.010	<0.010	0.017
pH		6.9	6.9	7.0	6.7	6.8	6.8	7.2	6.8	6.8	6.7	6.7	6.7
Potassium	mg/l		70.91				55.18				59		
Residue on Evaporation													
Sampling Depth (m)	m												
Selenium	µg/l		<0.5				<0.5				<1.0		
Silver	µg/l		nm				nm						
Sodium	mg/l		130.76				99.43				110		
Strontium	µg/l		1169.14				956.28				890		
Sulphate	mg/l SO4		4.1				<2.0				<2.0		
Suspended Solids	mg/l												
Temp	°C	10.8	10.5	18.2	12.8	9.1	12.1	11.3	13.1	10.1	9.7	14.5	13.7
Thallium	µg/l		<0.1				<0.1				<1.0		
Time Sampled		11:10	10:30	10:20	10:45	09:30	10:35	12:25	10:30	11:00	10:30	10:20	10:30
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	7.32	<0.08	<0.20	<0.20	<0.20	<0.20
Total S Solids	mg/l												
Uranium	µg/l		<0.1				<0.1				<1.0		
Vanadium	µg/l		1.07				0.7				<1.0		
Zinc	µg/l		2.4				57.6				29		



Dundalk Landfill Site
LEACHATE QUALITY

Monitoring Point:		LH2											
PARAMETERS	Units	RESULTS											
		Date											
		16-Jan-12	23-Apr-12	23-Jul-12	08-Oct-12	30-Jan-13	15-Apr-13	22-Jul-13	07-Oct-13	27-Jan-14	07-Apr-14	14-Jul-14	15-Oct-14
Alkalinity	mg/l CaCO3												
Aluminium	µg/l		5				<5				<10.0		
Ammonia	mg/l N	56.09	104.8	8.4	76.78	22.51	93.57	11.54	12.19	2.9	49	140	130
Antimony	µg/l		<0.5				0.63				1		
Arsenic	µg/l		1.23				0.88				<1.0		
Barium	µg/l		393.3				707.7				330		
Beryllium	µg/l		<0.5				<0.5				<1.0		
B.O.D.	mg/l O2	10.1	15.8	nm	18.5	15.4	16	17.8	<10	4.8	6	<20	26
Boron	µg/l		1858.9				1162.5				830		
Cadmium	µg/l		<0.1				<0.1				0.06		
Calcium	mg/l Ca		260.08				228.26				200		
C.O.D.	mg/l O2	77	148	21	144	92	107	32	49	48	68	186	152
Chloride	mg/l Cl	78	114	11	79	39	85	50	76	26	65	132	167
Chromium	µg/l		2.7				6.6				4.8		
Cobalt (µg/l)	µg/l		2.6				5				3.4		
Conductivity	µS/cm @ 25	2110	2700	685	2320	1424	2660	1062	1212	936	1782	3300	3360
Copper	µg/l		0.5				3.5				12		
Cyanide	mg/l CN	<0.05	<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		0.15				<0.150				0.26		
Iron	µg/l		10759.3				178.8				160		
Lead	µg/l		<0.5				<0.5				<1.0		
Magnesium	mg/l Mg		86.04				67.69				48		
Manganese	µg/l		855.8				639.4				690		
Mercury	µg/l		<0.05				<0.05				<0.050		
Molybdenum	µg/l		1.6				5.5				8.6		
Nickel	µg/l		2.2				11.1				14		
o-Phosphate	mg/l P	0.16	0.03	0.04	0.19	0.02	<0.02	<0.02	0.02	0.034	<0.010	0.098	<0.010
pH		6.9	7.1	7.2	6.8	6.8	6.9	7.2	7.2	7	6.9	6.8	6.9
Potassium	mg/l		92.07				63.17				45		
Residue on Evaporation													
Sampling Depth (m)	m												
Selenium	µg/l		<0.5				<0.5				<1.0		
Silver	µg/l		nm				nm						
Sodium	mg/l		124.94				90.9				64		
Strontium	µg/l		1043.19				931.56				650		
Sulphate	mg/l SO4		4.1				77.3				87		
Suspended Solids	mg/l												
Temp	°C	10	10.7	17.9	13.0	8.1	11.9	11.3	12.6	7.0	9.3	14.2	13.6
Thallium	µg/l		<0.1				<0.1				<1.0		
Time Sampled		11:25	10:45	10:35	11:00	09:55	11:00	12:25	10:40	11:25	10:50	10:40	10:45
Tin (µg/l)	µg/l		<1				nm						
T.O.C.	mg/l												
T.O.N	mg/l N	<0.08	0.3	0.13	0.98	0.11	0.3	7.32	4.08	0.73	<0.20	<0.20	<0.20
Total S Solids	mg/l												
Uranium	µg/l		0.1				0.46				<1.0		
Vanadium	µg/l		0.7				0.83				<1.0		
Zinc	µg/l		23				110.6				44		



Dundalk Landfill Site
LEACHATE QUALITY

Monitoring Point:		LH4											
PARAMETERS	Units	RESULTS											
		Date											
		16-Jan-12	23-Apr-12	23-Jul-12	08-Oct-12	30-Jan-13	15-Apr-13	22-Jul-13	07-Oct-13	27-Jan-14	07-Apr-14	17-Jul-14	15-Oct-14
Alkalinity	mg/l CaCO3												
Aluminium	µg/l		9.5				8.3				<10.0		
Ammonia	mg/l N	1.64	1.63	154.03	114.18	121.22	106.56	132.12	117.27	300	200	190	180
Antimony	µg/l		<0.5				<0.5				<1.0		
Arsenic	µg/l		2.6				0.71				1		
Barium	µg/l		185.2				117.9				180		
Beryllium	µg/l		<0.5				<0.5				<1.0		
B.O.D.	mg/l O2	44.4	71.1	1121	33.8	72.1	30.2	142.8	82	34	61	20	82
Boron	µg/l		2319.3				1045.3				1900		
Cadmium	µg/l		<0.1				<0.1				0.09		
Calcium	mg/l Ca		194.66				135.03				170		
C.O.D.	mg/l O2	249	265	2450	176	197	218	217	275	212	179	205	366
Chloride	mg/l Cl	181	185	34	132	129	95	130	234	235	207	170	204
Chromium	µg/l		1.3				3.7				8.4		
Cobalt (µg/l)	µg/l		4.6				3.2				4.4		
Conductivity	µS/cm @ 25	3890	3570	1690	2790	2650	2350	2660	3310	3880	3830	3560	3620
Copper	µg/l		<0.5				4.8				13		
Cyanide	mg/l CN	<0.05	<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		29832.9				2079.2				240		
Lead	µg/l		<0.5				<0.5				<1.0		
Magnesium	mg/l Mg		100.14				51.61				90		
Manganese	µg/l		1060				1154.5				960		
Mercury	µg/l		<0.05				<0.05				<0.050		
Molybdenum	µg/l		<0.5				<0.5				1.5		
Nickel	µg/l		3.8				4.6				8		
o-Phosphate	mg/l P	1.24	0.57	<0.02	0.16	0.44	1.02	0.1	<0.02	0.52	0.37	<0.010	0.033
pH		6.9	7	7.2	6.8	6.8	6.8	6.8	6.9	7	6.9	6.8	6.9
Potassium	mg/l		157.91				75.82				140		
Residue on Evaporation													
Sampling Depth (m)	m												
Selenium	µg/l		0.5				<0.5				<1.0		
Silver	µg/l		nm				nm						
Strontium	µg/l		203.55				93.03				180		
Sodium	mg/l		1101				749.32				900		
Sulphate	mg/l SO4		2.2				4.2				3.4		
Suspended Solids	mg/l												
Temp	°C	12.4	12.1	18.1	13.7	7.5	12.2	11.8	12.7	11.4	12	14.6	13.5
Thallium	µg/l		<0.1				<0.1				<1.0		
Time Sampled		12:15	11:10	11:45	11:25	10:30	11:35	10:45	10:55	12:50	11:30	11:35	11:10
Tin (µg/l)	µg/l		<1				nm						
T.O.C.	mg/l												
T.O.N	mg/l N	<0.08	<0.08	<0.08	0.89	<0.08	0.55	0.18	<0.08	1	1.8	<0.20	<0.20
Total S Solids	mg/l												
Uranium	µg/l		<0.1				0.1				<1.0		
Vanadium	µg/l		2.51				1.12				<1.0		
Zinc	µg/l		13.8				71.4				37		



Dundalk Landfill Site
LEACHATE QUALITY

Monitoring Point:		LH6											
PARAMETERS	Units	RESULTS											
		Date											
		16-Jan-12	23-Apr-12	23-Jul-12	08-Oct-12	30-Jan-13	15-Apr-13	22-Jul-13	07-Oct-13	27-Jan-14	07-Apr-14	14-Jul-14	15-Oct-14
Alkalinity	mg/l CaCO3												
Aluminium	µg/l		17.5				6.7				<10.0		
Ammonia	mg/l N	1.4	16.75	10.11	14.17	1.74	5.85	33.79	66.68	5.4	5.7	38	51
Antimony	µg/l		0.91				<0.5				<1.0		
Arsenic	µg/l		4.53				1.03				1.3		
Barium	µg/l		103.4				50				98		
Beryllium	µg/l		<0.5				<0.5				<1.0		
B.O.D.	mg/l O2	56.1	163.4	141.2	21.7	9	33.6	246.5	75	24	45	120	<100
Boron	µg/l		98.3				63.2				180		
Cadmium	µg/l		<0.1				<0.1				<0.020		
Calcium	mg/l Ca		257.21				91.45				140		
C.O.D.	mg/l O2	557	757	819	255	58	92	1041	802	191	107	1150	640
Chloride	mg/l Cl	334	40	31	28	12	26	53	69	24	20	55	85
Chromium	µg/l		<0.5				<0.5				1.5		
Cobalt (µg/l)	µg/l		1.9				1.5				1.6		
Conductivity	µS/cm @ 25	5080	1657	1096	1681	427	729	1727	2040	913	886	2010	1985
Copper	µg/l		<0.5				1.1				12		
Cyanide	mg/l CN	<0.05	<0.05	nm	<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				0.19		
Iron	µg/l		32084.8				2325.8				430		
Lead	µg/l		<0.5				<0.5				<1.0		
Magnesium	mg/l Mg		41.08				11.59				23		
Manganese	µg/l		4272.6				2015.8				1900		
Mercury	µg/l		<0.05				<0.05				<0.050		
Molybdenum	µg/l		<0.5				<0.5				<1.0		
Nickel	µg/l		1.8				2.8				3.7		
o-Phosphate	mg/l P	0.96	<0.02	0.03	<0.02	0.06	0.09	nr	0.37	0.062	0.027	0.94	0.26
pH		7	7.1	7	6.7	7.1	6.8	6.8	6.8	6.8	6.7	6.5	6.7
Potassium	mg/l		17.36				6.7				16		
Residue on Evaporation													
Sampling Depth (m)	m												
Selenium	µg/l		0.6				<0.5				<1.0		
Silver	µg/l		nm				nm						
Strontium	µg/l		101.34				27.96				41		
Sodium	mg/l		653.49				245.66				400		
Sulphate	mg/l SO4		4.5				5.2				11.2		
Suspended Solids	mg/l												
Temp	°C	16	12.2	18	14.7	6.9	10.1	11.6	14.2	8.2	10.6	15.1	13.5
Thallium	µg/l		<0.1				<0.1				<1.0		
Time Sampled		12:45	11:30	12:10	11:50	10:50	11:55	11:30	11:20	12:15	11:55	11:05	11:30
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	<0.08	<0.20	<0.20	<0.20	<0.20
Total S Solids	mg/l												
Uranium	µg/l		1.38				0.3				<1.0		
Vanadium	µg/l		3.56				0.82				<1.0		
Zinc	µg/l		3.1				31.8				43		

APPENDIX E

GROUNDWATER RESULTS

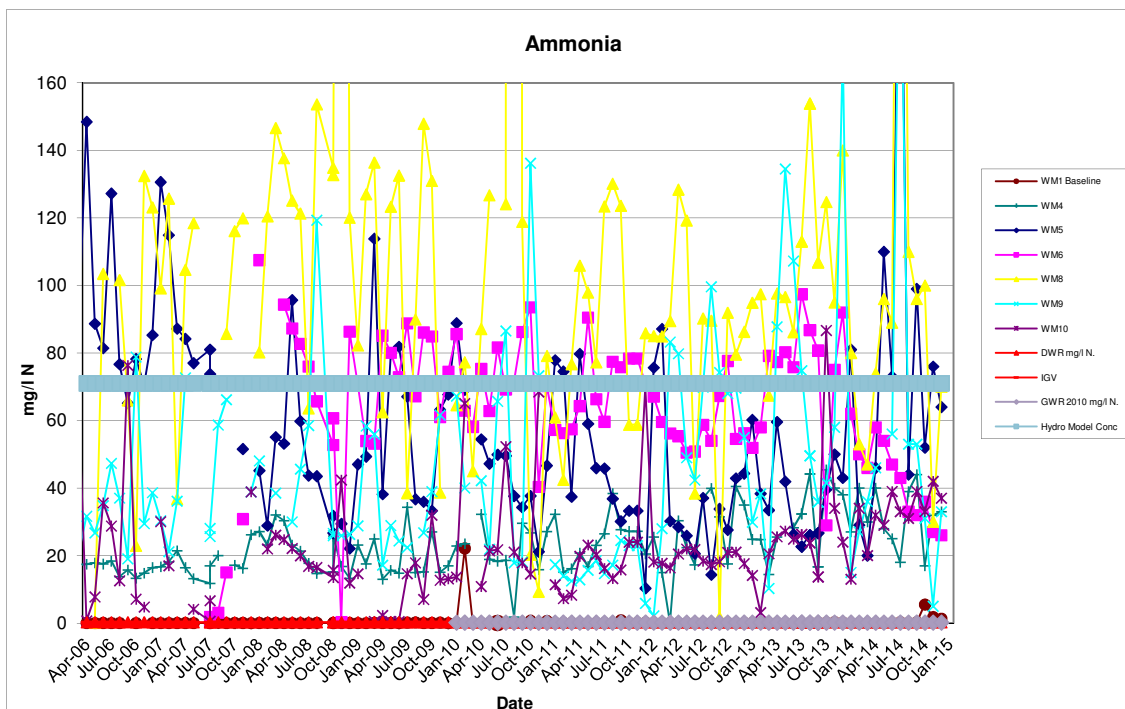
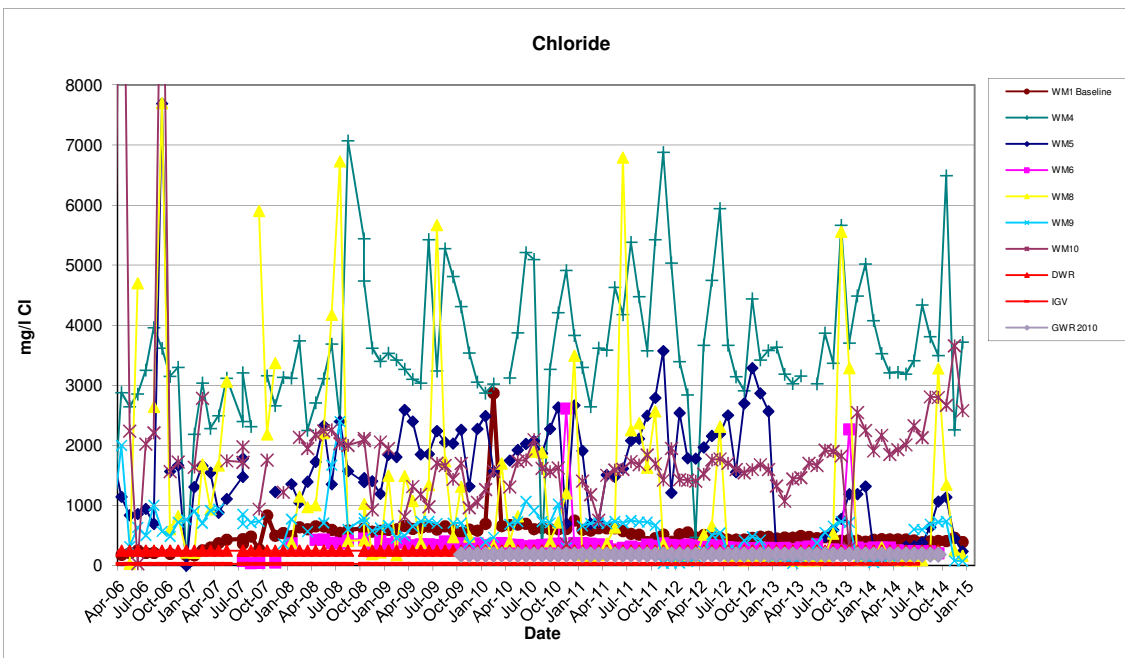
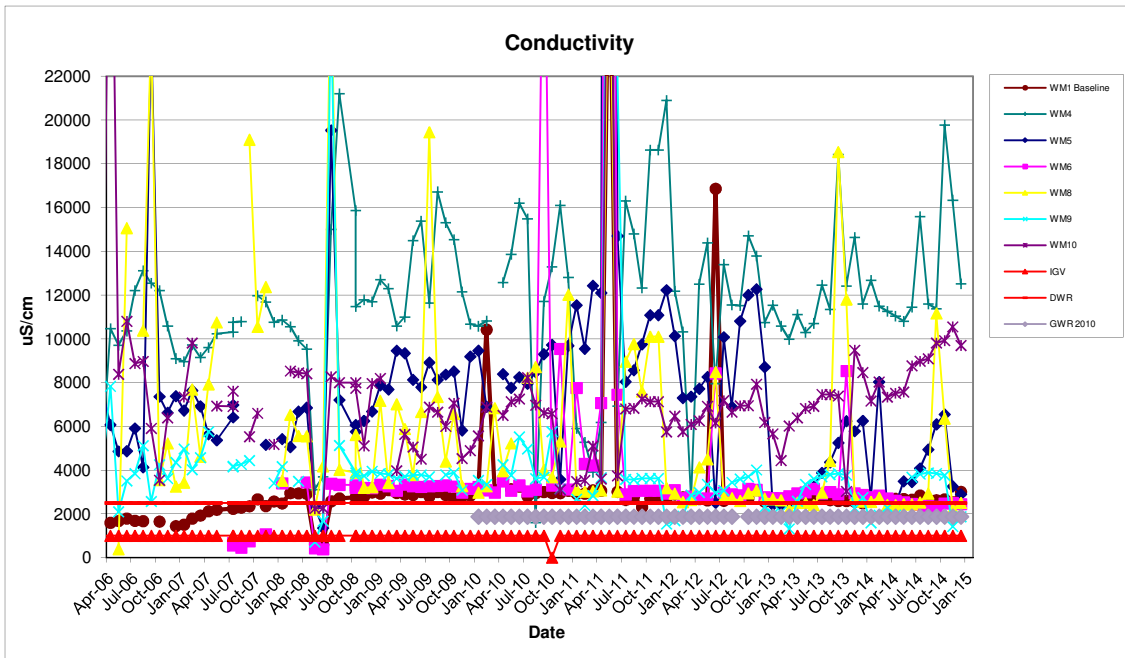
Monitoring Point:		Dundaik Landfill Site																									
		GROUNDWATER QUALITY WM1																									
PARAMETERS	Units	RESULTS																									
		Date																									
		10-Dec-12	30-Jan-13	11-Feb-13	25-Mar-13	15-Apr-13	07-May-13	10-Jun-13	22-Jul-13	06-Aug-13	16-Sep-13	07-Oct-13	18-Nov-13	02-Dec-13	27-Jan-14	17-Feb-14	10-Mar-14	07-Apr-14	13-May-14	04-Jun-14	14-Jul-14	26-Aug-14	08-Sep-14	15/10/2014	17/11/2014	08/12/2014	
Alkalinity	mg/l CaCO3					436												428									
Aluminium	µg/l					<5												<10.0									
Ammonia	mg/l N	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	0.057	0.038	0.081	<0.020	0.045	0.067	0.26	0.026	0.24	5.5	1.8	1.3	
Antimony	µg/l					<0.5												<1.0									
Arsenic	µg/l					0.57												<1.0									
Barium	µg/l					96.4												90									
Beryllium	µg/l					<0.5												<1.0									
B.O.D.	mg/l O2																										
Boron	µg/l					390.8												400									
Cadmium	µg/l					<0.1												<0.020									
Calcium	mg/l Ca					100.82												110									
C.O.D.	mg/l O2																										
Chloride	mg/l Cl	482	454	469	467	495	480	459	475	434	417	433	418	401	432	441	440	440	438	421	391	408	413	411	466	394	
Chromium	µg/l					<0.5												<1.0									
Cobalt	µg/l					<0.5												<1.0									
Conductivity	µS/cm @ 25	2560	2580	2590	2670	2800	2750	2700	2700	2630	2590	2590	2560	2480	2590	2700	2630	2690	2680	2650	2840	2660	2630	2670	2530	3010	
Copper	µg/l					0.7												<1.0									
Cyanide	mg/l CN					<0.05												<0.05									
D.O.	% Saturation		40						17						31			26			31			25			
Fluoride	mg/l					0.2												0.26									
Iron	µg/l					<10												<10.0									
Lead	µg/l					<0.5												<1.0									
Magnesium	mg/l Mg					48.83												54									
Manganese	µg/l					2.5												<5.0									
Mercury	µg/l					<0.05												<0.050									
Molybdenum	µg/l					2												2.9									
Nickel	µg/l					0.9												<1.0									
o-Phosphate	mg/l P					<0.02												0.012									
pH			7.4			7.5			7.4			7.4			7.9			7.5			7.5				7.4		
Potassium	mg/l					21.43												21									
Residue on Evaporation	mg/l					1723												1476									
Sampling Depth	m	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	2.6	2.7	2.6	2.7	2.5	2.9	nm	2.5	3	2.9	2.3	2.8	
Selenium	µg/l					<0.5												<1.0									
Silver	µg/l					nm																					
Sodium	mg/l					399.21												420									
Strontium	µg/l					531.62												520									
Sulphate	mg/l SO4					292.5												298.8									
Suspended Solids	mg/l																										
Temp	°C		7.9			12.8			16.8			14.8			9.5			10.7			14.9			13			
Thallium	µg/l					<0.1												<1.0									
Time Sampled		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	11:10	9:20	10:45	10:50	09:20	12:20	11:30	11:55	12:25	11:05	11:55	10:25	
Tin	µg/l					nm																					
T.O.C.	mg/l		3.1			2.3			2.7			3.1			3.4			3.1			5.5			9.7			
T.O.N	mg/l N					0.37												1.2									
Total S Solids	mg/l																										
Uranium	µg/l					1.53												1.5									
Vanadium	µg/l					<0.5												<1.0									
Zinc	µg/l					2.2												<1.0									
Water Level m OD		4.77	1.87	2.17	2.27	1.97	1.97	1.67	1.87	1.87	1.67	1.87	1.87		2.17	2.07	2.17	2.07	2.27	1.87	nm	2.27	1.77	1.87	2.47	1.97	nm

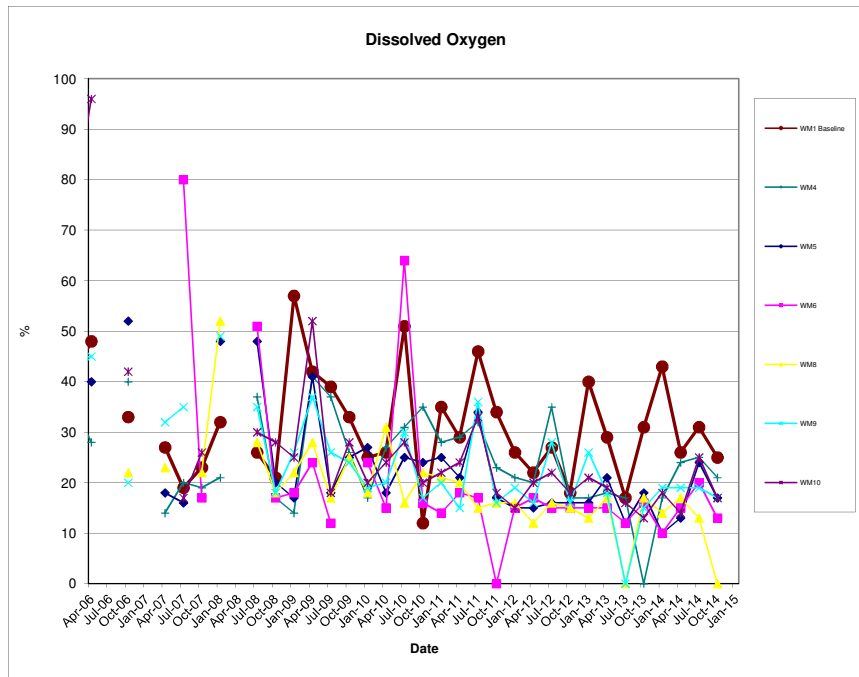
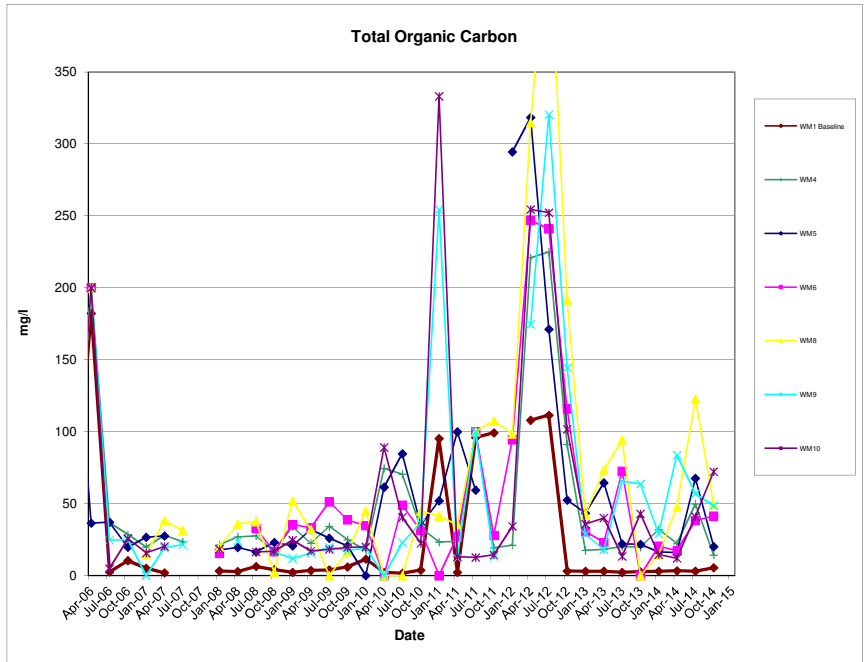
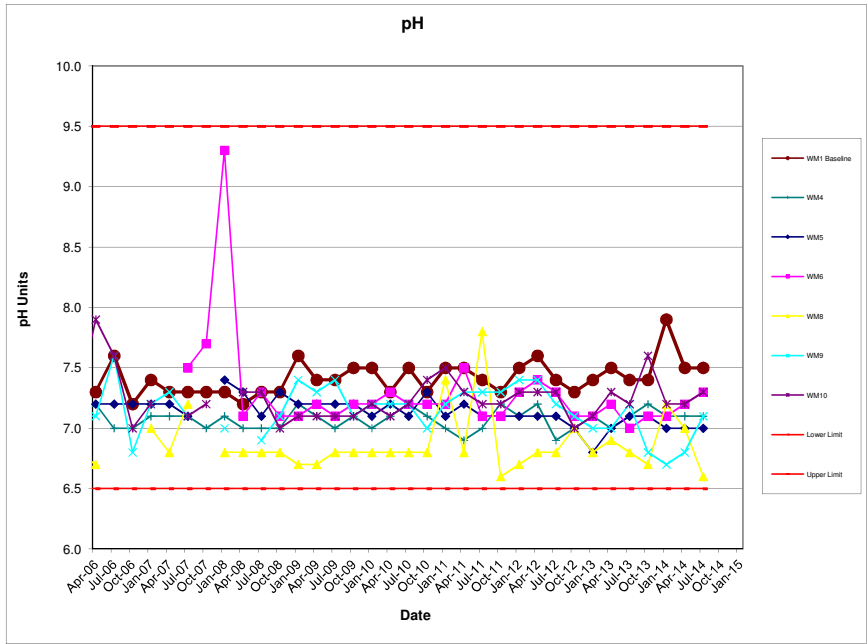
		Dundaik Landfill Site																								
		GROUNDWATER QUALITY																								
		WM5																								
Monitoring Point:																										
		RESULTS																								
		Date																								
PARAMETERS	Units	10-Dec-12	30-Jan-13	11-Feb-13	25-Mar-13	15-Apr-13	07-May-13	10-Jun-13	22-Jul-13	06-Aug-13	16-Sep-13	#####	18/11/2013	02/12/2013	27/01/2014	17/02/2014	10/03/2014	07-Apr-14	13-May-14	04-Jun-14	14-Jul-14	26-Aug-14	08-Sep-14	15/10/2014	17/11/2014	08/12/2014
Alkalinity	mg/l CaCO3					1000												685								
Aluminium	µg/l					<5												<10.0								
Ammonia	mg/l N	44.31	60.2	38.34	33.45	59.59	41.93	26.23	22.67	26.04	26.67	39.61	50	43	81	29	20	46	110	73	240	44	99	52	76	64
Antimony	µg/l					<0.5												<1.0								
Arsenic	µg/l					1.15												<1.0								
Barium	µg/l					157.7												150								
Beryllium	µg/l					<0.5												<1.0								
B.O.D.	mg/l O2																									
Boron	µg/l					1038.4												1100								
Cadmium	µg/l					<0.1												<0.020								
Calcium	mg/l Ca					142.78												150								
C.O.D.	mg/l O2																									
Chloride	mg/l Cl	2569	180	186	190	246	305	365	481	595	778	1190	1190	1320	265	142	141	175	319	322	382	639	1070	1140	456	236
Chromium	µg/l					3.1												2.4								
Cobalt	µg/l					2.3												1.8								
Conductivity	µS/cm @ 25	8710	2410	2380	2460	2890	2910	3240	3880	4360	5250	6240	5780	6250	2720	8030	2160	2420	3490	3460	4080	4940	6090	6550	3260	2900
Copper	µg/l					<0.5												<1.0								
Cyanide	mg/l CN					<0.05												<0.05								
D.O.	% Saturation		16			21			12			16			10			13			24			17		
Fluoride	mg/l					<0.150												0.19								
Iron	µg/l					1408.7												41								
Lead	µg/l					<0.5												<1.0								
Magnesium	mg/l Mg					77.43												80								
Manganese	µg/l					561.5												290								
Mercury	µg/l					<0.05												<0.050								
Molybdenum	µg/l					<0.5												<1.0								
Nickel	µg/l					3.2												1.9								
o-Phosphate	mg/l P					0.14												0.037								
pH			6.8			7			7.1			7.1			7			7			7			7		
Potassium	mg/l					66.01												65								
Residue on Evaporation	mg/l					1610												1543								
Sampling Depth	m	5.3	4.4	3.4	4.8	5.3	4	4.5	3.7	4.1	4.5	5.1	4	4.2	4.8	3.9	4.2	5.2	5	5.3	nm	4.3	3.8	5.3	4.9	4.6
Selenium	µg/l					0.5												<1.0								
Silver	µg/l					nm																				
Sodium	mg/l					192.44												180								
Strontium	µg/l					845.06												730								
Sulphate	mg/l SO4					24.8												15.2								
Suspended Solids	mg/l																									
Temp	°C		9.4			13.1			16.2			14.9			10.2			12.5			15.1			13		
Thallium	µg/l					<0.1												<1.0								
Time Sampled		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	12:15	12:40	12:40	11:10	11:50	11:30	12:20	13:05	12:00	11:45	11:05	10:35
Tin	µg/l					nm																				
T.O.C.	mg/l		43.4			64.5			22.1			20.5			17.3			16.1			67.6			20.2		
T.O.N	mg/l N					1.95												72								
Total S Solids	mg/l																									
Uranium	µg/l					<0.1												<1.0								
Vanadium	µg/l					1.1												<1.0								
Zinc	µg/l					4.1												2.7								
Water Level m OD	5.57	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	0.77	1.67	1.37	0.37	0.57	0.27		1.27	1.77	0.27	0.67	0.97

GROUNDWATER QUALITY
WM9

PARAMETERS	Units	RESULTS																											
		Date																											
		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	#####	18/11/2013	02/12/2013	27/01/2014	17/02/2014	10/03/2014	07-Apr-14	13-May-14	04-Jun-14	14-Jul-14	26-Aug-14	08-Sep-14	15/10/2014	17/11/2014	08/12/2014			
Alkalinity	mg/l CaCO3					1140																					813		
Aluminium	µg/l					<5																					<10.0		
Ammonia	mg/l N	54.97	29.89	38.28	10.26	87.79	134.52	107.26	74.76	49.57	35.88	41.51	58	170	15	27	36			46			56	220	53	53	31	5	33
Antimony	µg/l					<0.5															<1.0								
Arsenic	µg/l					1.44															1.1								
Barium	µg/l					150.9															520								
Beryllium	µg/l					<0.5															<1.0								
B.O.D.	mg/l O2																												
Boron	µg/l					1042.6															780								
Cadmium	µg/l					<0.1															0.02								
Calcium	mg/l Ca					198.23															240								
C.O.D.	mg/l O2																												
Chloride	mg/l Cl	98	97	102	37	113	184	374	552	660	733	720	93	113	50	142	157			78			606	597	692	727	739	80	75
Chromium	µg/l					3.2															2.7								
Cobalt	µg/l					3.4															2.4								
Conductivity	µS/cm @ 25	2310	2000	2090	1316	2580	3350	3600	3700	3800	3840	3770	2270	2750	1591	1945	2280			1953			3680	3820	3880	3850	3770	1427	1871
Copper	µg/l					3.5															23								
Cyanide	mg/l CN					<0.05															<0.05								
D.O.	% Saturation		26			18			<10			13			19					19			19				17		
Fluoride	mg/l					<0.150															0.18								
Iron	µg/l					2013.4															1300								
Lead	µg/l					<0.5															<1.0								
Magnesium	mg/l Mg					67.72															57								
Manganese	µg/l					1175.1															1800								
Mercury	µg/l					<0.05															<0.050								
Molybdenum	µg/l					1															<1.0								
Nickel	µg/l					5.6															3.8								
o-Phosphate	mg/l P					0.16															0.15								
pH			7			7			7.2				7.6		6.7					6.8			7.1				7.2		
Potassium	mg/l					65.56															42								
Residue on Evaporation	mg/l					1398															1158								
Sampling Depth	m	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	4	3.9	4.1			5			5	nm	4	3.7	4.8	4.3	4.4
Selenium	µg/l					<0.5															<1.0								
Silver	µg/l					nm																							
Sodium	mg/l					106.82															75								
Strontium	µg/l					840.95															740								
Sulphate	mg/l SO4					92.2															99.9								
Suspended Solids	mg/l																												
Temp	°C		9.6			14.7			16.7				15.3		11.3					12.9					15.6		14		
Thallium	µg/l					<0.1															<1.0								
Time Sampled		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	12:20	12:15	12:55			12:15			11:50	12:35	13:20	12:30	12:00	11:25	11:50
Tin	µg/l					nm																							
T.O.C.	mg/l		18.1			65.7			63.8				14.6		12.8					56.9					48.6		12.2		
T.O.N	mg/l N					<0.08															<0.20								
Total S Solids	mg/l																												
Uranium	µg/l					1.05															<1.0								
Vanadium	µg/l					1.62															<1.0								
Zinc	µg/l					29.6															49								
Water Level m OD	5.78	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	1.78	1.88	1.68			0.78			0.78		1.78	2.08	0.98	1.48	1.38

		Dundalk Landfill Site																									
		GROUNDWATER QUALITY																									
		WM10																									
		RESULTS																									
		Date																									
PARAMETERS	Units	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	#####	18/11/2013	02/12/2013	#####	#####	#####	#####	07-Apr-14	13-May-14	04-Jun-14	14-Jul-14	26-Aug-14	08-Sep-14	15/10/2014	17/11/2014	08/12/2014
Alkalinity	mg/l CaCO3					1020													720								
Aluminium	µg/l					<5													10								
Ammonia	mg/l N	17.62	14.13	3.11	20.53	25.56	27.26	24.85	26.29	23.76	13.68	86.68	34	24	13	34	20	32	29	39	33	31	39	33	42	37	
Antimony	µg/l					<0.5												<1.0									
Arsenic	µg/l					1.58												1.7									
Barium	µg/l					106.8												100									
Beryllium	µg/l					<0.5												<1.0									
B.O.D.	mg/l O2																										
Boron	µg/l					1394.5												1600									
Cadmium	µg/l					<0.1												0.03									
Calcium	mg/l Ca					101.49												150									
C.O.D.	mg/l O2																										
Chloride	mg/l Cl	1600	1327	1073	1444	1465	1705	1668	1923	1901	1827	289	2550	2250	1910	2170	1850	1930	2010	2330	2130	2810	2800	2670	3660	2580	
Chromium	µg/l					1.7												3.7									
Cobalt	µg/l					1.6												1.5									
Conductivity	µS/cm @ 25	6180	5660	4440	6020	6390	6820	6920	7460	7450	7390	3030	9480	8460	7160	8030	7340	7510	7570	8770	8980	9090	9810	9920	10550	9700	
Copper	µg/l					4.6												5.5									
Cyanide	mg/l CN					<0.05												<0.05									
D.O.	% Saturation		21			19			16								18	14			25				17		
Fluoride	mg/l					0.2												0.16									
Iron	µg/l					41.2												210									
Lead	µg/l					<0.5												<1.0									
Magnesium	mg/l Mg					126.29												170									
Manganese	µg/l					63.7												97									
Mercury	µg/l					<0.05												<0.050									
Molybdenum	µg/l					1.1												1.3									
Nickel	µg/l					6.9												4.9									
o-Phosphate	mg/l P					0.04												0.084									
pH			7.1			7.3			7.2									7.2			7.3				7.2		
Potassium	mg/l					85.51												98									
Residue on Evaporation	mg/l					3757												4345									
Sampling Depth	m	5.5	4.6	3.7	4.3	5.1	4.4	4.9	4.5	4.5	4.9	4.9	4.3	4.5	4.9	4.4	4.6	5.3	5.5	5.5	nm	4.8	4.6	4.9	4.2	4.9	
Selenium	µg/l					1.5												<5									
Silver	µg/l					nm																					
Sodium	mg/l					989.53												1400									
Strontium	µg/l					1041.27												1300									
Sulphate	mg/l SO4					141												190.6									
Suspended Solids	mg/l																										
Temp	°C		9.3			13.8			15.5									11.8			15				13.2		
Thallium	µg/l					<0.1												<1.0									
Time Sampled		12:35	12:30	12:20	08:10	12:05	12:20	13:25	13:20	11:40	13:20	11:55	12:20	11:35	12:10	13:10	12:30	08:45	11:15	10:55	12:05	12:40	11:15	11:30	10:45	10:30	
Tin	µg/l					nm																					
T.O.C.	mg/l		40.1			13.4			43								22.3	41.1			72.2				14.8		
T.O.N	mg/l N					0.11												3.9									
Total S Solids	mg/l																										
Uranium	µg/l					1.28												1.2									
Vanadium	µg/l					<0.5												<1.0									
Zinc	µg/l					19												20									
Water Level m OD		5.64	0.14	1.04	1.94	1.34	0.54	1.24	0.74	1.14	1.14	0.74	1.34	1.14	0.74	1.24	1.04	0.34	0.14	0.14		0.84	1.04	0.74	1.44	0.74	

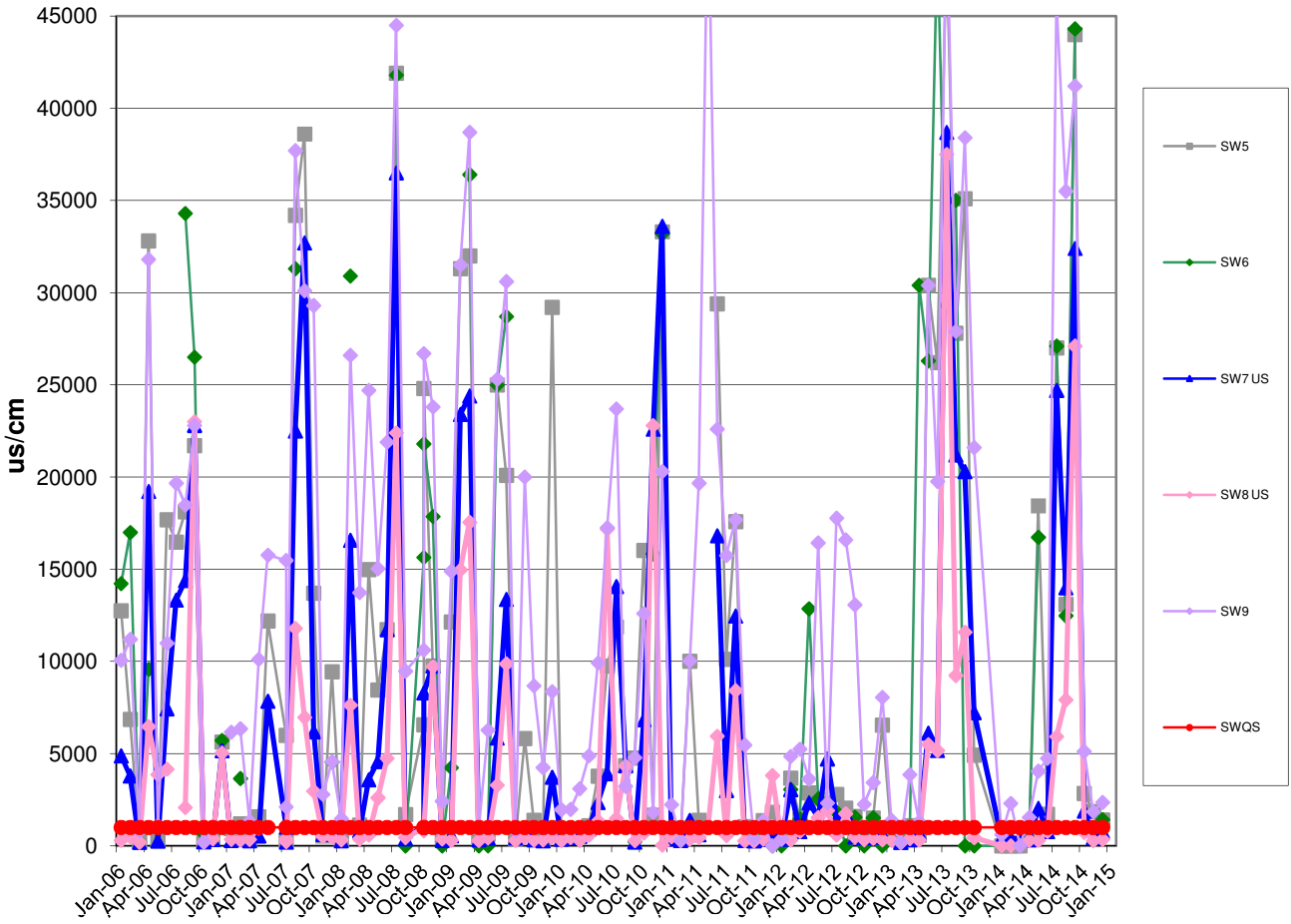




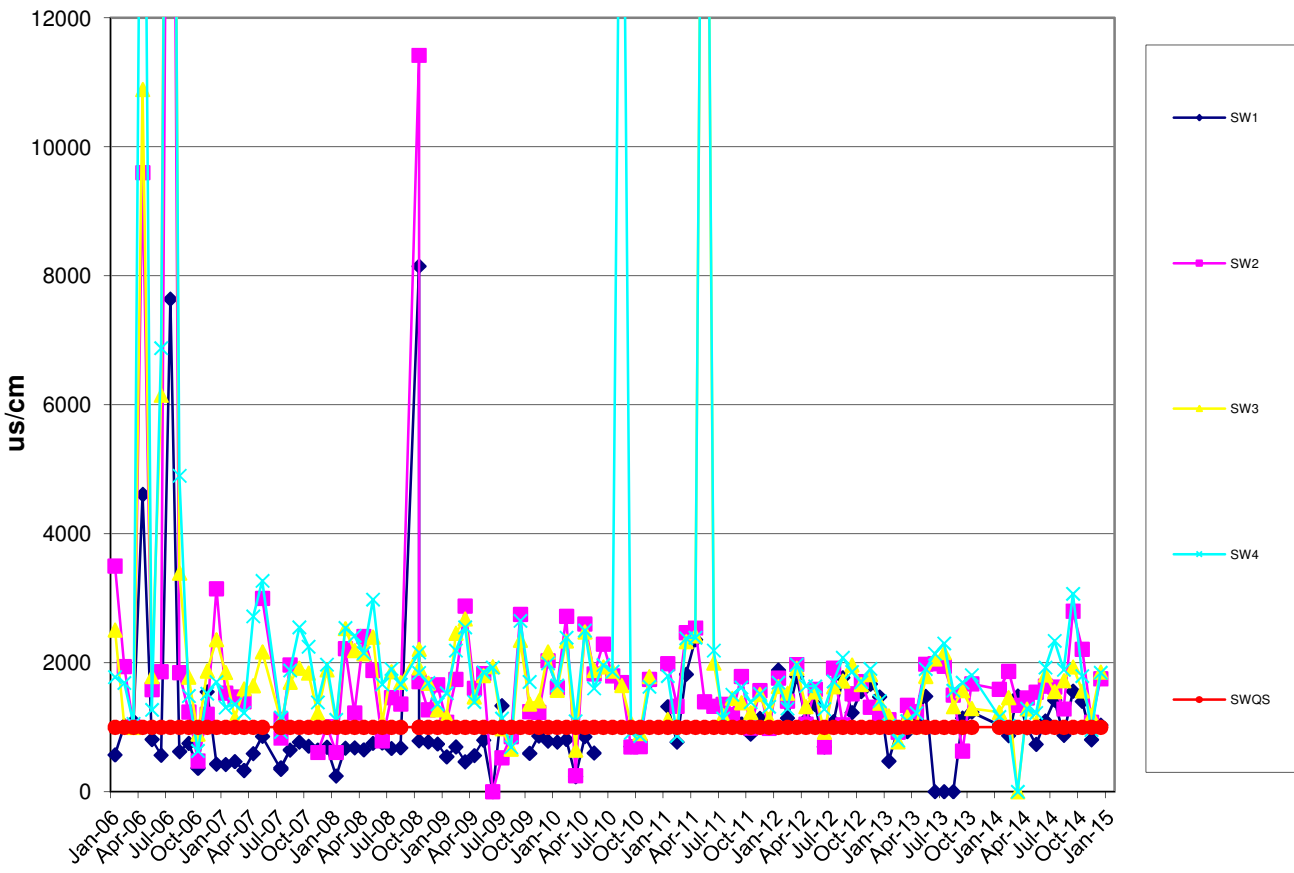
APPENDIX F

SURFACE WATER RESULTS

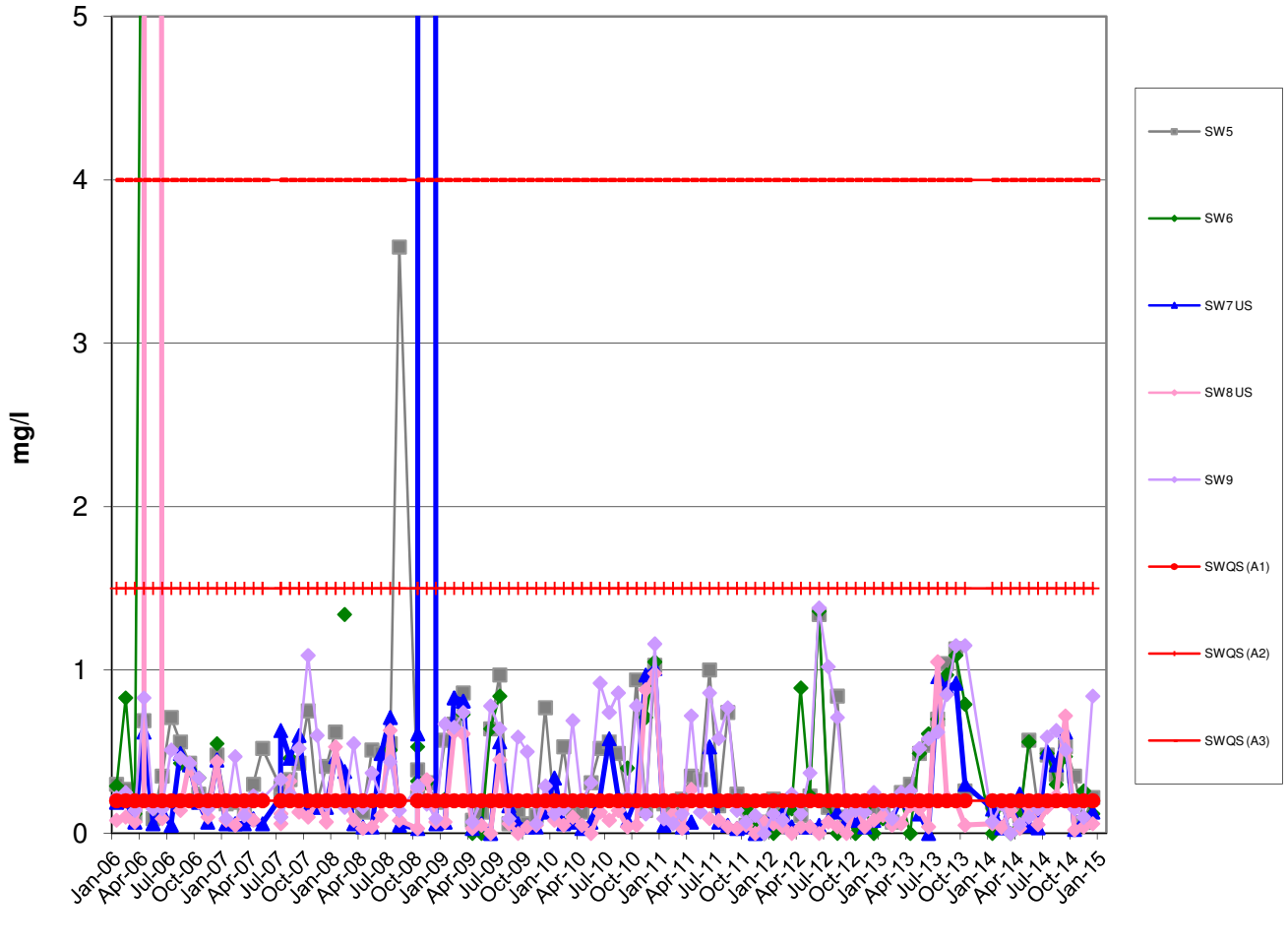
Conductivity (Estuary)



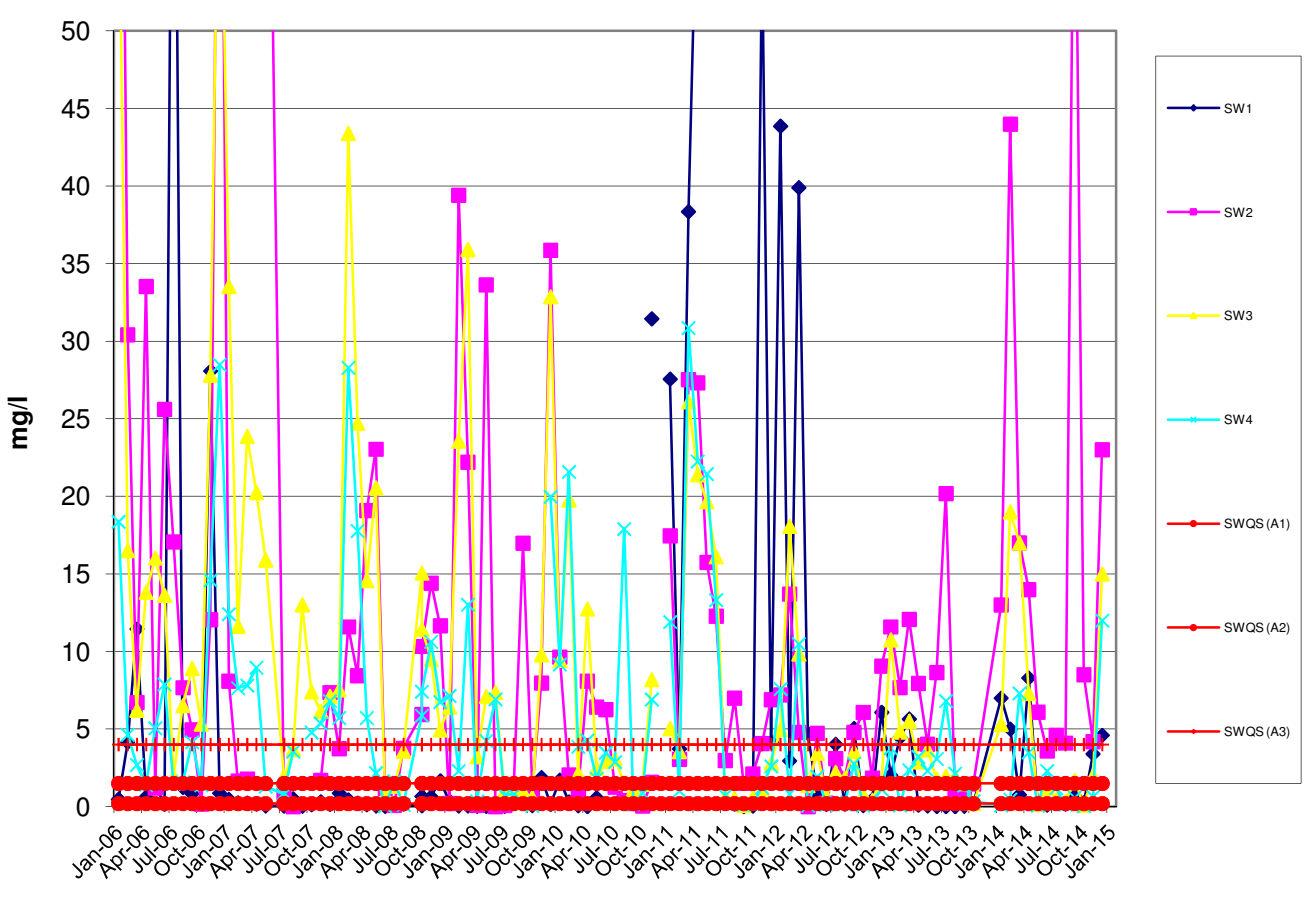
Conductivity (Stream)



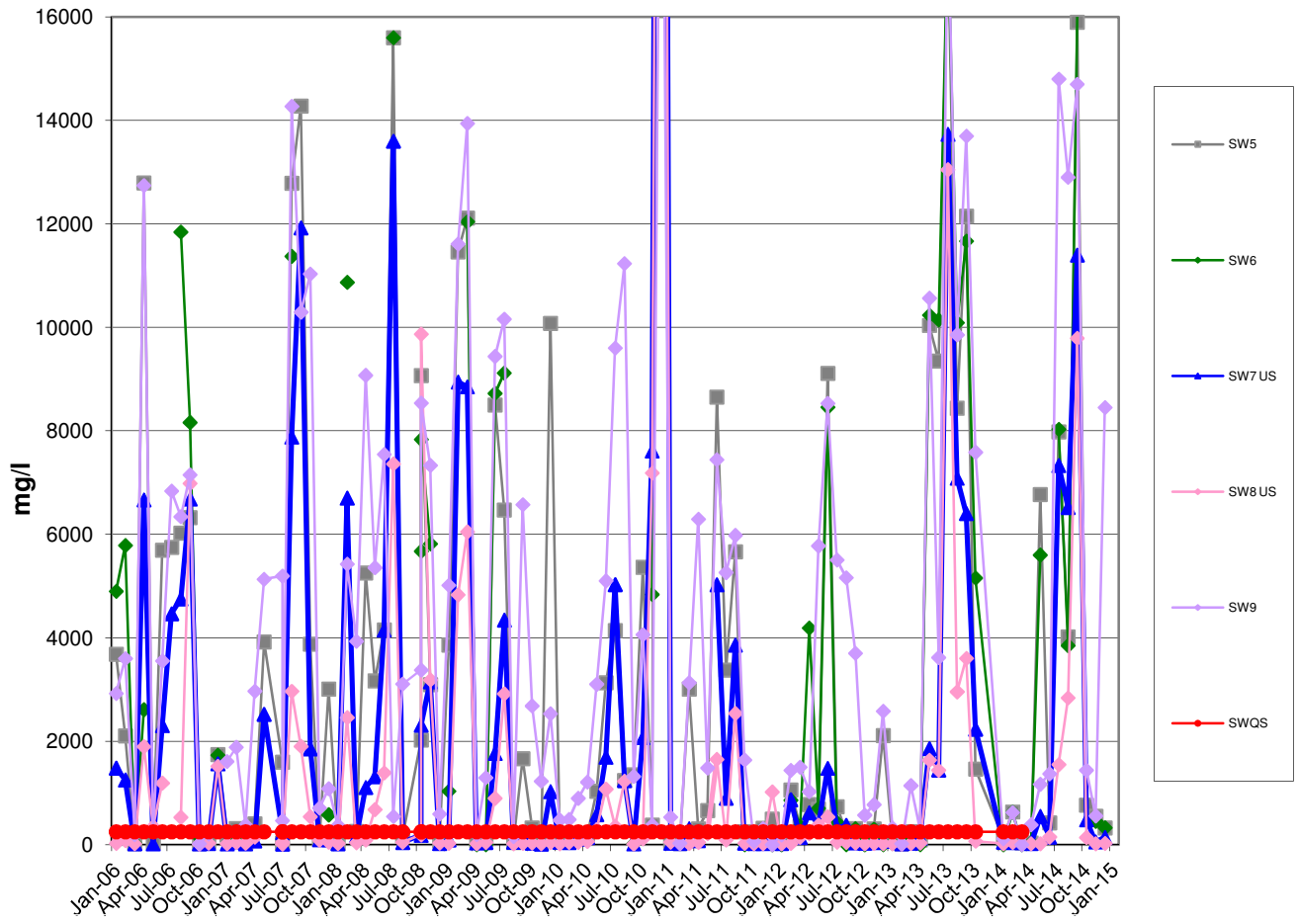
Ammonia (Estuary)



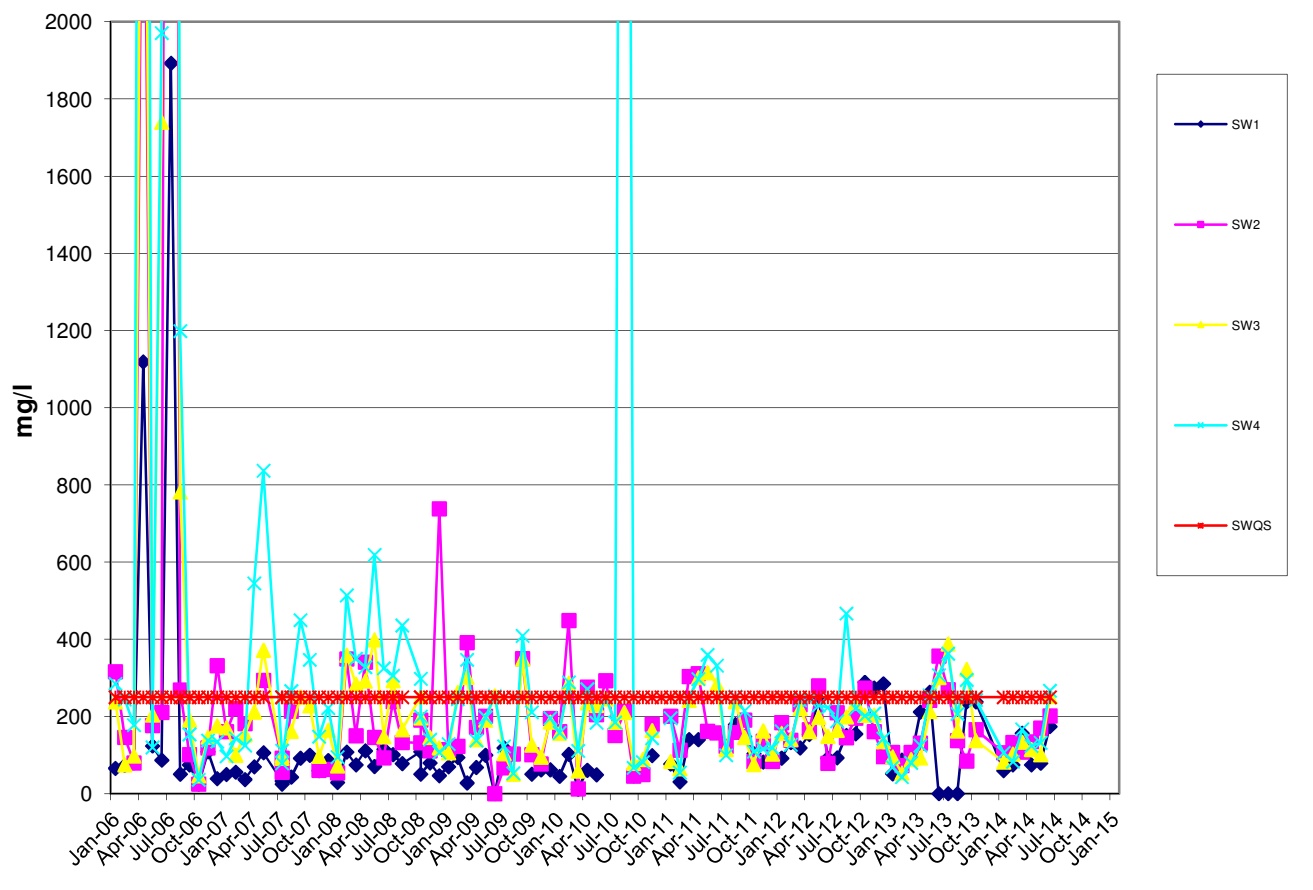
Ammonia (Stream)

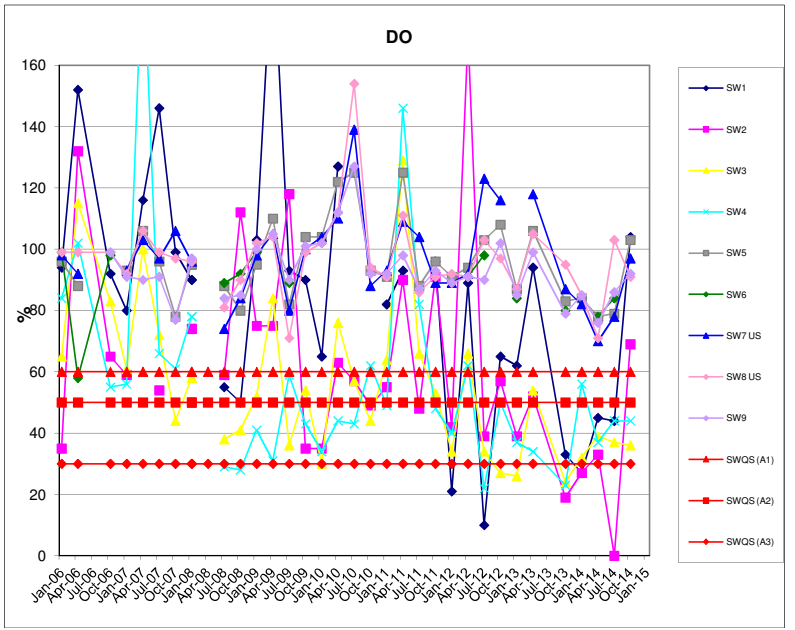
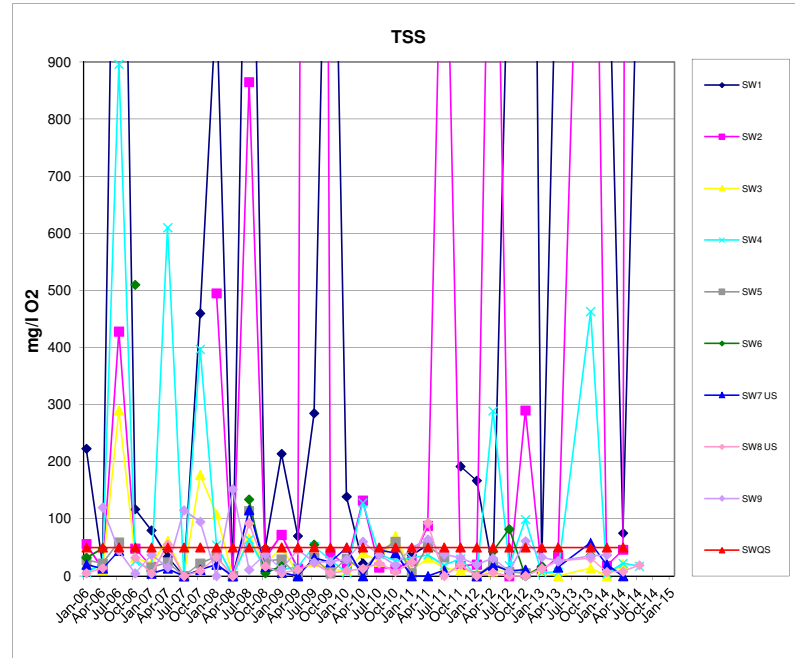
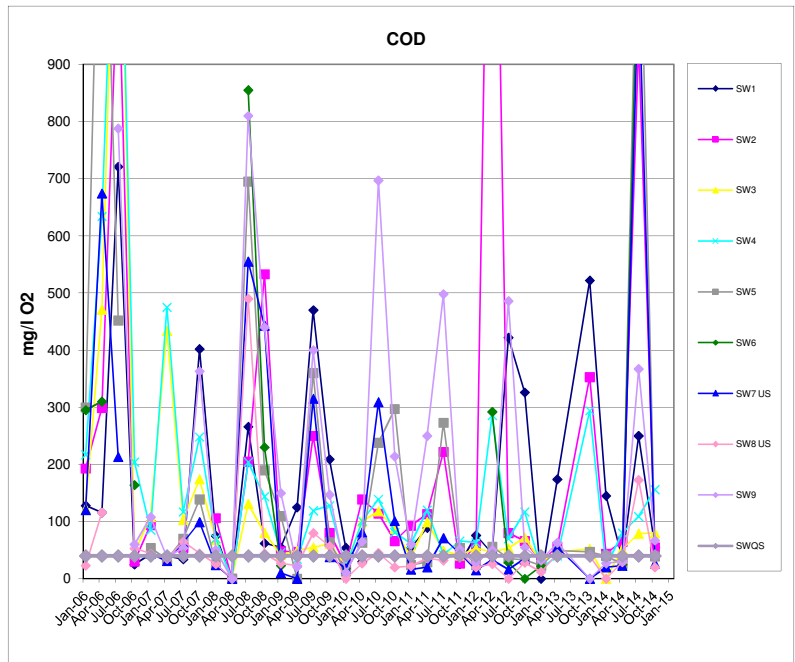


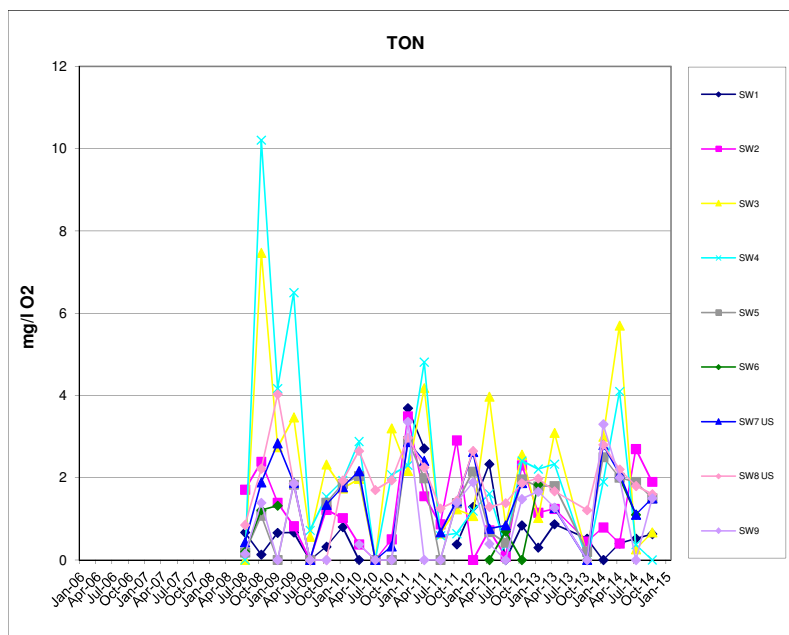
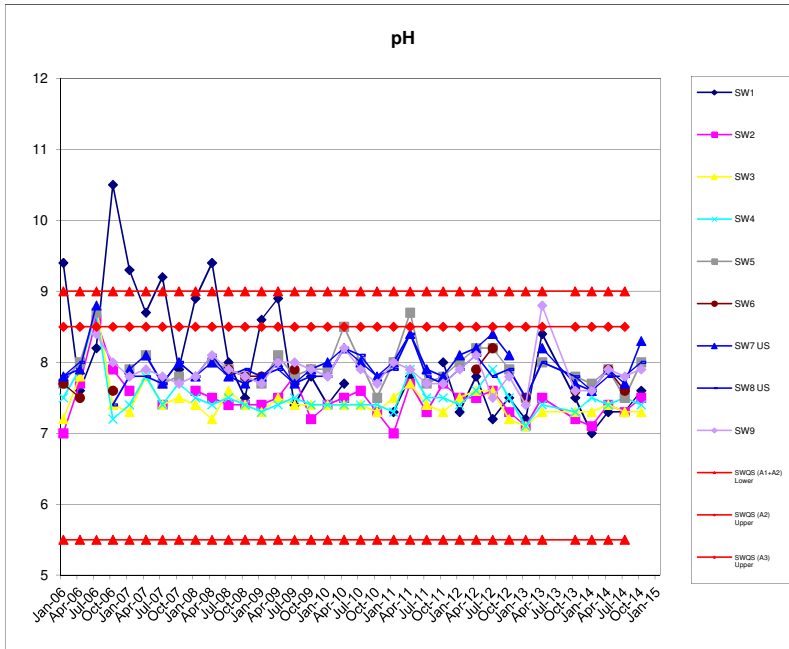
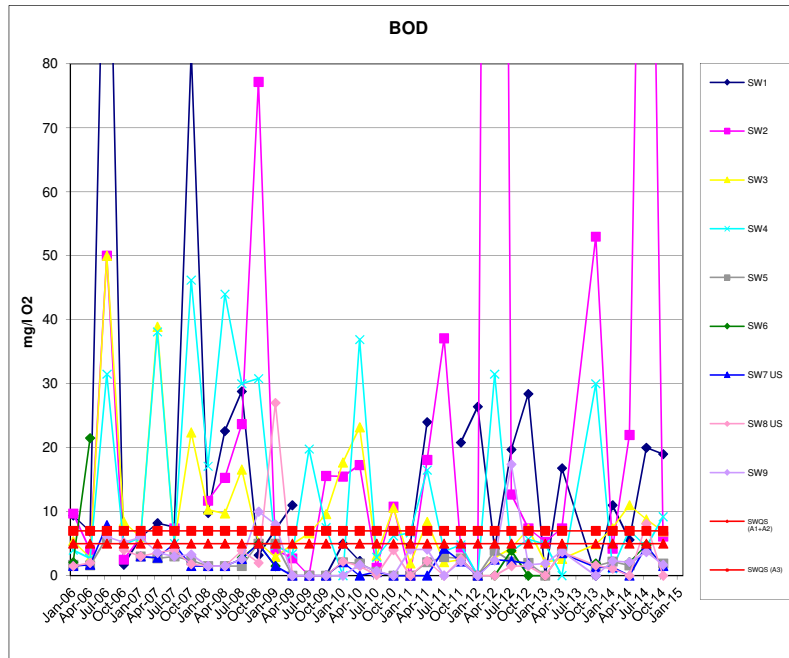
Chloride (Estuary)



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: 21:01:2014		Time: 15:30pm					
Instrument used: GA2000		Normal Analytical Range:		Date Next Calibration:						
Monitoring Personnel: J.O'N			Weather: Dry		Barometric pressure: 998mb					
Results										
Sample Station Number	Borehole/ spike/other	Survey Depth	CH ₄ (% v/v)	CO ₂ (% v/v)	O ₂ (% v/v)	Comments				
G1	PIEZO		0.2	0.3	18.9					
G2	PIEZO		0.1	0.4	19.2					
G3	PIEZO		0	0.5	18.7					
G4	PIEZO		0.1	0.6	19.5					
G5	PIEZO		0	0.4	19.5					
G6	PIEZO		0.3	0.4	18.9					
G7	PIEZO		0	0.2	19.5					
G8	PIEZO		0.1	0.3	19.4					
G9	PIEZO		0.3	0.2	18.7					
G10	PIEZO		0.2	0.3	19.4					
G16	PIEZO		0.1	0.2	19.7					
G17	PIEZO		0	0.5	19.9					
G20	PIEZO		0.1	0.6	19.5					
G21	PIEZO		0.1	0.4	19.1					
GM1	PIEZO		0.1	0.1	19.7					
GM2	PIEZO		0.1	0.4	19.8					
GM3	PIEZO		0.2	0.3	19.3					
GM4	PIEZO		0.1	0.4	19.2					
GM5	PIEZO		0.1	0.2	18.8					
GM6	PIEZO		0.1	0.2	18.9					
GM24	PIEZO		0	0.2	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: 21:01:2014			Time: 15:30pm	
Instrument used: GA2000		Normal Analytical Range:			Date Next Calibration:			
Monitoring Personnel: J.O'N				Weather: Dry			Barometric pressure: 998mb	
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			10.3	8.1	4.1			
Landfill flare monitor			10.3	8.1	4.1			

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: 18:02:2014		Time: 11am	
Instrument used: GA2000		Normal Analytical Range:		Date Next Calibration:		
Monitoring Personnel: J.O'N			Weather: Dry		Barometric pressure: 1005mb	
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	0.3	19.2	
G2	PIEZO		0.1	0.5	19.5	
G3	PIEZO		0.1	0.4	18.9	
G4	PIEZO		0.1	0.3	19.9	
G5	PIEZO		0.2	0.5	19.2	
G6	PIEZO		0.2	0.4	19.5	
G7	PIEZO		0.1	0.5	20.1	
G8	PIEZO		0.1	0.6	19.8	
G9	PIEZO		0.5	0.4	18.7	
G10	PIEZO		0.1	0.4	19.7	
G16	PIEZO		0	0.3	19.9	
G17	PIEZO		0.1	0.5	20.1	
G20	PIEZO		0.2	0.6	18.5	
G21	PIEZO		0	0.5	20.0	
GM1	PIEZO		0.1	0.1	18.5	
GM2	PIEZO		0	0.2	19.5	
GM3	PIEZO		0.1	0.2	19.8	
GM4	PIEZO		0	0.3	19.5	
GM5	PIEZO		0	0.3	19.5	
GM6	PIEZO		0.2	0.1	19.2	
GM24	PIEZO		0	0.2	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: 18:02:2014		Time: 11am					
Instrument used: GA2000		Normal Analytical Range:		Date Next Calibration:						
Monitoring Personnel: J.O'N			Weather: Dry		Barometric pressure: 1005mb					
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			41	21	2.6					
Landfill flare monitor			41	21	2.6					

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: 12:03:2014		Time: 10am						
Instrument used: GA2000		Normal Analytical Range:		Date Next Calibration:							
Monitoring Personnel: J.O'N			Weather: Dry		Barometric pressure: 1033mb						
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	19.7						
G2	PIEZO		0.2	0.5	19.5						
G3	PIEZO		0	0.4	18.4						
G4	PIEZO		0.2	0.5	18.6						
G5	PIEZO		0.1	0.3	19.7						
G6	PIEZO		0.2	0.1	19.1						
G7	PIEZO		0	0.1	20						
G8	PIEZO		0.2	0.1	19.5						
G9	PIEZO		0.3	0.1	18.7						
G10	PIEZO		0.3	0.2	19.9						
G16	PIEZO		0.1	0.2	19.4						
G17	PIEZO		0	0.4	18.9						
G20	PIEZO		0.2	0.4	19.3						
G21	PIEZO		0	0.4	18.1						
GM1	PIEZO		0	0.2	19.5						
GM2	PIEZO		0	0.2	18.6						
GM3	PIEZO		0	0.1	19.6						
GM4	PIEZO		0	0.1	18.1						
GM5	PIEZO		0	0.3	19.5						
GM6	PIEZO		0	0.3	19.2						
GM24	PIEZO		0	0.2	19.3						

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: 9-04-14		Time: 14:00 pm						
Instrument used: GA2000		Normal Analytical Range:		Date Next Calibration: August 2014							
Monitoring Personnel: Damien Holmes			Weather: Dry		Barometric pressure: 1006mb						
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	19.7						
G2	PIEZO		0.2	0.5	19.5						
G3	PIEZO		0	0.4	19.3						
G4	PIEZO		0	0.3	19.4						
G5	PIEZO		0	0.6	20.1						
G6	PIEZO		0.1	0.3	20						
G7	PIEZO		0	0.4	19.8						
G8	PIEZO		0.2	0.5	18.8						
G9	PIEZO		0	0.1	20.2						
G10	PIEZO		0	0.2	19.9						
G16	PIEZO		0	0.4	20.2						
G17	PIEZO		0	0.5	20.4						
G20	PIEZO		0.1	0.2	19.8						
G21	PIEZO		0	0.5	20.5						
GM1	PIEZO		0	0.5	19.5						
GM2	PIEZO		0	0.4	20.2						
GM3	PIEZO		0	0.5	20						
GM4	PIEZO		0	0.4	20.1						
GM5	PIEZO		0	0.1	19.8						
GM6	PIEZO		0	0.5	20.2						
GM24	PIEZO		0	0.5	19.9						

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: 16-05-14		Time: 10:00 am						
Instrument used: GA2000		Normal Analytical Range:		Date Next Calibration: August 2014							
Monitoring Personnel: Damien Holmes			Weather: Showers		Barometric pressure: 1004mb						
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	0.4	19.2						
G2	PIEZO		0.1	0.5	19.4						
G3	PIEZO		0.1	0.4	18.9						
G4	PIEZO		0.1	0.3	19.7						
G5	PIEZO		0.1	0.5	19.0						
G6	PIEZO		0.1	0.3	19.1						
G7	PIEZO		0	0.3	19.6						
G8	PIEZO		0.1	0.6	19.6						
G9	PIEZO		0	0.3	18.9						
G10	PIEZO		0	0.4	19.6						
G16	PIEZO		0	0.5	19.5						
G17	PIEZO		0	0.5	20.1						
G20	PIEZO		0.1	0.5	19.4						
G21	PIEZO		0.1	0.6	19.2						
GM1	PIEZO		0	0.4	19.3						
GM2	PIEZO		0	0.3	19.9						
GM3	PIEZO		0	0.4	18.9						
GM4	PIEZO		0	0.4	19.8						
GM5	PIEZO		0	0.1	19.6						
GM6	PIEZO		0	0.3	20.2						
GM24	PIEZO		0	0.2	19.9						

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: 11-06-14		Time: 09:00 am						
Instrument used: GA2000		Normal Analytical Range:		Date Next Calibration: August 2014							
Monitoring Personnel: Damien Holmes			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	0.3	19.4						
G2	PIEZO		0	0.4	19.3						
G3	PIEZO		0	0.3	19.1						
G4	PIEZO		0	0.4	19.6						
G5	PIEZO		0.1	0.3	19.3						
G6	PIEZO		0	0.2	19.8						
G7	PIEZO		0	0.4	20.1						
G8	PIEZO		0.2	0.4	19.1						
G9	PIEZO		0	0.4	19.2						
G10	PIEZO		0	0.5	19.7						
G16	PIEZO		0	0.3	19.4						
G17	PIEZO		0	0.2	20.4						
G20	PIEZO		0	0.6	20.1						
G21	PIEZO		0.1	0.4	19.6						
GM1	PIEZO		0	0.4	19.3						
GM2	PIEZO		0.1	0.3	20						
GM3	PIEZO		0	0.5	19.3						
GM4	PIEZO		0	0.4	19.8						
GM5	PIEZO		0	0.2	19.7						
GM6	PIEZO		0.1	0.3	19.9						
GM24	PIEZO		0	0.2	19.9						

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: 10-07-14		Time: 09:00 am						
Instrument used: GA2000		Normal Analytical Range:		Date Next Calibration: August 2014							
Monitoring Personnel: Damien Holmes			Weather: Showers		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	0.2	20.2						
G2	PIEZO		0	0.2	20.1						
G3	PIEZO		0	0.2	20.1						
G4	PIEZO		0	0.2	19.7						
G5	PIEZO		0.1	0.6	19.5						
G6	PIEZO		0.1	0.3	19.1						
G7	PIEZO		0	0.3	19.6						
G8	PIEZO		0	0.4	20.1						
G9	PIEZO		0	0.2	19.8						
G10	PIEZO		0	0.2	19.6						
G16	PIEZO		0	0.5	19.5						
G17	PIEZO		0	0.5	20.1						
G20	PIEZO		0	0.2	19.9						
G21	PIEZO		0	0.4	19.8						
GM1	PIEZO		0	0.4	19.3						
GM2	PIEZO		0	0.3	19.9						
GM3	PIEZO		0	0.4	18.9						
GM4	PIEZO		0	0.4	19.9						
GM5	PIEZO		0	0.2	19.6						
GM6	PIEZO		0	0.3	20.2						
GM24	PIEZO		0	0.2	19.9						

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: 10-07-14		Time: 09:00 am	
Instrument used: GA2000		Normal Analytical Range:		Date Next Calibration: August 2014		
Monitoring Personnel: Damien Holmes			Weather: Showers		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	0.2	20.2	
G2	PIEZO		0	0.2	20.1	
G3	PIEZO		0	0.2	20.1	
G4	PIEZO		0	0.2	19.7	
G5	PIEZO		0.1	0.6	19.5	
G6	PIEZO		0.1	0.3	19.1	
G7	PIEZO		0	0.3	19.6	
G8	PIEZO		0	0.4	20.1	
G9	PIEZO		0	0.2	19.8	
G10	PIEZO		0	0.2	19.6	
G16	PIEZO		0	0.5	19.5	
G17	PIEZO		0	0.5	20.1	
G20	PIEZO		0	0.2	19.9	
G21	PIEZO		0	0.4	19.8	
GM1	PIEZO		0	0.4	19.3	
GM2	PIEZO		0	0.3	19.9	
GM3	PIEZO		0	0.4	18.9	
GM4	PIEZO		0	0.4	19.9	
GM5	PIEZO		0	0.2	19.6	
GM6	PIEZO		0	0.3	20.2	
GM24	PIEZO		0	0.2	19.9	

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: 19-08-14		Time: 10:00 am						
Instrument used: GA2000		Normal Analytical Range:		Date Next Calibration: August 2014							
Monitoring Personnel: Damien Holmes			Weather: Showers		Barometric pressure: 1004mb						
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	0.2	19.9						
G2	PIEZO		0	0.4	19.3						
G3	PIEZO		0	0.3	19.1						
G4	PIEZO		0	0.4	19.6						
G5	PIEZO		0.1	0.3	19.3						
G6	PIEZO		0	0.2	19.8						
G7	PIEZO		0	0.4	20.1						
G8	PIEZO		0	0.2	20.1						
G9	PIEZO		0	0.4	19.2						
G10	PIEZO		0	0.5	19.7						
G16	PIEZO		0	0.3	19.4						
G17	PIEZO		0	0.2	20.4						
G20	PIEZO		0	0.2	20.1						
G21	PIEZO		0.1	0.4	19.6						
GM1	PIEZO		0	0.4	19.3						
GM2	PIEZO		0.1	0.3	20						
GM3	PIEZO		0	0.5	19.3						
GM4	PIEZO		0	0.4	19.8						
GM5	PIEZO		0	0.2	19.7						
GM6	PIEZO		0	0.2	20						
GM24	PIEZO		0	0.2	19.9						

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: 09-09-14		Time: 14:00 pm					
Instrument used: GA2000		Normal Analytical Range:		Date Next Calibration: July 2015						
Monitoring Personnel: Damien Holmes			Weather: Dry		Barometric pressure: 1006mb					
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	19.7					
G2	PIEZO		0.2	0.5	19.5					
G3	PIEZO		0	0.4	19.3					
G4	PIEZO		0	0.3	19.4					
G5	PIEZO		0	0.6	20.1					
G6	PIEZO		0.1	0.3	20					
G7	PIEZO		0	0.4	19.8					
G8	PIEZO		0.2	0.5	19.4					
G9	PIEZO		0	0.1	20.2					
G10	PIEZO		0	0.2	19.9					
G16	PIEZO		0	0.4	20.2					
G17	PIEZO		0	0.5	20.4					
G20	PIEZO		0.1	0.2	19.8					
G21	PIEZO		0	0.5	20.5					
GM1	PIEZO		0	0.5	19.5					
GM2	PIEZO		0	0.4	20.2					
GM3	PIEZO		0	0.5	20.1					
GM4	PIEZO		0	0.4	20.1					
GM5	PIEZO		0	0.1	19.8					
GM6	PIEZO		0	0.5	20.2					
GM24	PIEZO		0	0.5	19.9					

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: 15-10-14		Time: 09.30am						
Instrument used: GA2000		Normal Analytical Range:		Date Next Calibration: July 2015							
Monitoring Personnel: Damien Holmes			Weather: Dry		Barometric pressure: 1004mb						
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	0.4	19.9						
G2	PIEZO		0.1	0.7	19.4						
G3	PIEZO		0	0.2	19.5						
G4	PIEZO		0	0.3	19.4						
G5	PIEZO		0	0.6	20.1						
G6	PIEZO		0.1	0.3	20						
G7	PIEZO		0	0.2	20.1						
G8	PIEZO		0	0.5	18.8						
G9	PIEZO		0	0.1	20.2						
G10	PIEZO		0	0.2	19.9						
G16	PIEZO		0	0.4	20.2						
G17	PIEZO		0	0.2	20.4						
G20	PIEZO		0.1	0.2	19.8						
G21	PIEZO		0	0.5	20.5						
GM1	PIEZO		0	0.5	19.5						
GM2	PIEZO		0	0.4	20.2						
GM3	PIEZO		0	0.5	20						
GM4	PIEZO		0	0.4	20.1						
GM5	PIEZO		0	0.1	19.8						
GM6	PIEZO		0	0.5	20.2						
GM24	PIEZO		0	0.3	20.1						

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: 11-11-14		Time: 09:00 am	
Instrument used: GA2000		Normal Analytical Range:		Date Next Calibration: July 2015		
Monitoring Personnel: Damien Holmes			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		0.1	0.2	20.2	
G2	PIEZO		0	0.2	20.1	
G3	PIEZO		0	0.2	20.1	
G4	PIEZO		0	0.2	19.9	
G5	PIEZO		0.1	0.4	19.9	
G6	PIEZO		0.1	0.2	19.9	
G7	PIEZO		0	0.3	19.6	
G8	PIEZO		0	0.4	20.1	
G9	PIEZO		0	0.4	19.9	
G10	PIEZO		0	0.2	19.6	
G16	PIEZO		0	0.4	19.8	
G17	PIEZO		0	0.3	20.1	
G20	PIEZO		0	0.2	19.9	
G21	PIEZO		0	0.4	19.8	
GM1	PIEZO		0	0.4	19.8	
GM2	PIEZO		0	0.3	19.9	
GM3	PIEZO		0	0.4	19.8	
GM4	PIEZO		0	0.4	19.9	
GM5	PIEZO		0	0.1	19.6	
GM6	PIEZO		0	0.3	20.2	
GM24	PIEZO		0	0.2	19.9	

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 05-12-14		Time: 10:00 am						
Instrument used: GA2000		Normal Analytical Range:		Date Next Calibration: July 2015							
Monitoring Personnel: Damien Holmes			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	0.2	19.9						
G2	PIEZO		0	0.2	19.9						
G3	PIEZO		0	0.2	19.8						
G4	PIEZO		0	0.4	19.6						
G5	PIEZO		0.1	0.3	19.3						
G6	PIEZO		0	0.2	19.8						
G7	PIEZO		0	0.4	20.1						
G8	PIEZO		0	0.2	20.1						
G9	PIEZO		0	0.4	19.2						
G10	PIEZO		0.1	0.5	19.6						
G16	PIEZO		0	0.3	19.4						
G17	PIEZO		0	0.2	20.2						
G20	PIEZO		0	0.2	20.1						
G21	PIEZO		0.1	0.3	19.8						
GM1	PIEZO		0	0.4	19.3						
GM2	PIEZO		0.1	0.3	20						
GM3	PIEZO		0.1	0.5	19.6						
GM4	PIEZO		0	0.4	19.8						
GM5	PIEZO		0	0.2	19.7						
GM6	PIEZO		0	0.2	20						
GM24	PIEZO		0	0.2	19.9						

APPENDIX I

COMPOSTING MONITORING AND BIOFILTER RESULTS



*ANALYSIS OF COMPOSTED GREEN
MATERIAL FROM V&W RECYCLING
RECEIVED 19TH DECEMBER 2013*

*Ref year.
2014*

REPORT NO: 43929

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

PREPARED BY: Aoife Doyle
Environmental Scientist
Bord na Mona Environmental Ltd. T/A ANUA

DATE: 18 February 2014

1 Introduction

One sample was received from V&W Recycling on the 19th 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
375531	Not known

The sample was analysed as requested by the client.

2 Results of Analysis

Compost Testing and Analysis Service

Report ref: 13-38282

Sample reference: 375531

Sample matrix: not known

Maturity Tests

Oxygen Uptake Rate

Sample no	Test Method	OUR Stability results (mmolO ₂ /kg OS/h)
375531	PrEN 16087-1	5.0

Self Heating

Sample no	Maximum Temperature reached (ambient 18°C)
375531	18

Plant Nutrient

Sample no	pH	EC μS.cm ⁻¹
375531	7.2	670
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
375531	0	206	49	331
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)
375531	10	Not detected
Test Method	ISO 11866-2	I.S. EN ISO 6579

Physical Analysis

Sample no	H ₂ O %	Dry Matter %	Organic Matter %
375531	60	40	50
Test Method	I.S. EN 13041	I.S. EN 13041	I.S. EN 13039

Cress Germination Test

Sample no	Sample Not Diluted with peat, EC correct	% Germination compared to control*	Root Index Compared to control (%)	MLVI compared to control (%)
375531		97	96	95

* <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 %
39	18	18	19	6.1	<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	1.1	<0.01	<0.01	<0.01	<0.01
4-8mm	2.7	<0.01	<0.01	<0.01	<0.01
8-16mm	<0.01	<0.01	0.02	<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
375531	0.45	10.6	35.8	0.09
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
375531	10.6	24.7	114
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 %
375531	2.21	0.32	0.58
Test Method	I.S. EN 13554-1	I.S. EN 13650	I.S. EN 13650



Monitoring and Testing Services

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 email info@fitzsci.ie

A copy of this certificate is available on www.fitzsci.ie

Customer	Manager	Lab Report Ref. No.	1143/025/01
	V & W Recycling	Date of Receipt	04/12/2014
	Newry Rd	Sampled On	04/12/2014
	Dundalk	Date Testing Commenced	04/12/2014
	Co. Louth	Received or Collected	Delivered by Customer
Customer PO		Condition on Receipt	Acceptable
Customer Ref	Biofilter 1	Date of Report	12/12/2014
Ref 2		Sample Type	Other
Ref 3			

CERTIFICATE OF ANALYSIS

Test Parameter	SOP	Analytical Technique	Result	Units	Acc.
% Moisture Content	235	Drying @ 104 C	61.8	%	
Ammonia (Solid)	114	Colorimetry	267.81	mg/Kg as N	
pH (Solid)	110	Electrometry	8.3	pH Units	
TVC @ 22°C (Solid)	141	Incubation @ 22C/ 72H	540000	cfu/g	
TVC @ 37°C (Solid)	141	Incubation @ 37C/ 48H	170000	cfu/g	

Signed: 
Aoife Harmon - Technical Supervisor

Date : 12/12/2014

Acc. : Accredited Parameters by ISO 17025:2005

PVL - Parametric Value Limit as per EU (Drinking water) Regulations (SI 122 2014)

For bacterial analysis a result of 0 means none detected in volume examined

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 (P) : Presumptive Results

** : The test result for this parameter may be invalid as it has exceeded the recommended holding time (BS EN ISO 5667-3:2012)



Monitoring and Testing Services

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Customer	Manager	Lab Report Ref. No.	1143/024/01
	V & W Recycling	Date of Receipt	09/09/2014
	Newry Rd	Sampled On	09/09/2014
	Dundalk	Date Testing Commenced	09/09/2014
	Co. Louth	Received or Collected	Delivered by Customer
Customer PO		Condition on Receipt	Acceptable
Customer Ref	Biofilter 1	Date of Report	23/09/2014
Ref 2		Sample Type	Other
Ref 3			

CERTIFICATE OF ANALYSIS

Test Parameter	SOP	Analytical Technique	Result	Units	Acc.
% Moisture Content	235	Drying @ 104 C	60.51	%	
Ammonia (Solid)	114	Colorimetry	104.41	mg/Kg as N	
pH (Solid)	110	Electrometry	7.6	pH Units	
TVC @ 22°C (Solid)	141	Incubation @ 22C/ 72H	220000	cfu/g	
TVC @ 37°C (Solid)	141	Incubation @ 37C/ 48H	120000	cfu/g	

Signed : 
Aoife Harmon - Technical Supervisor

Date : 23/09/2014

Acc. : Accredited Parameters by ISO 17025:2005

PVL - Parametric Value Limit as per EU (Drinking water) Regulations (SI 122 2014)

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 (P) : Presumptive Results

** : The test result for this parameter may be invalid as it has exceeded the recommended holding time (BS EN ISO 5667-3:2012)



Monitoring and Testing Services

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Customer	Manager	Lab Report Ref. No.	1143/024/02
	V & W Recycling	Date of Receipt	09/09/2014
		Sampled On	09/09/2014
	Newry Rd	Date Testing Commenced	09/09/2014
	Dundalk	Received or Collected	Delivered by Customer
	Co. Louth	Condition on Receipt	Acceptable
Customer PO		Date of Report	23/09/2014
Customer Ref	Biofilter 2	Sample Type	Other
Ref 2			
Ref 3			

CERTIFICATE OF ANALYSIS

Test Parameter	SOP	Analytical Technique	Result	Units	Acc.
% Moisture Content	235	Drying @ 104 C	57.95	%	
Ammonia (Solid)	114	Colorimetry	98.06	mg/Kg as N	
pH (Solid)	110	Electrometry	7.2	pH Units	
TVC @ 22°C (Solid)	141	Incubation @ 22C/ 72H	1120000	cfu/g	
TVC @ 37°C (Solid)	141	Incubation @ 37C/ 48H	800000	cfu/g	

Signed: 
Aoife Harmon - Technical Supervisor

Date : 23/09/2014

Acc. : Accredited Parameters by ISO 17025:2005

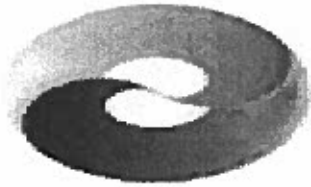
PVL - Parametric Value Limit as per EU (Drinking water) Regulations (SI 122 2014)

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 (P) : Presumptive Results

** : The test result for this parameter may be invalid as it has exceeded the recommended holding time (BS EN ISO 5667-3:2012)



ANUA
Bord na Móna - with nature

*ANALYSIS OF COMPOSTED GREEN
MATERIAL FROM V&W RECYCLING
RECEIVED 17TH DECEMBER 2014*

REPORT NO: 48771/1

ATTENTION:
V&W RECYCLING
NEWRY ROAD
DUNDALK
CO. LOUTH

PREPARED BY: Roisin Kavanagh
Team Leader
ANUA

DATE:

1 Introduction

1 sample was received from V&W Recycling on the 18th of December 2014. No details of this sample are known; it was received in good condition and labelled as follows:

ANUA lab code	Client code
405696	Organic Compost 17/12/14

The sample was analysed as requested by the client.

2 Results of Analysis

Compost Testing and Analysis Service

Report ref: 14-43080

Sample reference: 405696
Sample matrix: not known

Maturity Tests Oxygen Uptake Rate

Sample no	Test Method	OUR Stability results (mmolO ₂ /kg OS/h)
405696	PrEN 16087-1	1.6

Self Heating

Sample no	Maximum Temperature reached (ambient 20°C)
405696	17

Plant Nutrient

Sample no	pH	EC μS.cm ⁻¹
405696	5.9	1120
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
405696	170	2850	689	2553
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 %
405696	2.07	0.16	0.33
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)
405696	<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
405696	0.36	6.86	22.6	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
405696	7.8	18	82
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 %
405696	60.7	39.3	76.1
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 %
43	20	18	18	2.1	0	0

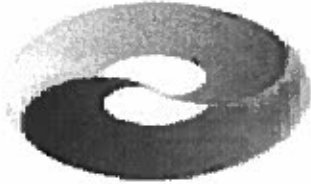
Contaminants (Dry Wt. Basis)

Sieve size	Stones %	Metals %	Plastic %	Glass %	Other %
<1mm	<0.01	<0.01	<0.01	<0.01	<0.01
1-2mm	<0.01	<0.01	<0.01	<0.01	<0.01
2-4mm	<0.01	<0.01	<0.01	<0.01	<0.01
4-8mm	<0.01	<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 EC	% Germination compared to control*	Root Index Compared to control (%)	MLVI compared to control (%)
405696	EC	100	89	93

* <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 13TH OCTOBER 2014*

REPORT NO: 47824

ATTENTION:
V&W RECYCLING
NEWRY ROAD
DUNDALK
CO. LOUTH

PREPARED BY: Roisin Kavanagh
Team Leader
ANUA

DATE: 17 November 2014

1 Introduction

1 sample was received from V&W Recycling on the 13th of October 2014. No details of this sample are known; it was received in good condition and labelled as follows:

ANUA lab code	Client code
398770	Organic Compost

The sample was analysed as requested by the client.

2 Results of Analysis

Compost Testing and Analysis Service

Report ref: 14-42172

Sample reference: 398770

Sample matrix: not known

Maturity Tests

Oxygen Uptake Rate

Sample no	Test Method	OUR Stability results (mmolO ₂ /kg OS/h)
398770	PrEN 16087-1	1.4

Self Heating

Sample no	Maximum Temperature reached (ambient 21.3°C)
398770	18.5

Plant Nutrient

Sample no	pH	EC μS.cm ⁻¹
398770	6.2	1539
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
398770	8	547	234	752
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 %
398770	2.4	0.44	0.69
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)
398770	<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
398770	0.45	19.8	32.9	0.09
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
398770	19	26.4	111
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 %
398770	55.1	44.9	72.8
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 %
47	18	16	14	4	0	0

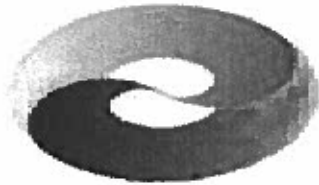
Contaminants (Dry Wt. Basis)

Sieve size	Stones %	Metals %	Plastic %	Glass %	Other %
<1mm	<0.01	<0.01	<0.01	<0.01	<0.01
1-2mm	<0.01	<0.01	<0.01	<0.01	<0.01
2-4mm	<0.01	<0.01	<0.01	<0.01	<0.01
4-8mm	<0.01	<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 EC	% Germination compared to control*	Root Index Compared to control (%)	MLVI compared to control (%)
398770	EC	87	88	88

* <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 12TH SEPTEMBER 2014*

REPORT NO: 47438

ATTENTION:

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

PREPARED BY:

**Robert Conlon
Environmental Scientist
ANUA**

DATE:

22 October 2014

1 Introduction

1 sample was received from V&W Recycling on the 12th of September 2014. No details of this sample are known; it was received in good condition and labelled as follows:

ANUA lab code	Client code
396365	12/09/14 Organic Compost

The sample was analysed as requested by the client.

2 Results of Analysis

Compost Testing and Analysis Service

Report ref: 14-41795

Sample reference: 396365
Sample matrix: not known

Maturity Tests Oxygen Uptake Rate

Sample no	Test Method	OUR Stability results (mmolO ₂ /kg OS/h)
396365	PrEN 16087-1	1.3

Self Heating

Sample no	Maximum Temperature reached (ambient 24.8°C)
396365	17.8

Plant Nutrient

Sample no	pH	EC μS.cm ⁻¹
396365	6.7	928
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
395365	9	414	184	503
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 %
396365	2.4	0.4	0.5
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)
396365	<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
396365	0.52	12.1	28.9	0.09
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
396365	13.7	28.2	125
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 %
395365	57.4	42.6	72.1
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 %
48	18	16	14	3.7	0.1	0

Contaminants (Dry Wt. Basis)

Sieve size	Stones %	Metals %	Plastic %	Glass %	Other %
<1mm	<0.01	<0.01	<0.01	<0.01	<0.01
1-2mm	<0.01	<0.01	<0.01	<0.01	<0.01
2-4mm	1.41	<0.01	<0.01	<0.01	<0.01
4-8mm	2.88	<0.01	<0.01	<0.01	<0.01
8-16mm	1.06	<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 (%)
395365	EC	100	98	98

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