



# **ANNUAL ENVIRONMENTAL REPORT**

**January - December 2016**

**For**

**Dundalk Landfill Site**

**Co. Louth**

**Waste Licence Reference W0034-02**

**By**

**Louth County Council**

**To**

**Environmental Protection Agency**

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# 1 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 study<sup>1</sup> 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 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

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<sup>1</sup> Proposal for leachate management, July 2004. RPS MCOS.

which transfers the gas collected, under suction, provided by compressor, and to the 600 m<sup>3</sup> 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 2016. The landfill site ceased to accept waste in October 2002. A Recycling Centre is currently in operation at the facility.

## 2 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 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 Landfill<sup>2</sup>**

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

<sup>2</sup> 1997-2001 figures based on estimates.

- glass
- magazines/newspaper
- building rubble
- domestic plastics
- clothing/textiles
- 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 5,544 tonnes. The figures are taken from National Waste Report 2016 Survey.

109 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. 2,621 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 5.14.

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
Mixed residual waste	20 03 01	109	Indaver Incinerator W0167-03
Garden	20 02 01	2,621	Dundalk Council W0034-02
Cardboard packaging	15 01 01	569	Peute Europe NI6000076
Newspaper and magazines	20 01 01	250	Peute Europe NI6000076
Glass packaging	15 01 07	242	Glasson NI LN06/08
Aluminium cans	15 01 04	9	Tinnelly NI LN09/10
Steel cans	15 01 04	30	Tinnelly NI LN09/10
Metals	20 01 40	354	Tinnelly NI LN09/10
Plastic packaging	15 01 02	591	Shabara Plastics MN 080022-01
Clothes/Textiles	20 01 10 & 20 01 011	30	Secondhand Clothing
Wood packaging	15 01 03	200	Thornton Disposal W0195-02 Tyrone Energy P0374/11A
Wood non-packaging	20 01 38	309	Thornton Disposal W0195-02 Tyrone Energy P0374/11A
Lead acid batteries and accumulators	16 06 01*	15	Rilta W0192/03
Paint, inks, adhesives and resins (non-hazardous)	20 01 27*	1.0	Enva Portlaoise WO184-01
Waste mineral oils	13 01* or 13 02*	5	Enva Portlaoise (W0184-01)
Building Rubble	17 01 07	218	Scotch Corner Landfill W0020-01
<b>Total</b>		<b>5,544</b>	

## 4 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 4,320 m<sup>3</sup>. Reportable emissions for this location as per PRTR requirement are;

- Ammonia (NH<sub>3</sub>)
- 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 m<sup>2</sup> 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 equates to 1,127 to 5,637 m<sup>3</sup> of leachate produced.

## 4.3 Emissions to Air

There is no continuous air emission monitoring at Dundalk 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 5.14 and 5.15.

### 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 600m<sup>3</sup> flare was installed at Dundalk Landfill Site. This was downsized in 2013 to a 300m<sup>3</sup> 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 55,334 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)	236,493
Methane flared	181,159
Methane utilised in engine/s	0.0
<b>Net Methane Emission</b>	<b>55,334</b>

## 5 Summary of Results and Interpretations of Environmental Monitoring

### 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 2016**

Parameters	Units	No. of Samples	Minimum	Maximum
Aluminium	µg/l	3	< 50	143
Ammonia	mg/l N	26	8.89	135
Antimony	µg/l	3	< 4	< 4
Arsenic	µg/l	3	< 2	2.96
Barium	µg/l	3	371	438
B.O.D.	mg/l O2	23	< 1	136.5
Boron	µg/l	3	706	952
Cadmium	µg/l	3	< 0.5	< 0.5
C.O.D.	mg/l O2	23	40	3,500
Chloride	mg/l Cl	26	21	164
Chromium	µg/l	3	< 3	8.35
Conductivity	µS/cm @ 25	26	978	3,390
Copper	µg/l	3	7.15	28.9
Fluoride	mg/l	3	0.046	0.076
Iron	µg/l	3	5.63	14.1
Lead	µg/l	3	< 0.5	7.7
Magnesium	mg/l Mg	3	48.2	56.8
Manganese	µg/l	3	277	512
Molybdenum	µg/l	3	< 9	<9
Nickel	µg/l	3	3.53	8.43
o-Phosphate	mg/l P	26	< 0.02	0.26
pH		26	6.84	7.49
Potassium	mg/l	3	50	58.7
Selenium	µg/l	3	< 1	1.75
Silver	µg/l	3	< 2	< 2
Sodium	mg/l	3	97.8	100
Strontium	µg/l	3	545	946
Sulphate	mg/l SO4	6	7.9	18.2
Temp	°C	3	14.2	16.5
T.O.C.	mg/l	9	< 0.1	12.1
T.O.N	mg/l N	13	< 0.1	1.64
Uranium	µg/l	3	< 0.5	< 0.5
Vanadium	µg/l	3	< 8	< 8

**Table 5.2 Raw Leachate Concentrations**

Parameter	Dundalk Landfill Site		From 30 Samples from UK/Irish Landfills Accepting Domestic Waste Results in mg/l		
	Min.Conc	Max.Conc	Min.Conc	Max.Conc	Mean
Ammonia (mg/N)	8.89	135	<0.2	1,700	491
BOD (mg/l)	< 1	136.5	4.5	>4800	>834
COD (mg/l)	40	3,500	<10	33,700	3,078
Chloride (mg/l)	21	164	27	3,410	1,256
Iron (µg/l)*	5.63	14.1	0.4	664	54.4
Potassium (mg/l)	50	58.7	2.7	1,480	491
Sodium (mg/l)	97.8	100	12	3,000	904
TON (mg/l N)	< 0.1	1.64	/	/	/
Conductivity (µS/cm)	978	3,390	503	19,200	7,789
pH (pH units)	6.84	7.49	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 5.3 below.



**Table 5.3 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 values<sup>3</sup> (IGV),
- SI No 278 of 2007 EC (Drinking water) Regulations (DWR),
- SI No 9 of 2010 European Communities Environmental Objectives (Groundwater) Regulations 2010 as amended (GTV),
- 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 upgradient 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 downgradient groundwater can be assessed. WM1 is the upgradient 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 (1,000  $\mu\text{Scm}$ ) and GTV (800 to 1,875  $\mu\text{Scm}$ ) throughout the monitoring period. Ammonia concentrations exceeded the GTV (0.175 mg/l N) in four of the twelve sampling dates. The highest concentration was 1.34 mg/l N in July. Chloride concentrations were above the GTV (187.5 mg/l) throughout the

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

monitoring period except for December. The highest chloride reading recorded was 462 mg/l in October.

#### 5.4.2 Quarterly Parameters

WM1 exhibits TOC values ranging from < 1 to 28.7 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 List I and II substances, metals and non-metals were undertaken on the 20<sup>th</sup> December 2016 at one location upgradient of the site (WM1). Manganese and Total Alkalinity were not analysed during the monitoring period.

Calcium, Copper, Fluoride, Magnesium, Nickel, Sodium, Sulphate, and Zinc were below the IGV, DWR and GWR 2010 were applicable. Parameters concentrations above the IGV, DWR and GWR 2010 were:

- Iron 1.1 mg/l;
- Orthophosphate 0.0313 mg/l; and
- Potassium 24.8 mg/l.

Total Oxidised Nitrogen (TON) concentration was 1.99 mg/l.

Other parameters detected above the limit of detection were:

- Strontium 274 µg/l, and
- Uranium 4.01 µg/l<sup>4</sup>.

Aluminium, Boron, Cadmium, Chromium, Cyanide, Lead, Mercury and Vanadium concentrations were below the lower limit of detection.

Pesticide and herbicide, volatile organic compound (VOC) and semi volatile organic compound (SVOC) parameters were analysed in WM1 in December. The results were below the lower detection limit for the analytical methodology used.

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<sup>4</sup> World Health Organisation (2011) Guidelines for Drinking-water Quality, Fourth Edition. Table A3.3 Guideline values for chemicals that are of health significance in drinking-water. Uranium 30 µg/l.

## 5.5 Downgradient 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**

Parameters	Units	No. of Samples	Minimum	Maximum
Aluminium	µg/l	5	< 50	871
Ammonia	mg/l N	59	13.7	107
Boron	µg/l	5	676	1410
Cadmium	µg/l	5	< 0.5	< 0.5
Calcium	mg/l Ca	5	88.6	390
Chloride	mg/l Cl	59	79.6	3740
Chromium	µg/l	5	< 3	3.78
Conductivity	µS/cm @ 25	59	1,988	12,000
Copper	µg/l	5	< 4	24.2
Cyanide	mg/l CN	5	< 5	< 5
Fluoride	mg/l	5	0.057	0.349
Iron	mg/l	5	2.26	46.8
Lead	µg/l	5	< 0.5	22.7
Magnesium	mg/l Mg	5	67.9	282
Mercury	µg/l	5	< 0.02	0.198
Nickel	µg/l	5	5.98	52.8
o-Phosphate	mg/l P	15	< 0.02	< 0.02
pH	pH units	48	6.57	7.6
Potassium	mg/l	5	52.6	154
Sodium	mg/l	5	218	2060
Strontium	µg/l	5	642	2170
Sulphate	mg/l SO4	15	17.9	417
Suspended	mg/l	15	5	125
Temp	°C	35	12.5	21.8
T.O.C.	mg/l	48	4.13	42.8
T.O.N	mg/l N	15	0.526	4.41
Total S Solids	mg/l	5	1380	8220
Uranium	µg/l	5	< 0.5	1.65
Vanadium	µg/l	5	< 8	< 8
Zinc	µg/l	5	4.57	291

### 5.5.1 Monthly Parameters

Results from downgradient boreholes indicate elevated levels of Ammonia above the DWR (0.3 mg/l N), IGV (0.12 mg/l N) and GTV (0.065-0.175 mg/l N) in the majority of downgradient boreholes. The highest Ammonia concentration recorded was 107 mg/l N in WM8 in September.

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 upgradient groundwater moving below the source does not have a significant dilution effect on infiltrating leachate.

Electrical Conductivity exceeded the DWR (2,500  $\mu$ S/cm), IGV (1,000  $\mu$ S/cm) and GTV (800-1,875  $\mu$ S/cm) in all boreholes. The highest level was recorded in WM10 in December (12,000  $\mu$ S/cm). Chloride levels also exceeded the DWR (250 mg/l), IGV (30 mg/l) and GTV (24-187.5 mg/l) throughout the monitoring period. The highest Chloride concentration recorded was 3,740 mg/l also in WM10 in December.

It should be noted that saline water intrusion may contribute to the high levels of Chloride and Electrical Conductivity recorded downgradient 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 (42.8 mg/l) in December.

pH levels in downgradient boreholes are within the IGV and DWR of 6.5 and 9.5. pH levels ranged from 6.57 to 7.6.

### 5.5.3 Annually

Annual analysis for List I and II substances, metals and non-metals were undertaken on the 20<sup>th</sup> December 2016 in all downgradient boreholes. Manganese and Total Alkalinity were not analysed during this monitoring period.

Chromium, Copper, Fluoride and Mercury were below the IGV, DWR and GWR 2010 where applicable in all downgradient boreholes.

Concentrations were above the IGV, DWR and GWR 2010 for the following parameters:

- Aluminium < 50 to 871 ug/l except WM6 (< 50 ug/l) and WM9 (< 50 ug/l);
- Boron 1,040 to 1,410 µg/l except WM5 (676 µg/l);
- Calcium 88.6 to 390 mg/l except WM5 (88.6 mg/l) and WM6 (156 mg/l);
- Iron 2.26 to 46.8 mg/l,
- Lead 22.7 µg/l at WM8,
- Magnesium 67.9 to 282 mg/l;
- Nickel 5.98 to 52.8 ug/l except WM6 (5.98 ug/l) and WM9 (11.5 ug/l);
- Potassium 52.6 to 154 mg/l;
- Sodium 218 to 2060 mg/l;
- Sulphate 417 mg/l at WM10; and
- Zinc 291 µg/l at WM8.

TON values downgradient ranged from 0.526 to 4.41 mg/l.

Other parameters detected above the limit of detection were:

- Strontium 642 to 2,170 µg/l; and
- Uranium 1.65 µg/l at WM5 and 1.26 µg/l at WM10<sup>5</sup>.

Cadmium, Cyanide, Ortho-phosphate and Vanadium concentrations were below the lower limit of detection.

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

Pesticide and herbicide, VOC and SVOC parameters were below the lower detection limit for the analytical methodology.

#### 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 mOD	4.77	5.12	5.57	5.87	5.15	5.78	5.64
29/01/16	2.6		4.85	3.45	3.82	2.82	4.86
29/02/16	2.7		4.46	3.52	3.62	2.85	4.91
31/03/16	2.65		4.58	3.55	3.61	2.89	4.82
05/04/16	2.2		0.8	2.4	1.32	3.01	0.81
31/05/16	2.18		1.95	2.35	1.61	3.06	0.77
22/06/16	2.16		0.98	2.38	1.62	2.95	0.83
28/07/16			4.62	4.92	3.27	5.22	5.25
17/08/16	2.98		4.7	4.89	3.25	5.21	5.31
30/09/16	2.75		4.7	4.91	3.26	5.21	5.26
28/10/16	1.9	Dry	0.82	2.41	1.42	2.95	0.8
29/11/16	1.92	Dry	0.87	2.31	1.59	2.98	0.75
20/12/16	2.02	Dry	0.9	2.35	1.57	2.86	0.83

## 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.

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

WM6 concentrations are below the maximum predicted concentration range. For the remaining boreholes:

- WM5 exceeds the maximum predicted concentration range for Ammoniacal Nitrogen in 1 of the 12 sampling rounds (May);
- WM8 (gravel aquifer) exceeds the maximum predicted concentration range for Ammoniacal Nitrogen in 10 of the 12 sampling rounds;
- WM9 exceeds the maximum predicted concentration range for Ammoniacal Nitrogen in 1 of the 12 sampling rounds (December); and
- WM10 exceeds the maximum predicted concentration range for Ammoniacal Nitrogen in 2 of the 12 sampling rounds.

A hydrogeological risk assessment (HRA) 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.

The HRA has set revised down gradient compliance levels for ammonia as a reliable indicator of organic waste as chloride and electrical conductivity are being heavily influenced by tide levels and saline intrusion. Ammonia concentrations in down gradient boreholes were within the proposed compliance levels shown in Table 5.7 except WM10 in July (82.8 mg/l N) which was above the proposed compliance level of 75.7 mg/l N.

**Table 5.7 Proposed Groundwater Compliance Levels for Ammoniacal Nitrogen**

Groundwater Borehole	Proposed Ammoniacal Nitrogen Compliance Level (mg/l)
WM1	0.175
WM4	55.5
WM5	100.2
WM6	110.9
WM8	192.0
WM9	165.4
WM10	75.7



## 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/EQS) 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 5.8.

**Table 5.8 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 5.9 provides a summary of results in 2016 for SW1 to SW4 surface water locations.

**Table 5.9 Surface Water Parameters SW1 to SW4**

Parameter	Units	No. of Samples	Minimum	Maximum
Alkalinity	mg/l CaCO <sub>3</sub>	2	395	405
Aluminium	µg/l	2	< 50	< 50
Ammonia	mg/l N	27	< 0.11	18.4
B.O.D.	mg/l O <sub>2</sub>	17	1.26	4.64
Boron	µg/l	2	< 135	< 135
Cadmium	µg/l	2	< 0.5	< 0.5
Calcium	mg/l Ca	2	158	170
C.O.D.	mg/l O <sub>2</sub>	17	38	135
Chloride	mg/l Cl	27	46.2	426
Chromium	µg/l	2	< 3	< 3
Conductivity	µS/cm @ 25	27	805	2520
Copper	µg/l	2	< 4	5.56
Iron	mg/l	2	0.24	0.356
Lead	µg/l	2	< 0.5	< 0.5
Magnesium	mg/l Mg	2	35.9	36.2
Manganese	µg/l	2	45.5	67.9
Nickel	µg/l	2	4.42	4.55
o-Phosphate	mg/l P	2	0.0222	0.0245
pH	pH units	19	7.22	7.85
Potassium	mg/l	2	21	22.3
Sodium	mg/l	2	128	132
Strontium	µg/l	2	596	630
Sulphate	mg/l SO <sub>4</sub>	2	193	200
Suspended	mg/l	19	< 3	363
Temp	°C	5	12.5	22.3
T.O.N	mg/l N	19	< 0.1	6.51
Uranium	µg/l	2	2.19	2.38
Vanadium	µg/l	2	< 8	< 8
Zinc	µg/l	1	4.44	4.44

Table 5.10 below provides a summary of results in 2016 for SW5 to SW9 surface water locations located in the estuary.

**Table 5.10 Surface Water Parameters SW5 to SW9**

Parameter	Units	No. of Samples	Minimum	Maximum
Alkalinity	mg/l CaCO <sub>3</sub>	5	90	100
Aluminium	µg/l	5	62	529
Ammonia	mg/l N	60	< 0.11	2.13
B.O.D.	mg/l O <sub>2</sub>	45	< 1	5.2
Boron	µg/l	5	< 135	< 135
Cadmium	µg/l	5	< 0.5	< 0.5
Calcium	mg/l Ca	5	34.1	45.6
C.O.D.	mg/l O <sub>2</sub>	35	10.2	78
Chloride	mg/l Cl	60	13.5	14900
Chromium	µg/l	5	< 3	< 3
Conductivity	µS/cm @ 25	60	220	39800
Copper	µg/l	5	< 3	17.7
Iron	mg/l	5	0.353	1.88
Lead	µg/l	5	< 0.5	6.19
Magnesium	mg/l Mg	5	6.84	13.2
Manganese	µg/l	5	25.3	87.7
Nickel	µg/l	5	3.11	6.29
o-Phosphate	mg/l P	9	< 0.02	0.03
pH	pH units	50	7.3	8.34
Potassium	mg/l	5	4.11	6.84
Sodium	mg/l	5	16	69.6
Strontium	µg/l	5	109	151
Sulphate	mg/l SO <sub>4</sub>	5	20.3	34.3
Suspended	mg/l	50	< 3	92
Temp	°C	25	12.1	22
T.O.N	mg/l N	50	0.278	2.45
Uranium	µg/l	5	< 0.5	< 0.5
Vanadium	µg/l	5	< 8	< 8
Zinc	µg/l	5	10.7	691

### 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 18.4 mg/l N in SW2 in January and in the estuary was 2.13 mg/l N in SW5 (AD) in February.

Chloride concentrations exceeded the SWQS (250 mg/l) in SW4 in the stream at times and at all monitoring locations in the estuary throughout the monitoring period. The highest

Chloride concentration recorded in the stream was 426 mg/l at SW4 in November and in the estuary was 14,900 mg/l at SW9 in May.

Elevated Electrical Conductivity levels above the SWQS (1,000  $\mu\text{S}/\text{cm}$ ) were recorded in the stream and in the estuary throughout the monitoring period. The highest Electrical Conductivity value recorded in the stream was 2,520  $\mu\text{S}/\text{cm}$  at SW4 in May and in the estuary was 39,800  $\mu\text{S}/\text{cm}$  at SW9 in May.

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 7.22 to 8.34 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 4.64 mg/l in SW1 and in the estuary was 5.2 mg/l in SW6 (AD). For COD the highest concentration was 135 mg/l in SW1 and in the estuary was 78 mg/l in SW9 (DS).

Suspended Solids exceeded the SWQS (50 mg/l) in all surface water monitoring locations except SW2 in the stream and SW6 and SW8 in the estuary at times throughout the monitoring period. The highest concentration recorded in the stream was 363 mg/l in SW1 in March and in the estuary was 92 mg/l in SW5 (AD) in July.

The Total Organic Nitrogen (TON) showed no abnormal change throughout 2016, the highest concentration recorded in the stream was 6.51 mg/l in SW3 and in the estuary was 2.45 mg/l in SW8 (US).

The majority of parameters assessed show that levels of contamination increase between sampling points SW1 and SW4, which are located along the drainage ditch running along the north of the site. Plans are in place to drain a section of this ditch to the foul sewer as part of the compliance investigation for the site. Approval is required from Irish Water to allow this to proceed.

### 5.7.3 Annual Parameters

Annual analysis was undertaken on 20<sup>th</sup> December 2016 at surface water monitoring points SW3 and SW4 in the stream and SW5-SW9 in the estuary. Mercury was not analysed during this monitoring period.

Copper, Lead, Nickel, Sulphate and Zinc were below the EQS and SWQS where applicable in the stream and estuary surface water monitoring locations. Parameters exceeding the standards are as follows:

- Iron 0.24 to 0.356 mg/l in the stream and 0.353 to 1.88 mg/l in the estuary; and
- Manganese 45.5 to 67.9 ug/l in the stream and 25.3 to 87.7 ug/l in the estuary.

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

- Aluminium < 50 ug/l in the stream and 62 to 529 ug/l in the estuary;
- Magnesium 35.9 to 36.2 mg/l in the stream and 6.84 to 13.2 mg/l in the estuary;
- Strontium 596 to 630 µg/l in the stream and 109 to 151 ug/l in the estuary; and
- Uranium 2.19 to 2.38 ug/l in the stream and < 0.5 ug/l in the estuary.

Alkalinity concentrations ranged from 395 to 405 mg/l in the stream surface water monitoring locations and from 90 to 100 mg/l in the estuarine water.

Calcium concentrations in the stream ranged from 158 to 170 mg/l and in the estuary from 34.1 to 45.6 mg/l.

Ortho-phosphate concentrations ranged from 0.0222 to 0.0245 mg/l in the stream and < 0.02 to 0.03 mg/l in the estuary.

Potassium concentrations ranged from 21 to 22.3 mg/l in the stream and 4.11 to 6.84 mg/l in the estuary. Sodium concentrations ranged from 128 to 132 mg/l in the stream and 16 to 69.6 mg/l in the estuary.

Boron, Cadmium, Chromium, and Vanadium concentrations were below the lower limit of detection at surface water monitoring locations in the stream and in the estuary.

## 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 N<sup>6</sup>) in the estuary.

The highest concentration in the estuary was at SW5 (2.13 mg/l N) which is adjacent to the site. An upgradient source of contamination is detected in the monitoring results (SW7 and SW8) at times.

## 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.

Samples were not collected landfill discharge monitoring location (S2) during the monitoring period as there was No flow.

Table 5.11 illustrates the minimum and maximum concentrations of parameters that were monitored in S1. All parameter were within the ELV except for COD in March (5,120 mg/l) and Suspended Solids in March (6,320 mg/l).

**Table 5.11 Parameters Monitored in S1**

Parameter	Minimum	Maximum	Emission Limit Value (ELV)	
			S1: Civic Waste Facility (mg/l)	S2: Leachate from Landfill (mg/l)
BOD	1.5	132	750	2000
COD	25	<b>5,120</b>	1000	9000
Suspended Solids	8	<b>6,320</b>	1000	2000
Sulphate	3	45.3	300	400
pH	7.24	7.58	6-9	6-9
Temperature	17.8	17.8	40°C	40°C

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

## 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 5.12 and shown in Drawing in Appendix C (External Gas Monitoring Points).

**Table 5.12 Landfill Gas Monitoring Locations**

<b>Landfill Gas Wells within Waste and Boundary Locations</b>	GW1 to GW47 inclusive (as shown on Drawing No. 004 of the Restoration Plan for 34-1 (Nov 2002) agreed by the Agency)
<b>Piezometers Boundary Locations</b>	G1, G2, G3, G4, G5, G6, G7, G8, G9, G10, G16, G17, GM1, GM2, GM3, GM4, GM5, GM6, GM24 <sup>7</sup>

Landfill gas around the periphery of the site is indicated by piezometers as shown in Table 5.12 above.

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 GM6, 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 600m<sup>3</sup> enclosed Flare Unit and SCADA system was installed. This was downsized in 2013 to a 300m<sup>3</sup> 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 except for G1 in December (1.0 % v/v).

There were no exceedances of licence requirements of carbon dioxide greater than or equal to 1.5% v/v. The highest recording was 1.4 % v/v during the monitoring period.

<sup>7</sup> GM7 and GM8 are no longer monitored

## 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<sub>x</sub> as NO<sub>2</sub> 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 on 13<sup>th</sup> October 2016. These results are presented in Table 5.13. 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.

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 5.13 Sediment Results**

Parameter (ug/Kg)	SW5	SW6	SW7	SW8	SW9	Target Value (Dutch) (mg/Kg)	Inter - vention Value (Dutch) (mg/Kg)
Total Solids %	44.42	38.99	36.34	35.69	44.38		
Cadmium	< 10	< 10	< 10	< 10	< 10	0.8	1.2
Copper	10,336.3	9,642.49	7,380.41	10,377.3	10,658.2	36	190
Lead	11,139.6	10,354.4	8,177.48	9,989.99	17,286	85	530
Manganese	415,784	268228	213,399	277,718	323,095		
Mercury	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	0.3	10
Zinc	111,506	80,630	46,945.1	92,171	106,914	140	720
Total cyanide (mg/Kg)	0.8	< 0.5	1.5	0.7	0.6		



### 5.13 Dust Monitoring

Dust monitoring was carried out twice in the year. Table 5.14 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/m<sup>2</sup>/day. Dust monitor 2 was not monitored in November. From Table 5.14 it can be seen that all dust deposition levels in all periods are below the limit.

**Table 5.14 Dust Monitoring Results (mg/m<sup>2</sup>/day)**

Sampling Period	Dust Monitor 1	Dust Monitor 2	Dust Monitor 3
<b>July</b>	21.49	42.99	125.82
<b>August</b>	188.72	188.72	72.87
<b>November</b>	50.55	NM	26.4

NM = Not Monitored

### 5.14 Composting Monitoring

V & W recycling compost hedge grass & hedge cuttings from Civic Amenity users. 3,532 tonnes was received for composting in 2016. Compost testing was undertaken by Bord na Mona Ltd. Samples are taken from 4 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 four samples of compost were sent for analysis. The samples of compost were checked for compliance against Schedule F of Waste Licence W0034-02 and Oxygen Uptake Rate Bord na Móna Maturity Indicator Values (OS = organic solids) mmolO<sub>2</sub>/kg OS/h.

## 5.15 Bed Media

Moisture content, pH, Ammonia and Total viable counts were analysed for the bed media gases from Biofilter using Drager tubes. These results are available on site. There are no limits in waste licence for these parameters.

## 5.16 Meteorological Monitoring

Temperature and rainfall readings are taken from Dublin Airport.

**Table 5.16 Summary of Meteorological Monitoring for the Reporting Period**

Total Rainfall in Millimetres for Dublin Airport												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
118.4	59.7	36.3	88.2	46.8	58.5	43.7	61.9	56.6	60	36.9	46.6	<b>713.6</b>
Mean Temperature in Degrees C. for Dublin Airport												
5.7	4.4	5.9	6.2	11.1	14.0	15.7	15.4	14.3	10.4	5.6	6.7	9.6

## 6 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	CWF 2015	CWF 2016	% difference +/-
Electricity	kWh	3,850	3,900	3,800	4,020	+5.8
Water	m <sup>3</sup>	2,810	2,700	2,500	2,060	-17.6

## 7 Development / Infrastructural Works in Place and Planned, to Process Waste Quantities Projected

There is no additional development /infrastructural works planned for 2017 in the recycling facility and landfill site.

### 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.

### 7.1 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 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 2017.

## 9 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.

A bund integrity test was undertaken and a report is provided in Appendix I. The bunds are located together and each one and are constructed with reinforced concrete base (300mm) and walls (225mm). Each bund houses a plastic integrally banded oil storage tank. Each bund is certified to have passed the integrity test as per Environmental Agency of England and Wales Technical Report P16 (equivalent to CIRIA 163). No other inspections are undertaken.

## **10 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 Report on Incidents and Complaints Summaries

No complaints were received from the public and six incidents were reported in 2016. Five incidents were due to the flare shutting down which was short lived and resolved. One incident was reported regarding the breach of limit for discharge to sewer. A compliance investigation is ongoing in relation to elevated ammonia concentration in surface water along the northern boundary of the site.



## 12 Review of Nuisance Controls

### 12.1 Dust Control

There were no breaches of the dust deposition limit in 2016. 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

Noise monitoring was not undertaken during this monitoring period.

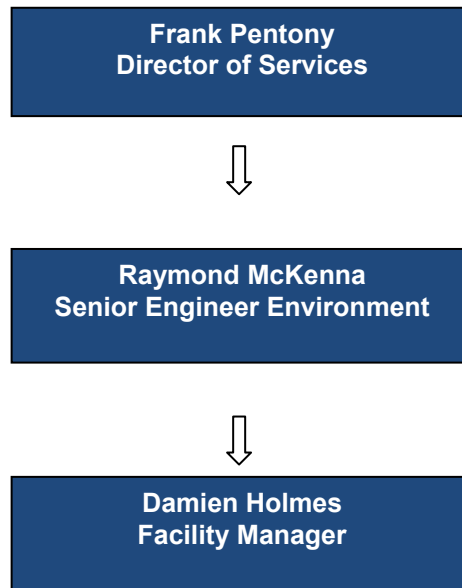
## 13 Volume of Leachate Produced and Volume of Leachate Transported Discharged Off Site

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 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 Annual Budget and Site Running Costs

The recycling facility is operated by third party (V & W Recycling) on behalf of Dundalk Town Council. A €3.00 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 <sup>2</sup> )	Waste Input t/month	Rainfall mm	Active Area Infiltration AR(A)(m <sup>3</sup> )	Temp Restored area	Temp Restored area(Temp) RCA(m <sup>2</sup> )	Restored area(Temp) infiltration IRCA(m <sup>3</sup> )	Permanently Restored area	Restored area RCA(m <sup>2</sup> )	Total Water	Cumulative Water	Absorptive Capacity aW(m <sup>3</sup> )	Cumulative Absorptive Capacity	Cumulative Leachate	Leachate produced Lo(m <sup>3</sup> )
2016	Closed		0.00	713.6	0				79000	5637	5637	5637	0.00	0.00	5637	5637
<b>Total</b>			<b>0.00</b>	<b>713.6</b>	<b>0</b>			<b>0</b>		<b>5637</b>			<b>0</b>			<b>5637</b>

**Assumptions**

<b>IRCA</b>	Temporarily capped/restored area infiltration of rainfall estimated %	30%	%
	Permanent capped/restored area infiltration of rainfall estimated % (2-10%)	10%	%
<b>Absorptive Capacity</b>	waste density of 0.8 tonnes/m <sup>3</sup> . Estimated absorptive capacity (water per tonne waste before leachate is produced) t/m <sup>3</sup>	0.06	t/m <sup>3</sup>
<b>Restored Area</b>	Area	79,000	m <sup>2</sup>
<b>Rainfall</b>	Rainfall taken from Dublin Airport	713.6	mm

## Appendix B

### PRTR Reporting



Environmental Protection Agency

| PRTR# : W0034 | Facility Name : Dundalk Landfill & Civic Waste Facility - Dundalk Town Council | Filename : W0034\_2016 PRTR.xls | Return Year : 2016 |

[Guidance to completing the PRTR workbook](#)

# PRTR Returns Workbook

Version 1.1.19

<b>REFERENCE YEAR</b>	2016
-----------------------	------

**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
<b>AER Returns Contact Name</b>	Damien Holmes
<b>AER Returns Contact Email Address</b>	damien.holmes@louthcoco.ie
<b>AER Returns Contact Position</b>	Executive Scientist
<b>AER Returns Contact Telephone Number</b>	042 9392920
<b>AER Returns Contact Mobile Phone Number</b>	086 6097315
<b>AER Returns Contact Fax Number</b>	042 9334549
<b>Production Volume</b>	0.0
<b>Production Volume Units</b>	
<b>Number of Installations</b>	0
<b>Number of Operating Hours in Year</b>	8760
<b>Number of Employees</b>	6
<b>User Feedback/Comments</b>	Discharges to sewer based on sample results multiplied by rainfall. This explains variances from 2015.
<b>Web Address</b>	

**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) ?	
--	--



4.1 RELEASES TO AIR

[Link to previous years emissions data](#)

| PRTR# : W0034 | Facility Name : Dundalk Landfill & Civic Waste Facility - Dundalk Town Council | Filename : W0034\_2016 PRTR.xls | Return Year : 2016 |

19/04/2017 09:50

SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS

POLLUTANT		RELEASERS TO AIR			Please enter all quantities in this section in KGs			
No. Annex II	Name	M/C/E	METHOD		Emission Point 1	QUANTITY		
			Method Code	Designation or Description		T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
01	Methane (CH4)	M	OTH	Gassim	0.0	55334.0	0.0	55334.0

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

SECTION B : REMAINING PRTR POLLUTANTS

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

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

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

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

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

Additional Data Requested from Landfill operators

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

Landfill:	Dundalk Landfill & Civic Waste Facility - Dundalk Town Council				
Please enter summary data on the quantities of methane flared and / or utilised	T (Total) kg/Year	M/C/E	Method Used		Facility Total Capacity m3 per hour
	Total estimated methane generation (as per site model)	C	Method Code	Designation or Description	
	Methane flared	M	Gassim	Gassim Lite	N/A
	Methane utilised in engine/s		Flare records	Flare records	0.0 (Total Flaring Capacity)
	Net methane emission (as reported in Section A above)				0.0 (Total Utilising Capacity)
	55334.0	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 C

19/04/2017 09:51

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			
06	Ammonia (NH3)	C	OTH	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
					18.1	18.1	0.0	0.0

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

SECTION B : REMAINING POLLUTANT EMISSIONS (as required in your Licence)

OFFSITE TRANSFER OF POLLUTANTS DESTINED FOR WASTE-WATER TREATMENT OR SEWER					Please enter all quantities in this section in KGs					
POLLUTANT		METHOD			QUANTITY					
Pollutant No.	Name	M/C/E	Method Used		S1					
			Method Code	Designation or Description	Emission Point 1	Emission Point 2	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year	
303	BOD	C	OTH		130.03	0.0	130.03	0.0	0.0	0.0
306	COD	C	OTH		270.43	0.0	270.43	0.0	0.0	0.0
343	Sulphate	C	OTH		110.16	0.0	110.16	0.0	0.0	0.0
240	Suspended Solids	C	OTH		157.68	0.0	157.68	0.0	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\_2016 PRTR.xls | Return Year : 2016 |

19/04/2017 09:51

Please enter all quantities on this sheet in Tonnes

6

Transfer Destination	European Waste Code	Hazardous	Quantity (Tonnes per Year)	Description of Waste	Waste Treatment Operation	Method Used		Location of Treatment	Haz Waste - Name and Licence/Permit No of Next Destination Facility Non-Haz Waste: Name and Licence/Permit No of Recoverer/Disposer	Haz Waste : Address of Next Destination Facility Non-Haz Waste: Address of Recoverer/Disposer	Name and License / Permit No. and Address of Final Recoverer / Disposer (HAZARDOUS WASTE ONLY)	Actual Address of Final Destination i.e. Final Recovery / Disposal Site (HAZARDOUS WASTE ONLY)
						M/C/E	Method Used					
Within the Country	13 02 05	Yes	5.0	mineral-based non-chlorinated engine, gear and lubricating oils	R9	M	Weighed	Offsite in Ireland	Enva ,W0184-01 Thornton Waste Disposal,Waste Licence W0195-02	Clonminam Industrial Estate,Portlaoise,Co. Laois ,Ireland	Enva,W0184-01,Clonminam ,Industrial,Estate,Portlaois,Ireland	Enva,Clonminam ,Industrial,Portlaois,Ireland
Within the Country	15 01 01	No	0.0	newspapers and magazines	R3	M	Weighed	Offsite in Ireland	Peute Europe,ni 6000076	Kimlainham wood,....Meath,Ireland		
To Other Countries	15 01 01	No	569.0	cardboard packaging	R3	M	Weighed	Abroad	Peute Europe,ni 6000076	Baahoekweg 4,LA Dordrecht,....Netherlands		
To Other Countries	15 01 01	No	250.0	newspapers and magazines	R3	M	Weighed	Abroad	Peute Europe,ni 6000076	Baahoekweg 4,LA Dordrecht,....Netherlands		
Within the Country	15 01 02	No	591.0	plastic packaging	R3	M	Weighed	Offsite in Ireland	Shrabra Plastic IRL,Licence No 15/5	Killycard ind est ,Castleblayey,Co Monaghan,....Ireland		
To Other Countries	15 01 04	No	393.0	metallic packaging	R4	M	Weighed	Abroad	John Tinnelly & Sons,WSEX 20/01	Co Down,BT38 8LZ,United Kingdom		
To Other Countries	15 01 07	No	242.0	glass packaging	R5	M	Weighed	Abroad	Glassdon ,NI licenceLN/06/08	52 Creagh Road,Toomebridge,Co Antrim,BT41 3SE,United Kingdom		
Within the Country	16 06 01	Yes	6.0	lead batteries	R4	M	Weighed	Offsite in Ireland	Rilta Environmental Ltd,Licence No W0192-02	Block 402 Grants Drive,Greenogue Business Park,Rathcoole ,Co Dublin,Ireland	Rilta Env,W0192-02,Block 402,Grant Drive,Greenogue,Rathcoole,Ireland	Rilta Env,Block 402,Grant Drive,Greenogue,Ireland
Within the Country	17 01 07	No	218.0	mixture of concrete, bricks, tiles and ceramics other than those mentioned in 17 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	30.0	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	1.0	paint, inks, adhesives and resins other than those mentioned in 20 01 27	R3	M	Weighed	Offsite in Ireland	Enva ,W0184-01 Thornton Waste Disposal,Waste Licence W0195-02	Clonminam Industrial Estate,Portlaoise,Co. Laois ,Ireland		
Within the Country	20 01 38	No	509.0	wood other than that mentioned in 20 01 37	R3	M	Weighed	Offsite in Ireland	Dundalk Town Council,W0034-02	Kimlainham wood,....Meath,Ireland		
Within the Country	20 02 01	No	2621.0	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	109.0	mixed municipal waste	D1	M	Weighed	Offsite in Ireland	Indaver Ireland,W0167-02	Carranstown,Duleek,....Co. Meath,Ireland		

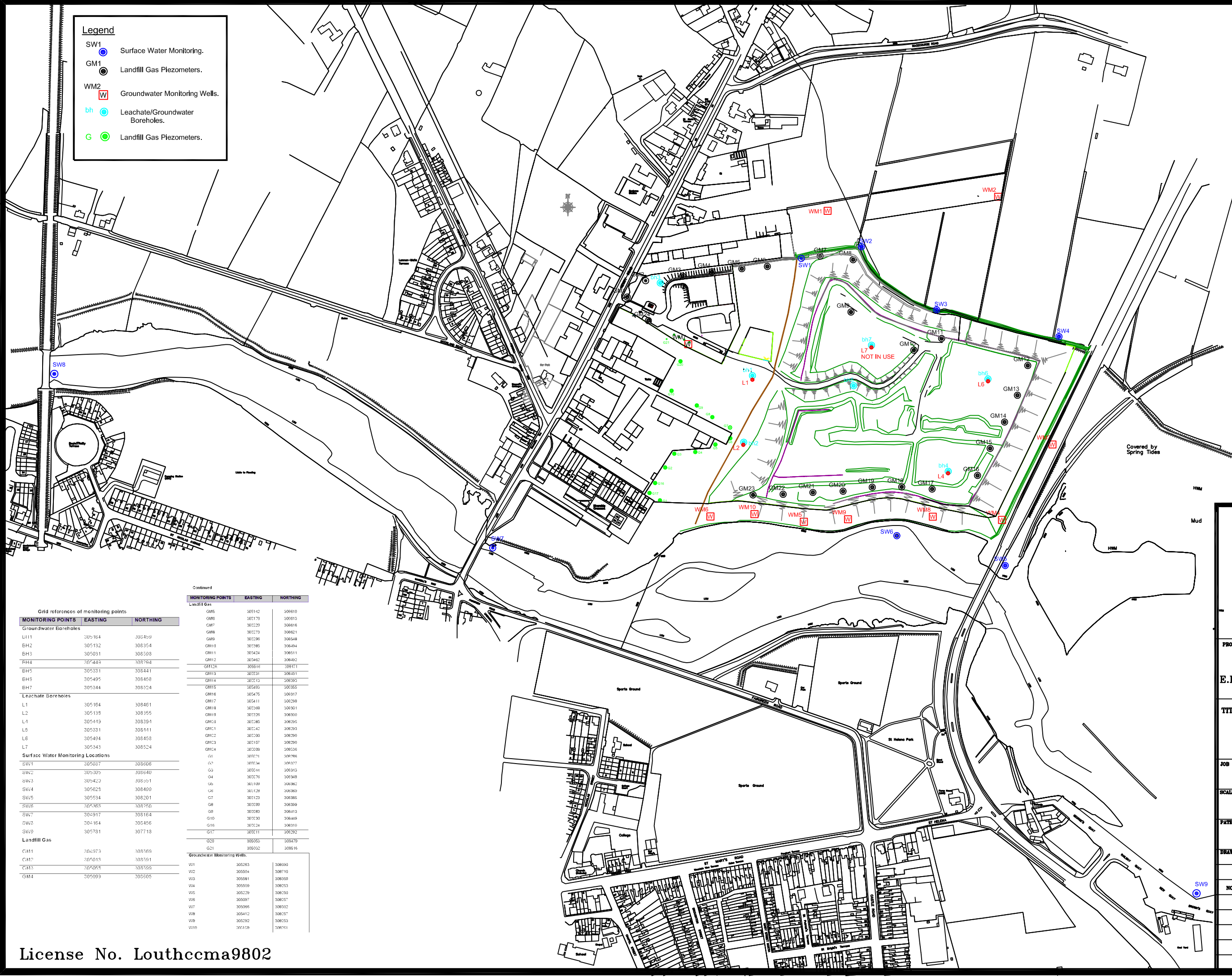
\* Select a row by double-clicking the Description of Waste then click the delete button

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

Continued

MONITORING POINTS	EASTING	NORTHING
<b>Landfill Gas</b>		
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	305326	308300
GM20	305385	308295
GM21	305342	308293
GM22	305300	308290
GM23	305197	308290
GM24	305209	308250
G1	305574	308396
G2	305534	308377
G3	305541	308343
G4	305576	308348
G6	305108	308362
G6	305128	308360
G7	305123	308386
G8	305038	308399
G8	305083	308413
G10	305130	308449
G16	305124	308310
G17	305071	308292
G20	305055	308479
G21	305052	308516
<b>Groundwater Monitoring Wells</b>		
WM1	305263	308690
WM2	305504	308710
WM3	305581	308330
WM4	305559	308313
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) 858975 Fax (045) 858981

**TOWN ENGINEER:- C. DUFF**

---

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

---

**TITLE:-**  
**Location Map**

---

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

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**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					
PARAMETERS						
		No. of Samples	Minimum	Maximum	Mean	Standard Deviation
	Units					
Alkalinity	mg/l CaCO <sub>3</sub>					
Aluminium	µg/l	3	< 50	143	100	62
Ammonia	mg/l N	26	8.89	135	70	39
Antimony	µg/l	3	< 4	< 4		
Arsenic	µg/l	3	< 2	2.96	3	
Barium	µg/l	3	371	438	398	35
Beryllium	µg/l	0	0	0		
B.O.D.	mg/l O <sub>2</sub>	23	< 1	136.5	34	47
Boron	µg/l	3	706	952	850	128
Cadmium	µg/l	3	< 0.5	< 0.5		
Calcium	mg/l Ca	0	0	0		
C.O.D.	mg/l O <sub>2</sub>	23	40	3500	558	960
Chloride	mg/l Cl	26	21	164	96	38
Chromium	µg/l	3	< 3	8.35	7	1
Cobalt (µg/l )	µg/l	0	0	0		
Conductivity	µS/cm @ 25	26	978	3390	2313	605
Copper	µg/l	3	7.15	28.9	20	12
Cyanide	mg/l CN	0	0	0		
D.O.	% Saturation	0	0	0		
Fluoride	mg/l	3	0.046	0.076	0	0
Iron	µg/l	3	5.63	14.1	10	4
Lead	µg/l	3	< 0.5	7.7	8	
Magnesium	mg/l Mg	3	48.2	56.8	51	5
Manganese	µg/l	3	277	512	377	121
Mercury	µg/l	0	0	0		
Molybdenum	µg/l	3	< 9	<9		
Nickel	µg/l	3	3.53	8.43	6	2
o-Phosphate	mg/l P	26	< 0.02	0.26	0	0
pH		26	6.84	7.49	7	0
Potassium	mg/l	3	50	58.7	54	4
Residue on Evaporation		0	0	0		
Sampling Depth (m )	m	0	0	0		
Selenium	µg/l	3	< 1	1.75	2	
Silver	µg/l	3	< 2	< 2		
Sodium	mg/l	3	97.8	100	99	1
Strontium	µg/l	3	545	946	710	210
Sulphate	mg/l SO <sub>4</sub>	6	7.9	18.2	14	5
Suspended Solids	mg/l	0	0	0		
Temp	°C	3	14.2	16.5	15	1
Thallium	µg/l	0	0	0		
Time Sampled		0	0	0		
Tin (µg/l )	µg/l	0	0	0		
T.O.C.	mg/l	9	< 0.1	12.1	4	5
T.O.N	mg/l N	13	< 0.1	1.64	1	1
Total S Solids	mg/l	0	0	0		
Uranium	µg/l	3	< 0.5	< 0.5		
Vanadium	µg/l	3	< 8	< 8		
Zinc	µg/l	0	0	0		

## Appendix E

### Groundwater Results







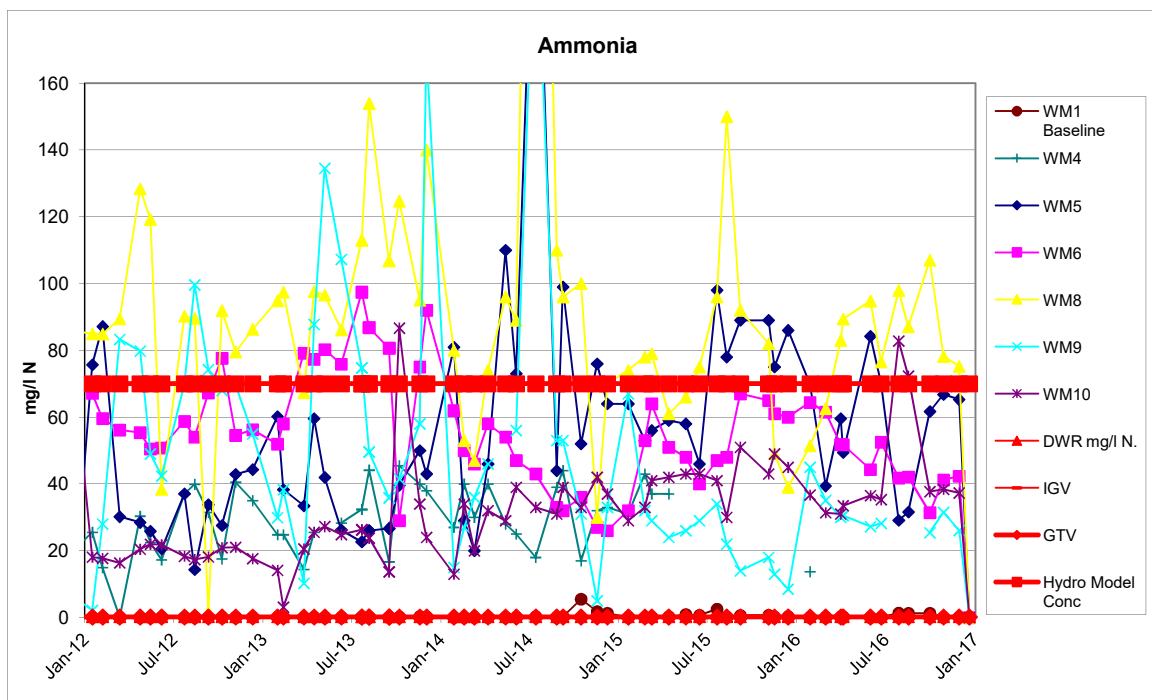
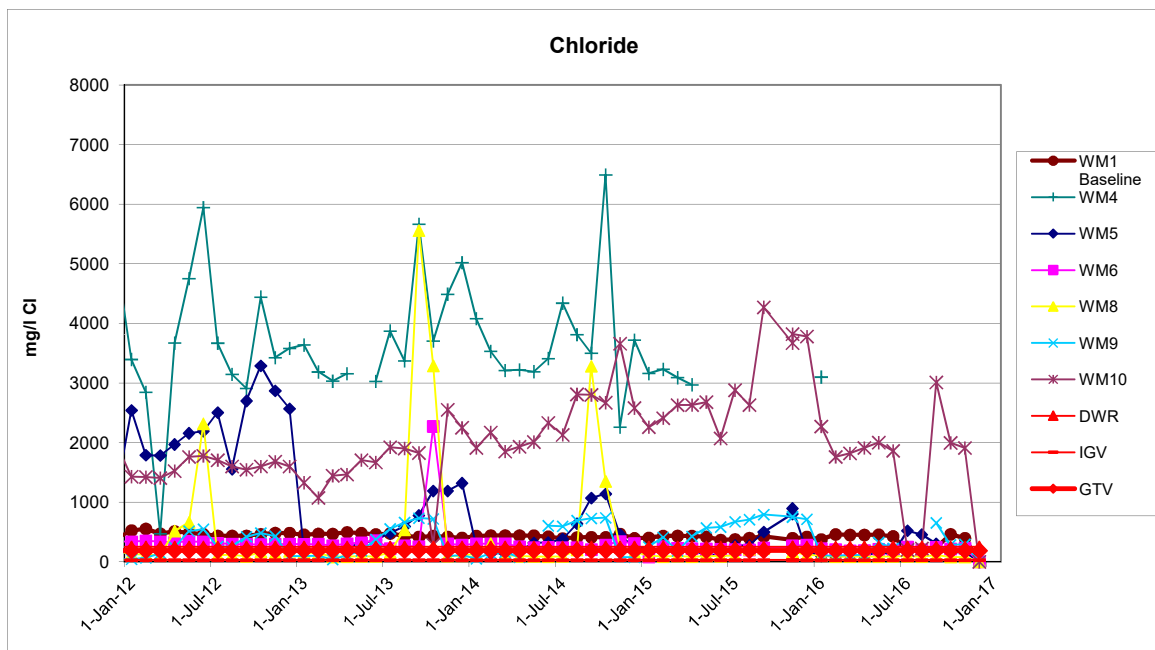
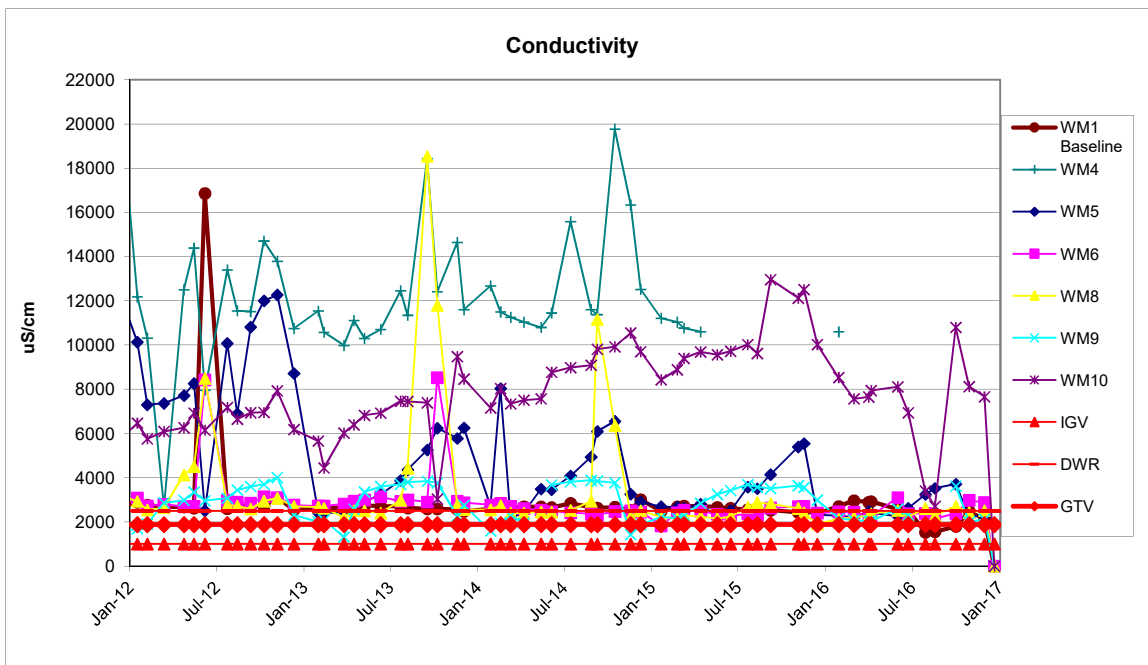


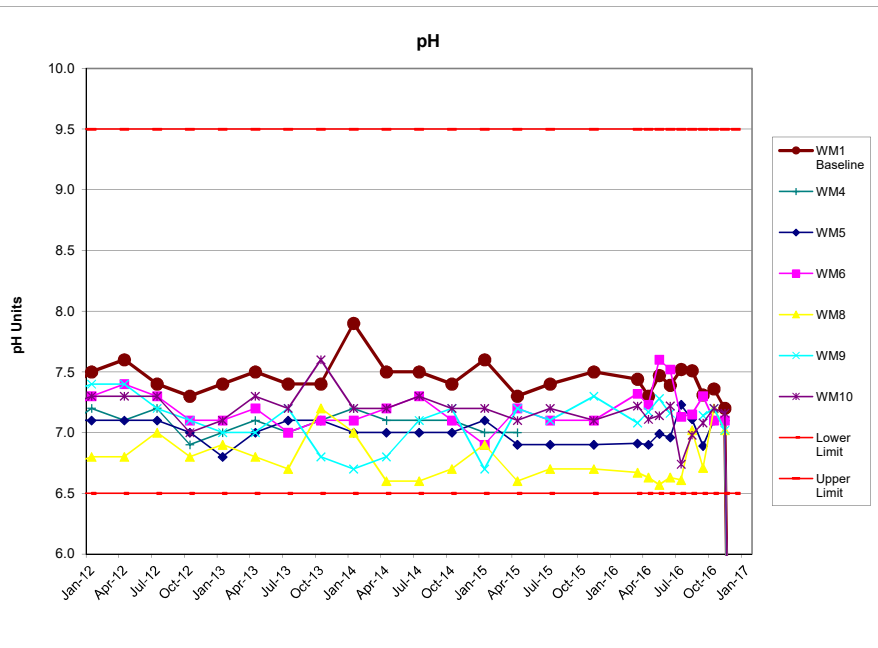
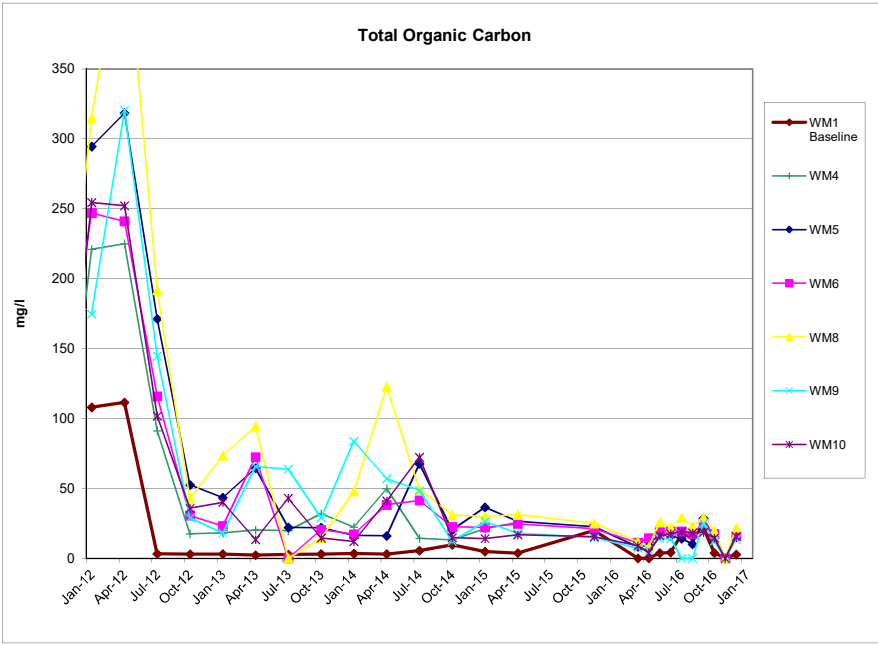
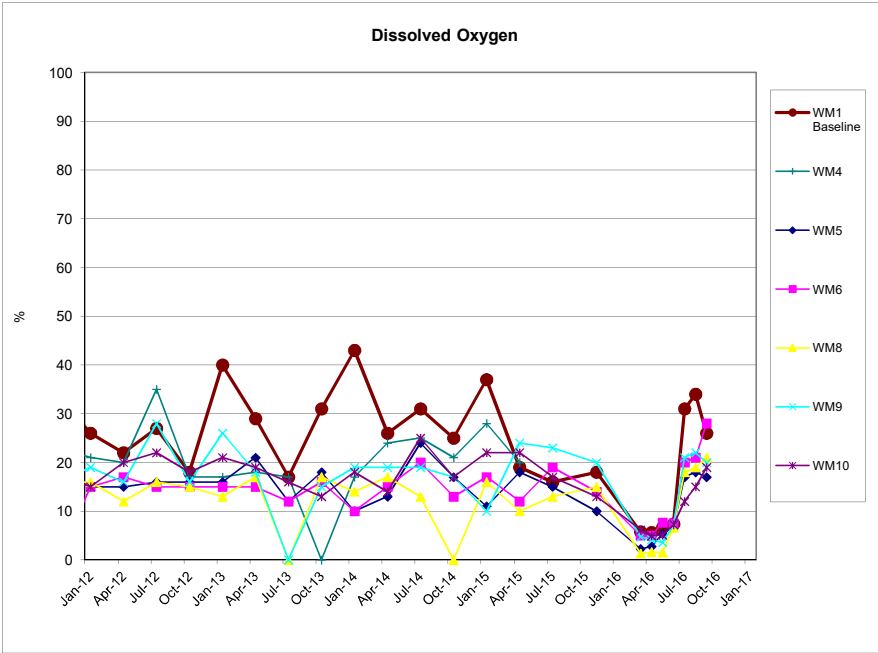












## Appendix F

### Surface Water Results











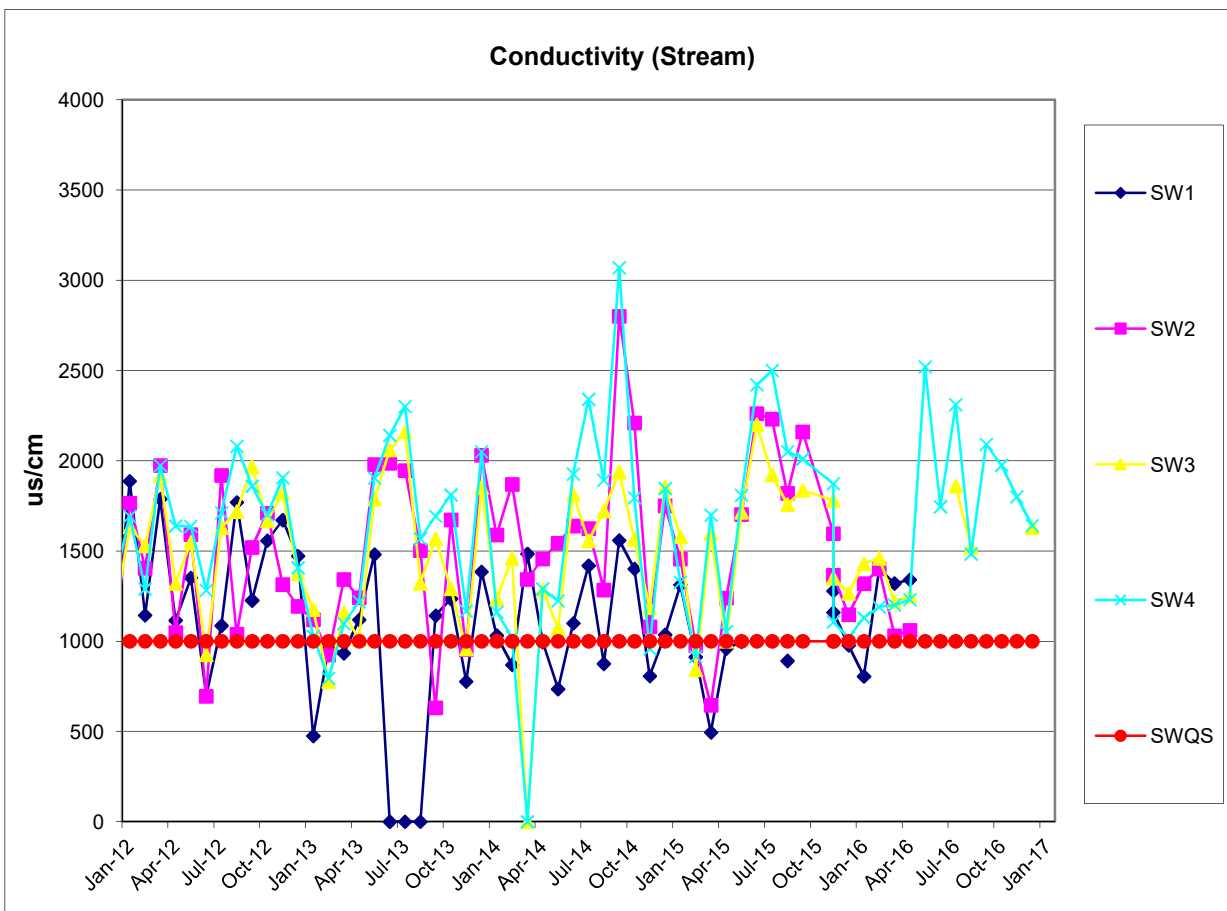
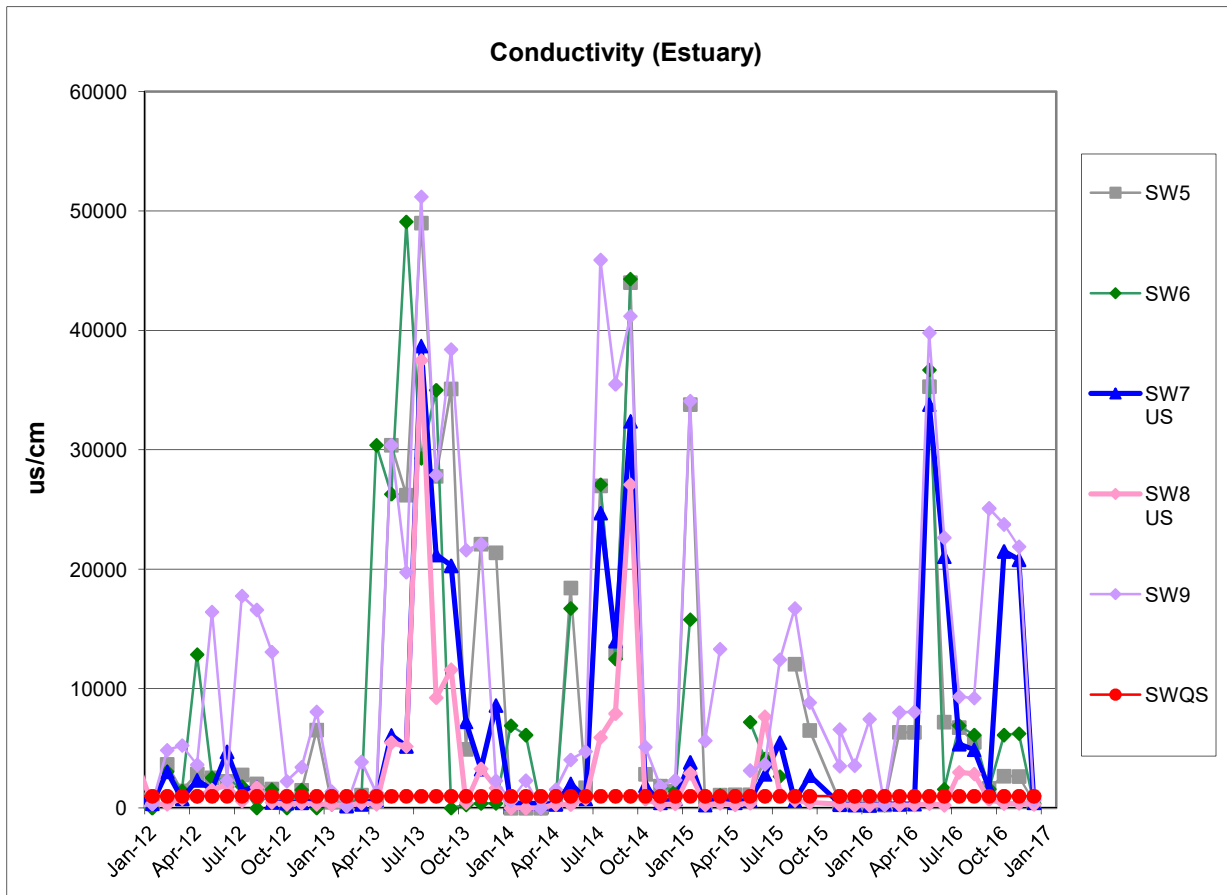






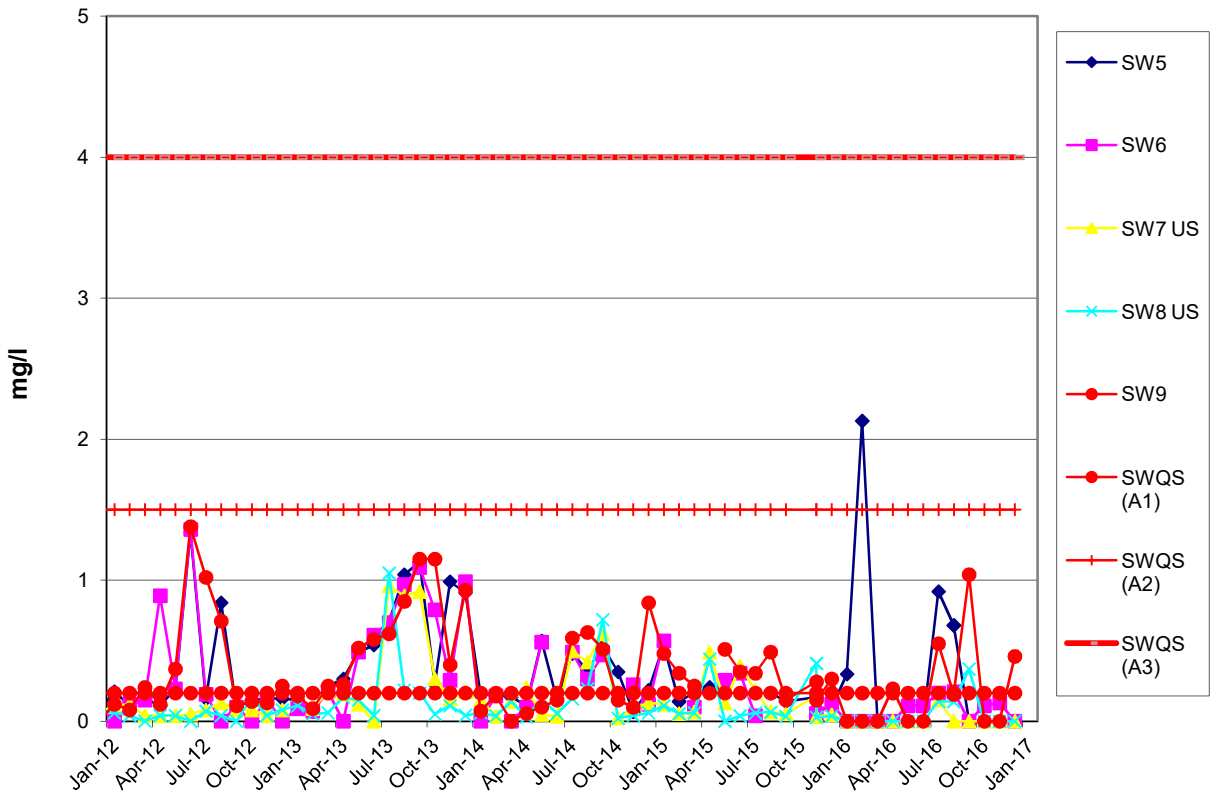




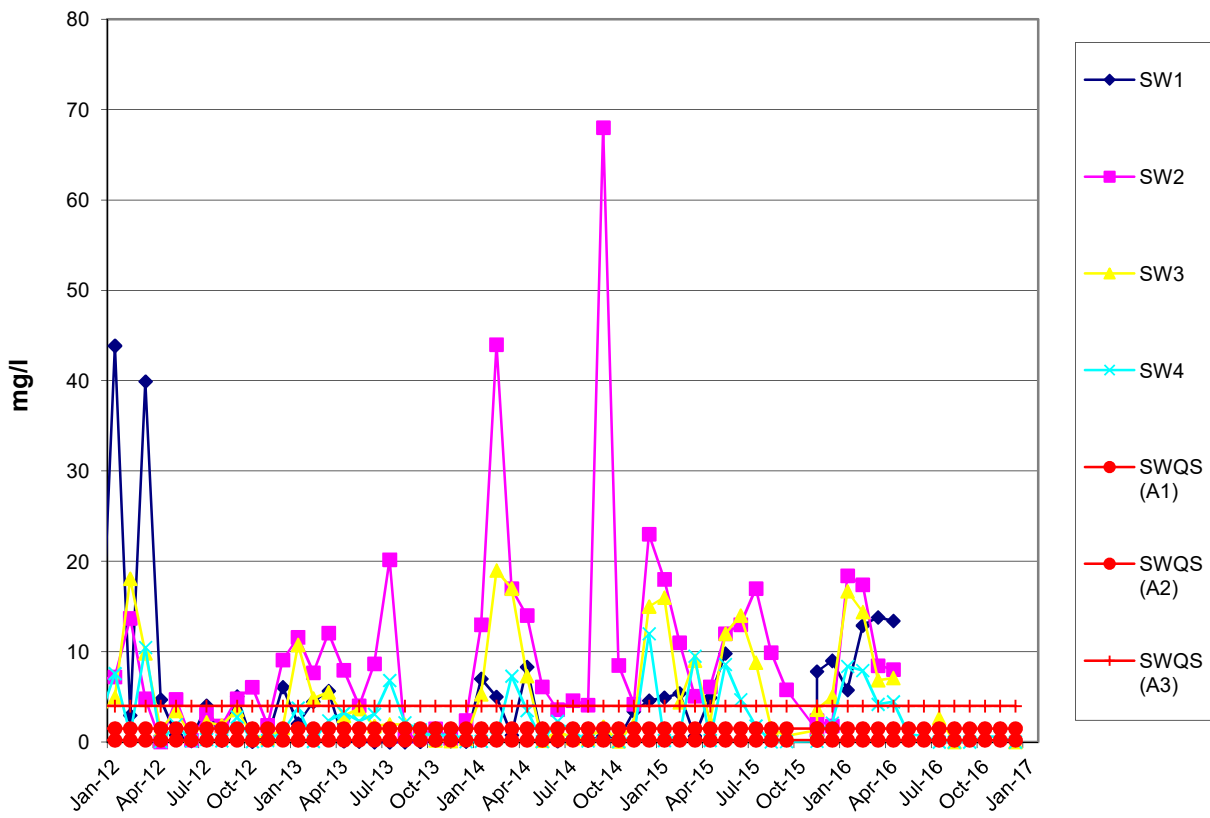




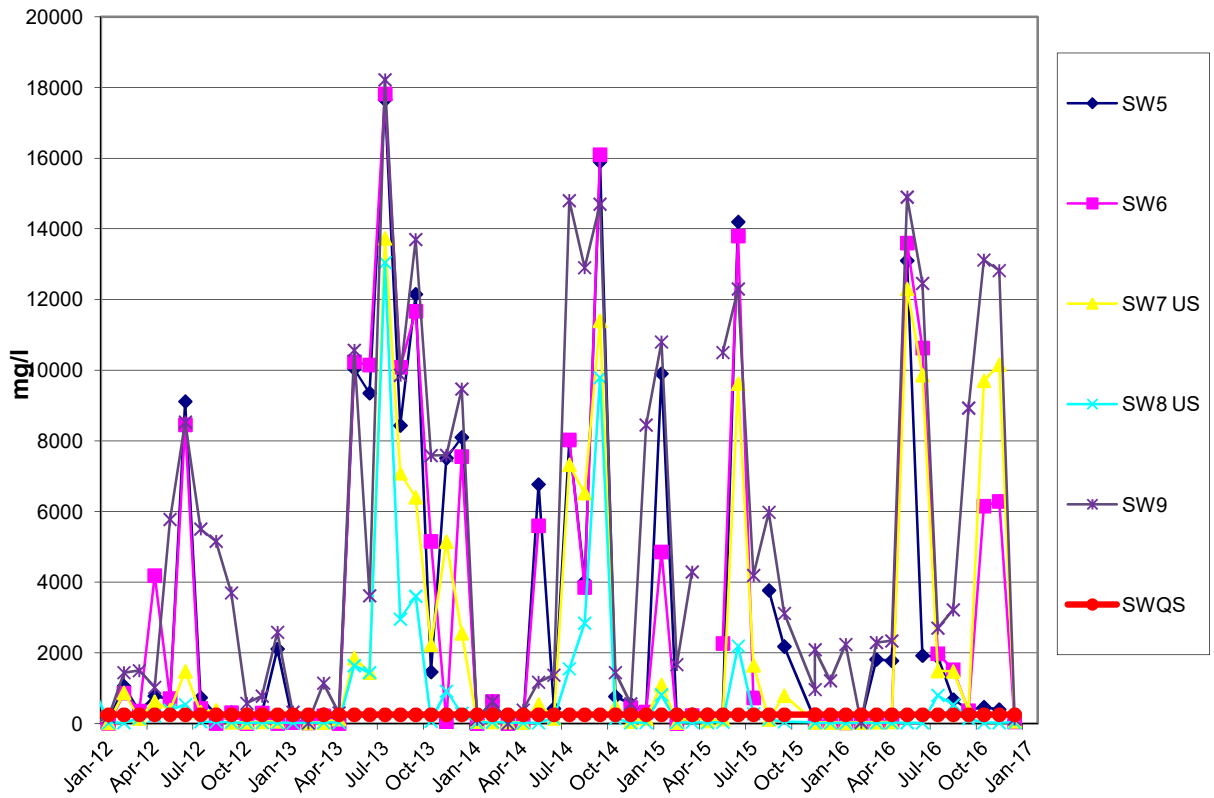
### Ammonia (Estuary)



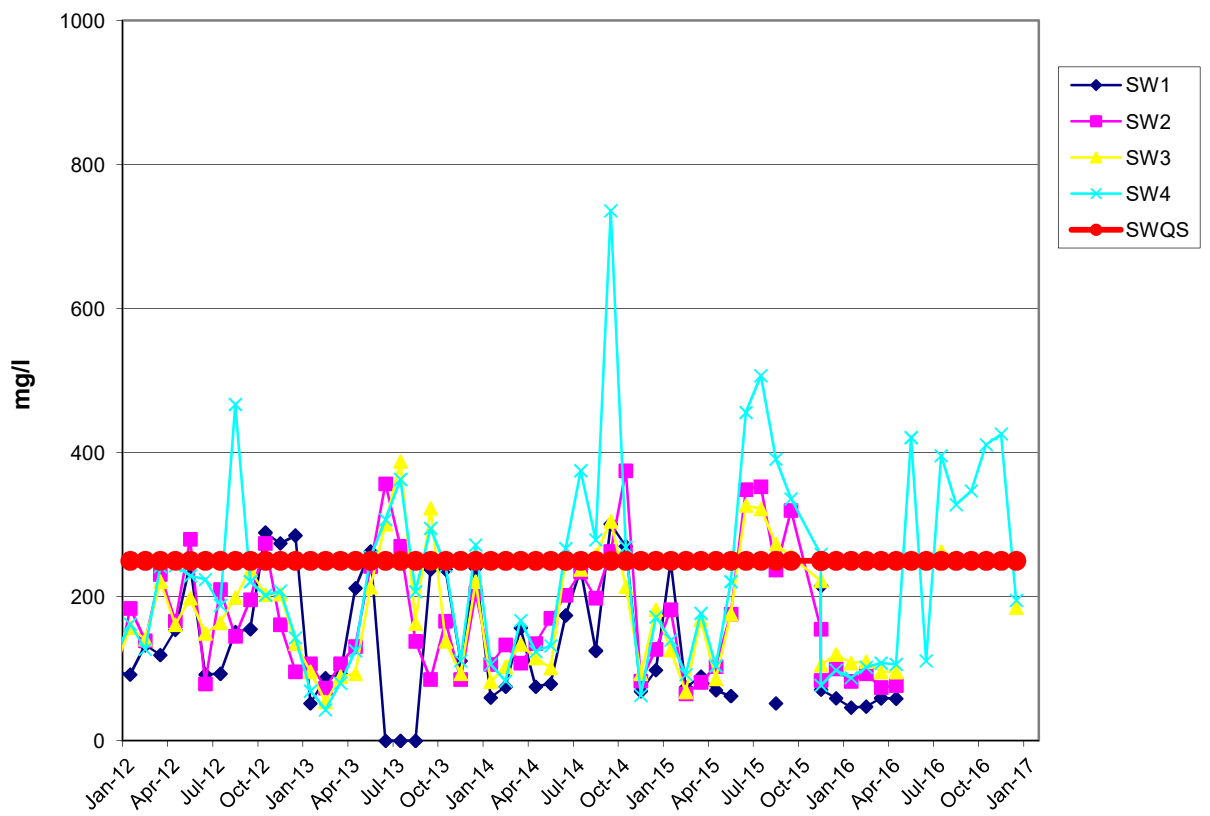
### Ammonia (Stream)



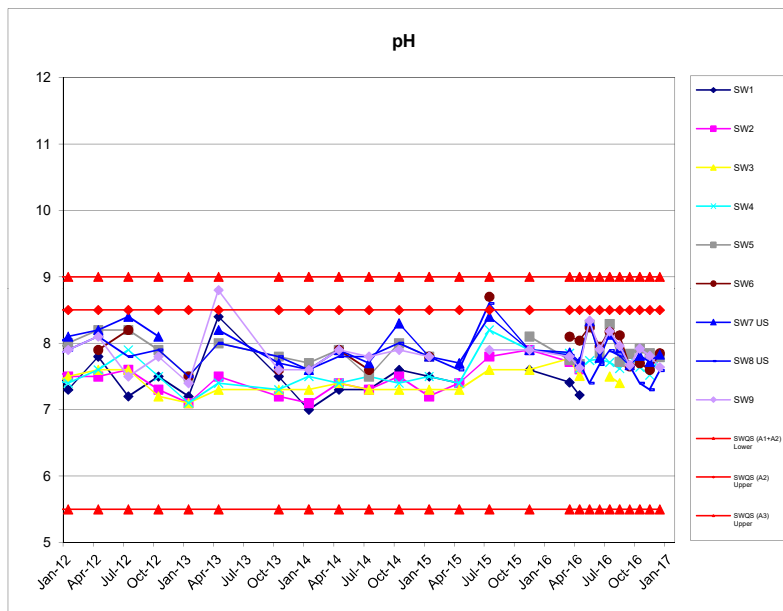
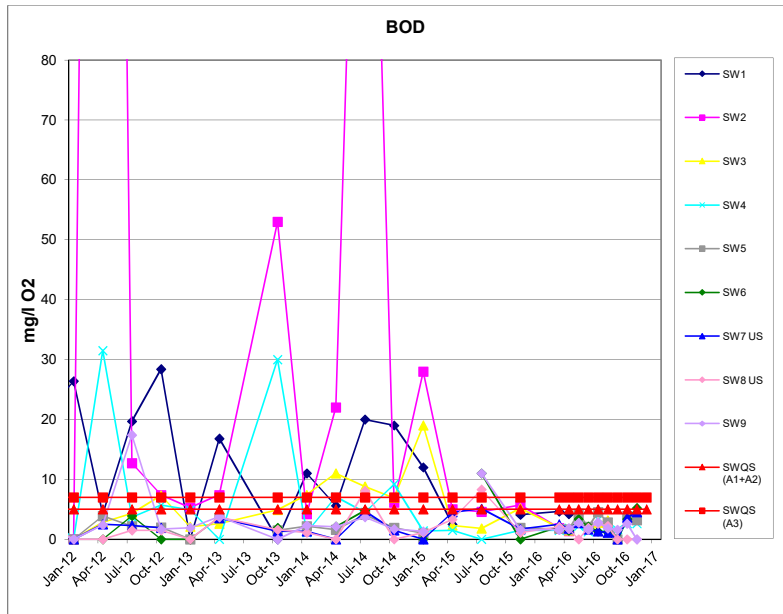
### Chloride (Estuary)



### 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/&gt;)&lt;/th&gt; &lt;/tr&gt; &lt;/thead&gt; &lt;tbody&gt; &lt;tr&gt; &lt;td colspan="/> <b>Site Name:</b> DUNDALK LANDFILL <td colspan="4"><b>Site Address:</b> NEWRY ROAD, DUNDALK</td>	<b>Site Address:</b> NEWRY ROAD, DUNDALK			
<b>Operator:</b> DUNDALK TOWN COUNCIL			<b>National Grid Reference:</b> 1632-12								
<b>Site Status:</b> Closed			<b>Date</b> 21-01-2016		<b>Time:</b> 11:00						
<b>Instrument used:</b> GEM5000		<b>Normal Analytical Range:</b>		<b>Date Next Calibration:</b> June 2016							
<b>Monitoring Personnel:</b> Damien Holmes			<b>Weather:</b> Dry		<b>Barometric pressure:</b> 1010mb						
Results											
Sample Station Number	Borehole/ spike/other	Survey Depth	CH <sub>4</sub> (% v/v)	CO <sub>2</sub> (% v/v)	O <sub>2</sub> (% v/v)	Comments					
G1	PIEZO		0.5	1.2	19.0						
G2	PIEZO		0	0.0	20.4						
G3	PIEZO		0	0.2	20.4						
G4	PIEZO		0	0.2	20.2						
G5	PIEZO		0	0.2	20.2						
G6	PIEZO		0	0.2	20.2						
G7	PIEZO		0	0.8	20.2						
G8	PIEZO		0	0.0	20.4						
G9	PIEZO		0	0.2	19.6						
G10	PIEZO		0	0.6	19.6						
G16	PIEZO		0	0.2	20.2						
G17	PIEZO		0	0.2	19.8						
G20	PIEZO		0	0.2	20.2						
G21	PIEZO		0	0.8	19.2						
GM1	PIEZO		0	0.2	20						
GM2	PIEZO		0	0.6	20.2						
GM3	PIEZO		0	0.6	19.6						
GM4	PIEZO		0	0.2	20.2						
GM5	PIEZO		0	0.4	20.2						
GM6	PIEZO		0	0.2	20.2						
GM24	PIEZO		0	0.2	19.4						





## LANDFILL GAS MONITORING

LANDFILL GAS MONITORING FORM							(Baseline <input type="checkbox"/> Ambient <input type="checkbox"/> )
<b>Site Name:</b> DUNDALK LANDFILL			<b>Site Address:</b> NEWRY ROAD, DUNDALK				
<b>Operator:</b> DUNDALK TOWN COUNCIL			<b>National Grid Reference:</b> 1632-12				
<b>Site Status:</b> Closed			<b>Date</b> 26-02-2016		<b>Time:</b> 10:00		
<b>Instrument used:</b> GEM5000		<b>Normal Analytical Range:</b>		<b>Date Next Calibration:</b> June 2016			
<b>Monitoring Personnel:</b> Damien Holmes			<b>Weather:</b> Dry		<b>Barometric pressure:</b> 1014mb		
Results							
Sample Station Number	Borehole/spike/other	Survey Depth	CH <sub>4</sub> (% v/v)	CO <sub>2</sub> (% v/v)	O <sub>2</sub> (% v/v)	Comments	
G1	PIEZO		0.6	1.2	19.2		
G2	PIEZO		0.2	0.6	20.2		
G3	PIEZO		0	0.0	20.2		
G4	PIEZO		0	0.6	19.6		
G5	PIEZO		0	0.6	20.1		
G6	PIEZO		0	0.2	20.2		
G7	PIEZO		0	0.6	19.4		
G8	PIEZO		0	0.5	20.2		
G9	PIEZO		0	0.3	19.9		
G10	PIEZO		0	0.6	19.6		
G16	PIEZO		0	0.2	19.9		
G17	PIEZO		0.4	1.3	19.2		
G20	PIEZO		0	0.2	20.2		
G21	PIEZO		0	0.5	19.3		
GM1	PIEZO		0	0.0	20.2		
GM2	PIEZO		0	0.6	20.2		
GM3	PIEZO		0	0.6	20.0		
GM4	PIEZO		0	0.2	19.8		
GM5	PIEZO		0	0.2	20.1		
GM6	PIEZO		0	0.4	20.2		
GM24	PIEZO		0	0.1	20		



## LANDFILL GAS MONITORING

LANDFILL GAS MONITORING FORM				(Baseline <input type="checkbox"/> Ambient <input type="checkbox"/> )		
<b>Site Name:</b> DUNDALK LANDFILL			<b>Site Address:</b> NEWRY ROAD, DUNDALK			
<b>Operator:</b> DUNDALK TOWN COUNCIL			<b>National Grid Reference:</b> 1632-12			
<b>Site Status:</b> Closed			<b>Date</b> 30-03-2016		<b>Time:</b> 11.00	
<b>Instrument used:</b> GEM5000		<b>Normal Analytical Range:</b>		<b>Date Next Calibration:</b> June 2016		
<b>Monitoring Personnel:</b> Damien Holmes			<b>Weather:</b> Dry		<b>Barometric pressure:</b> 1020mb	
Results						
Sample Station Number	Borehole/ spike/other	Survey Depth	CH <sub>4</sub> (% v/v)	CO <sub>2</sub> (% v/v)	O <sub>2</sub> (% v/v)	Comments
G1	PIEZO		0.4	1.2	19.1	
G2	PIEZO		0	0.2	20.0	
G3	PIEZO		0	0.4	20.2	
G4	PIEZO		0	0.2	19.8	
G5	PIEZO		0	1.0	19.2	
G6	PIEZO		0	0.2	20.2	
G7	PIEZO		0	0.0	20.4	
G8	PIEZO		0	0.4	20	
G9	PIEZO		0	0.3	20.1	
G10	PIEZO		0.5	1.1	18.8	
G16	PIEZO		0	0.2	20.0	
G17	PIEZO		0	0.2	19.8	
G20	PIEZO		0	0.2	20.1	
G21	PIEZO		0	0.6	19.6	
GM1	PIEZO		0	0.4	20.2	
GM2	PIEZO		0	0.4	19.6	
GM3	PIEZO		0	0.6	19.0	
GM4	PIEZO		0	0.2	20.2	
GM5	PIEZO		0	0.0	20.4	
GM6	PIEZO		0	0.2	20.2	
GM24	PIEZO		0	0.2	20.4	



## LANDFILL GAS MONITORING

LANDFILL GAS MONITORING FORM							(Baseline <input type="checkbox"/> Ambient <input 3"="" type="checkbox/&gt;)&lt;/th&gt; &lt;/tr&gt; &lt;/thead&gt; &lt;tbody&gt; &lt;tr&gt; &lt;td colspan="/> <b>Site Name:</b> DUNDALK LANDFILL <td colspan="4"><b>Site Address:</b> NEWRY ROAD, DUNDALK</td>	<b>Site Address:</b> NEWRY ROAD, DUNDALK			
<b>Operator:</b> DUNDALK TOWN COUNCIL			<b>National Grid Reference:</b> 1632-12								
<b>Site Status:</b> Closed			<b>Date:</b> 26-04-2016		<b>Time:</b> 10:00						
<b>Instrument used:</b> GEM5000		<b>Normal Analytical Range:</b>		<b>Date Next Calibration:</b> June 2016							
<b>Monitoring Personnel:</b> Damien Holmes			<b>Weather:</b> Dry		<b>Barometric pressure:</b> 1018mb						
Results											
Sample Station Number	Borehole/ spike/other	Survey Depth	CH <sub>4</sub> (% v/v)	CO <sub>2</sub> (% v/v)	O <sub>2</sub> (% v/v)	Comments					
G1	PIEZO		0.6	1.0	19.1						
G2	PIEZO		0	0.0	20.4						
G3	PIEZO		0	0.0	20.4						
G4	PIEZO		0	0.2	20.2						
G5	PIEZO		0	0.2	20.2						
G6	PIEZO		0	0.0	20.4						
G7	PIEZO		0	0.9	20.1						
G8	PIEZO		0	0.0	20.4						
G9	PIEZO		0	0.2	19.6						
G10	PIEZO		0	0.6	19.6						
G16	PIEZO		0	0.2	20.2						
G17	PIEZO		0	0.2	19.8						
G20	PIEZO		0	0.0	20.2						
G21	PIEZO		0	0.8	19.2						
GM1	PIEZO		0	0.2	20						
GM2	PIEZO		0	0.6	20.2						
GM3	PIEZO		0	0.6	19.8						
GM4	PIEZO		0	0.2	20.2						
GM5	PIEZO		0	0.2	20.4						
GM6	PIEZO		0	0.2	20.2						
GM24	PIEZO		0	0.2	19.4						



## LANDFILL GAS MONITORING

LANDFILL GAS MONITORING FORM				(Baseline <input type="checkbox"/> Ambient <input type="checkbox"/> )		
<b>Site Name:</b> DUNDALK LANDFILL			<b>Site Address:</b> NEWRY ROAD, DUNDALK			
<b>Operator:</b> DUNDALK TOWN COUNCIL			<b>National Grid Reference:</b> 1632-12			
<b>Site Status:</b> Closed			<b>Date:</b> 25-05-2016		<b>Time:</b> 12:00	
<b>Instrument used:</b> GEM5000		<b>Normal Analytical Range:</b>		<b>Date Next Calibration:</b> June 2016		
<b>Monitoring Personnel:</b> Damien Holmes			<b>Weather:</b> Dry		<b>Barometric pressure:</b> 1014mb	
Results						
Sample Station Number	Borehole/ spike/other	Survey Depth	CH <sub>4</sub> (% v/v)	CO <sub>2</sub> (% v/v)	O <sub>2</sub> (% v/v)	Comments
G1	PIEZO		0.7	1.1	19.1	
G2	PIEZO		0.2	0.6	19.9	
G3	PIEZO		0	0.0	20.4	
G4	PIEZO		0	0.6	19.6	
G5	PIEZO		0	0.2	20.1	
G6	PIEZO		0	0.2	20.4	
G7	PIEZO		0	0.7	19.4	
G8	PIEZO		0	0.5	20.2	
G9	PIEZO		0	0.3	20.4	
G10	PIEZO		0	0.6	19.8	
G16	PIEZO		0	0.2	19.9	
G17	PIEZO		0.6	1.2	19.0	
G20	PIEZO		0	0.2	20.2	
G21	PIEZO		0	0.3	20.0	
GM1	PIEZO		0	0.2	20.2	
GM2	PIEZO		0	0.6	20.0	
GM3	PIEZO		0	0.4	20.0	
GM4	PIEZO		0	0.2	19.8	
GM5	PIEZO		0	0.2	20.1	
GM6	PIEZO		0	0.2	20.2	
GM24	PIEZO		0	0.1	20	





## LANDFILL GAS MONITORING

LANDFILL GAS MONITORING FORM							(Baseline <input type="checkbox"/> Ambient <input 3"="" type="checkbox/&gt;)&lt;/th&gt; &lt;/tr&gt; &lt;/thead&gt; &lt;tbody&gt; &lt;tr&gt; &lt;td colspan="/> <b>Site Name:</b> DUNDALK LANDFILL <td colspan="4"><b>Site Address:</b> NEWRY ROAD, DUNDALK</td>	<b>Site Address:</b> NEWRY ROAD, DUNDALK			
<b>Operator:</b> DUNDALK TOWN COUNCIL			<b>National Grid Reference:</b> 1632-12								
<b>Site Status:</b> Closed			<b>Date</b> 29-06-2016		<b>Time:</b> 11.00						
<b>Instrument used:</b> GEM5000		<b>Normal Analytical Range:</b>		<b>Date Next Calibration:</b> June 2016							
<b>Monitoring Personnel:</b> Damien Holmes			<b>Weather:</b> Dry		<b>Barometric pressure:</b> 1022mb						
Results											
Sample Station Number	Borehole/ spike/other	Survey Depth	CH <sub>4</sub> (% v/v)	CO <sub>2</sub> (% v/v)	O <sub>2</sub> (% v/v)	Comments					
G1	PIEZO		0.5	1.3	19.0						
G2	PIEZO		0	0.4	20.1						
G3	PIEZO		0	0.6	20.2						
G4	PIEZO		0	0.2	19.8						
G5	PIEZO		0	0.8	19.2						
G6	PIEZO		0	0.24	20.1						
G7	PIEZO		0	0.0	20.4						
G8	PIEZO		0	0.4	20						
G9	PIEZO		0	0.2	20.2						
G10	PIEZO		0.6	1.3	19.2						
G16	PIEZO		0	0.2	20.2						
G17	PIEZO		0	0.2	19.8						
G20	PIEZO		0	0.4	20.2						
G21	PIEZO		0	0.6	19.6						
GM1	PIEZO		0	0.2	20.2						
GM2	PIEZO		0	0.2	20.2						
GM3	PIEZO		0	0.6	19.0						
GM4	PIEZO		0	0.0	20.4						
GM5	PIEZO		0	0.0	20.4						
GM6	PIEZO		0	0.2	20.4						
GM24	PIEZO		0	0.2	20.4						



## LANDFILL GAS MONITORING

LANDFILL GAS MONITORING FORM							(Baseline <input type="checkbox"/> Ambient <input 3"="" type="checkbox/&gt;)&lt;/th&gt; &lt;/tr&gt; &lt;/thead&gt; &lt;tbody&gt; &lt;tr&gt; &lt;td colspan="/> <b>Site Name:</b> DUNDALK LANDFILL <td colspan="4"><b>Site Address:</b> NEWRY ROAD, DUNDALK</td>	<b>Site Address:</b> NEWRY ROAD, DUNDALK			
<b>Operator:</b> DUNDALK TOWN COUNCIL			<b>National Grid Reference:</b> 1632-12								
<b>Site Status:</b> Closed			<b>Date:</b> 28-07-2016		<b>Time:</b> 13:00						
<b>Instrument used:</b> GEM5000		<b>Normal Analytical Range:</b>		<b>Date Next Calibration:</b> December 2016							
<b>Monitoring Personnel:</b> Damien Holmes			<b>Weather:</b> Dry		<b>Barometric pressure:</b> 1020mb						
Results											
Sample Station Number	Borehole/ spike/other	Survey Depth	CH <sub>4</sub> (% v/v)	CO <sub>2</sub> (% v/v)	O <sub>2</sub> (% v/v)	Comments					
G1	PIEZO		0.8	1.2	19.2						
G2	PIEZO		0	0.2	20.6						
G3	PIEZO		0	0.0	20.6						
G4	PIEZO		0	0.2	20.6						
G5	PIEZO		0	0.2	20.6						
G6	PIEZO		0	0.0	20.6						
G7	PIEZO		0	0.7	20.3						
G8	PIEZO		0	0.0	20.4						
G9	PIEZO		0	0.2	20.6						
G10	PIEZO		0	0.5	19.8						
G16	PIEZO		0	0.2	20.6						
G17	PIEZO		0	0.2	20.6						
G20	PIEZO		0	0.0	20.6						
G21	PIEZO		0	1.0	19.0						
GM1	PIEZO		0	0.2	20.4						
GM2	PIEZO		0	0.6	20.2						
GM3	PIEZO		0	0.2	20.0						
GM4	PIEZO		0	0.2	20.6						
GM5	PIEZO		0	0.2	20.6						
GM6	PIEZO		0	0.2	20.6						
GM24	PIEZO		0	0.2	20.6						



## LANDFILL GAS MONITORING

LANDFILL GAS MONITORING FORM							(Baseline <input type="checkbox"/> Ambient <input 3"="" type="checkbox/&gt;)&lt;/th&gt; &lt;/tr&gt; &lt;/thead&gt; &lt;tbody&gt; &lt;tr&gt; &lt;td colspan="/> <b>Site Name:</b> DUNDALK LANDFILL <td colspan="4"><b>Site Address:</b> NEWRY ROAD, DUNDALK</td>	<b>Site Address:</b> NEWRY ROAD, DUNDALK			
<b>Operator:</b> DUNDALK TOWN COUNCIL			<b>National Grid Reference:</b> 1632-12								
<b>Site Status:</b> Closed			<b>Date:</b> 17-08-2016		<b>Time:</b> 14:00						
<b>Instrument used:</b> GEM5000		<b>Normal Analytical Range:</b>		<b>Date Next Calibration:</b> December 2016							
<b>Monitoring Personnel:</b> Damien Holmes			<b>Weather:</b> Dry		<b>Barometric pressure:</b> 1018mb						
Results											
Sample Station Number	Borehole/ spike/other	Survey Depth	CH <sub>4</sub> (% v/v)	CO <sub>2</sub> (% v/v)	O <sub>2</sub> (% v/v)	Comments					
G1	PIEZO		0.9	1.3	18.9						
G2	PIEZO		0.2	0.4	19.5						
G3	PIEZO		0	0.0	20.6						
G4	PIEZO		0	0.2	20.2						
G5	PIEZO		0	0.2	20.6						
G6	PIEZO		0	0.2	20.6						
G7	PIEZO		0	0.5	20.0						
G8	PIEZO		0	0.4	20.4						
G9	PIEZO		0	0.2	20.6						
G10	PIEZO		0	0.2	20.2						
G16	PIEZO		0	0.2	20.0						
G17	PIEZO		0.2	1.0	19.2						
G20	PIEZO		0	0.2	20.6						
G21	PIEZO		0	0.3	20.4						
GM1	PIEZO		0	0.2	20.6						
GM2	PIEZO		0	0.2	20.6						
GM3	PIEZO		0	0.4	20.4						
GM4	PIEZO		0	0.2	20.6						
GM5	PIEZO		0	0.2	20.6						
GM6	PIEZO		0	0.2	20.4						
GM24	PIEZO		0	0.1	20.4						



## LANDFILL GAS MONITORING

LANDFILL GAS MONITORING FORM							(Baseline <input type="checkbox"/> Ambient <input 3"="" type="checkbox/&gt;)&lt;/th&gt; &lt;/tr&gt; &lt;/thead&gt; &lt;tbody&gt; &lt;tr&gt; &lt;td colspan="/> <b>Site Name:</b> DUNDALK LANDFILL <td colspan="4"><b>Site Address:</b> NEWRY ROAD, DUNDALK</td>	<b>Site Address:</b> NEWRY ROAD, DUNDALK			
<b>Operator:</b> DUNDALK TOWN COUNCIL			<b>National Grid Reference:</b> 1632-12								
<b>Site Status:</b> Closed			<b>Date</b> 30-09-2016		<b>Time:</b> 14.00						
<b>Instrument used:</b> GEM5000		<b>Normal Analytical Range:</b>		<b>Date Next Calibration:</b> December 2016							
<b>Monitoring Personnel:</b> Damien Holmes			<b>Weather:</b> Dry		<b>Barometric pressure:</b> 1022mb						
Results											
Sample Station Number	Borehole/ spike/other	Survey Depth	CH <sub>4</sub> (% v/v)	CO <sub>2</sub> (% v/v)	O <sub>2</sub> (% v/v)	Comments					
G1	PIEZO		0.6	1.2	18.8						
G2	PIEZO		0	0.2	20.4						
G3	PIEZO		0	0.6	20.2						
G4	PIEZO		0	0.2	20.4						
G5	PIEZO		0	0.4	19.6						
G6	PIEZO		0	0.2	20.2						
G7	PIEZO		0	0.0	20.6						
G8	PIEZO		0	0.4	20.0						
G9	PIEZO		0	0.2	20.6						
G10	PIEZO		0.8	1.4	19.0						
G16	PIEZO		0	0.2	20.4						
G17	PIEZO		0	0.2	20.6						
G20	PIEZO		0	0.4	20.4						
G21	PIEZO		0	0.6	19.6						
GM1	PIEZO		0	0.2	20.6						
GM2	PIEZO		0	0.0	20.6						
GM3	PIEZO		0	0.2	20.4						
GM4	PIEZO		0	0.0	20.4						
GM5	PIEZO		0	0.0	20.4						
GM6	PIEZO		0	0.2	20.6						
GM24	PIEZO		0	0.2	20.6						





## LANDFILL GAS MONITORING

LANDFILL GAS MONITORING FORM							(Baseline <input type="checkbox"/> Ambient <input 3"="" type="checkbox/&gt;)&lt;/th&gt; &lt;/tr&gt; &lt;/thead&gt; &lt;tbody&gt; &lt;tr&gt; &lt;td colspan="/> <b>Site Name:</b> DUNDALK LANDFILL <td colspan="4"><b>Site Address:</b> NEWRY ROAD, DUNDALK</td>	<b>Site Address:</b> NEWRY ROAD, DUNDALK			
<b>Operator:</b> DUNDALK TOWN COUNCIL			<b>National Grid Reference:</b> 1632-12								
<b>Site Status:</b> Closed			<b>Date:</b> 28-10-2016		<b>Time:</b> 15.00						
<b>Instrument used:</b> GEM5000		<b>Normal Analytical Range:</b>		<b>Date Next Calibration:</b> December 2016							
<b>Monitoring Personnel:</b> Damien Holmes			<b>Weather:</b> Dry		<b>Barometric pressure:</b> 1020mb						
Results											
Sample Station Number	Borehole/ spike/other	Survey Depth	CH <sub>4</sub> (% v/v)	CO <sub>2</sub> (% v/v)	O <sub>2</sub> (% v/v)	Comments					
G1	PIEZO		0.5	1.3	19.1						
G2	PIEZO		0	0.2	20.2						
G3	PIEZO		0	0.2	20.4						
G4	PIEZO		0	0.2	20.4						
G5	PIEZO		0	0.4	19.8						
G6	PIEZO		0	0.2	20.2						
G7	PIEZO		0	0.0	20.6						
G8	PIEZO		0	0.2	20.4						
G9	PIEZO		0	0.2	20.6						
G10	PIEZO		0.6	1.2	19.2						
G16	PIEZO		0	0.2	20.4						
G17	PIEZO		0	0.2	20.4						
G20	PIEZO		0	0.4	20.4						
G21	PIEZO		0	0.6	19.6						
GM1	PIEZO		0	0.2	20.4						
GM2	PIEZO		0	0.0	20.6						
GM3	PIEZO		0	0.2	20.4						
GM4	PIEZO		0	0.0	20.4						
GM5	PIEZO		0	0.0	20.4						
GM6	PIEZO		0	0.2	20.4						
GM24	PIEZO		0	0.2	20.4						



## LANDFILL GAS MONITORING

LANDFILL GAS MONITORING FORM				(Baseline <input type="checkbox"/> Ambient <input 3"="" type="checkbox/&gt;)&lt;/th&gt; &lt;/tr&gt; &lt;/thead&gt; &lt;tbody&gt; &lt;tr&gt; &lt;td colspan="/> <b>Site Name:</b> DUNDALK LANDFILL <td colspan="4"><b>Site Address:</b> NEWRY ROAD, DUNDALK</td>			<b>Site Address:</b> NEWRY ROAD, DUNDALK			
<b>Operator:</b> DUNDALK TOWN COUNCIL			<b>National Grid Reference:</b> 1632-12							
<b>Site Status:</b> Closed			<b>Date:</b> 10-11-2016		<b>Time:</b> 10:00					
<b>Instrument used:</b> GEM5000		<b>Normal Analytical Range:</b>		<b>Date Next Calibration:</b> December 2016						
<b>Monitoring Personnel:</b> Damien Holmes			<b>Weather:</b> Dry		<b>Barometric pressure:</b> 1024mb					
Results										
Sample Station Number	Borehole/ spike/other	Survey Depth	CH <sub>4</sub> (% v/v)	CO <sub>2</sub> (% v/v)	O <sub>2</sub> (% v/v)	Comments				
G1	PIEZO		0.6	1.2	19.0					
G2	PIEZO		0	0.2	20.4					
G3	PIEZO		0	0.2	20.4					
G4	PIEZO		0	0.2	20.4					
G5	PIEZO		0	0.2	20.6					
G6	PIEZO		0	0.0	20.6					
G7	PIEZO		0	0.5	20.1					
G8	PIEZO		0	0.2	20.4					
G9	PIEZO		0	0.2	20.6					
G10	PIEZO		0	0.6	19.8					
G16	PIEZO		0	0.2	20.4					
G17	PIEZO		0	0.2	20.4					
G20	PIEZO		0	0.0	20.6					
G21	PIEZO		0	1.0	19.2					
GM1	PIEZO		0	0.2	20.4					
GM2	PIEZO		0	0.6	20.2					
GM3	PIEZO		0	0.2	20.4					
GM4	PIEZO		0	0.2	20.4					
GM5	PIEZO		0	0.2	20.4					
GM6	PIEZO		0	0.2	20.4					
GM24	PIEZO		0	0.2	20.4					



## LANDFILL GAS MONITORING

LANDFILL GAS MONITORING FORM							(Baseline <input type="checkbox"/> Ambient <input 3"="" type="checkbox/&gt;)&lt;/th&gt; &lt;/tr&gt; &lt;/thead&gt; &lt;tbody&gt; &lt;tr&gt; &lt;td colspan="/> <b>Site Name:</b> DUNDALK LANDFILL <td colspan="4"><b>Site Address:</b> NEWRY ROAD, DUNDALK</td>	<b>Site Address:</b> NEWRY ROAD, DUNDALK			
<b>Operator:</b> DUNDALK TOWN COUNCIL			<b>National Grid Reference:</b> 1632-12								
<b>Site Status:</b> Closed			<b>Date:</b> 19-12-2016		<b>Time:</b> 11:00						
<b>Instrument used:</b> GEM5000		<b>Normal Analytical Range:</b>		<b>Date Next Calibration:</b> December 2016							
<b>Monitoring Personnel:</b> Damien Holmes			<b>Weather:</b> Dry		<b>Barometric pressure:</b> 1022mb						
Results											
Sample Station Number	Borehole/ spike/other	Survey Depth	CH <sub>4</sub> (% v/v)	CO <sub>2</sub> (% v/v)	O <sub>2</sub> (% v/v)	Comments					
G1	PIEZO		1.0	1.2	18.7						
G2	PIEZO		0.4	0.6	19.2						
G3	PIEZO		0	0.2	20.4						
G4	PIEZO		0	0.2	20.4						
G5	PIEZO		0	0.2	20.6						
G6	PIEZO		0	0.2	20.6						
G7	PIEZO		0	0.5	19.8						
G8	PIEZO		0	0.6	20.0						
G9	PIEZO		0	0.2	20.4						
G10	PIEZO		0	0.2	20.4						
G16	PIEZO		0	0.2	20.4						
G17	PIEZO		0.5	1.2	19.0						
G20	PIEZO		0	0.2	20.6						
G21	PIEZO		0	0.2	20.4						
GM1	PIEZO		0	0.2	20.6						
GM2	PIEZO		0	0.2	20.6						
GM3	PIEZO		0	0.4	20.4						
GM4	PIEZO		0	0.2	20.6						
GM5	PIEZO		0	0.2	20.6						
GM6	PIEZO		0	0.2	20.4						
GM24	PIEZO		0	0.0	20.4						



## Appendix I

# Bund Integrity Test



**DUNDALK LANDFILL &  
CIVIC WASTE FACILITY,  
NEWRY ROAD,  
DUNDALK, COUNTY  
LOUTH**

**W0034-02**

**BUND INTEGRITY  
TEST REPORT**

**P. HERR & ASSOCIATES**

CIVIL ENGINEERS & BUILDING SURVEYORS

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*FEBRUARY 2016*

## 1.0 INTRODUCTION

P. Herr & Associates were commissioned by Louth County Council to conduct inspections and integrity testing of two bunded areas at the Dundalk Landfill & Civic Waste Facility, Newry Road, Dundalk, County Louth in accordance with Condition 3.11 of the Waste Licence for the Facility

The bunds are located together and each one and are constructed with reinforced concrete base (300mm) and walls (225mm). Each bund houses a plastic integrally bunded oil storage tank.

Details of each bund are as follows:

	<i>Dimensions</i>	<i>Details of integrally bunded Oil Storage Tank</i>
Bund No.1	2.3m x 1.6m x 0.5m deep	Titan ES1360 EcoSafe Bunded Oil Tank (1.935m x 1.265m x 1.31m high)
Bund No.2	2.65m x 1.6m x 0.85m deep	Titan ES1800 EcoSafe Bunded Oil Tank (2.36m x 1.30m x 1.35m high)

## 2.0 BUND FUNCTION/CAPACITY

Each oil storage tank is integrally bunded and certified to provide 110% secondary containment in the event of a leak.

The function of the concrete bunds is to provide secondary containment in the event of spillages during the filling or emptying of the tanks. The requirement that the bunds offer 110% capacity of the stored oil is not applicable in this case.

## 3.0 TEST PROCEDURE

Testing was carried out to the protocol set out in the Environmental Agency of England and Wales Technical Report P16 (equivalent to CIRIA 163).

The bunds were initially inspected on 26/02/16 at 09.30.

The weather was dry during the initial inspection and remained dry throughout the test period.

Bund dimensions were recorded and a visual inspection of the walls and floors were carried out.

Each bund was filled with water to a depth of circa 0.4m in the case of Bund No.1 and circa 0.7m in the case of Bund No.2.

The water was retained in the tank and the depth recorded once more after six hours

#### 4.0 TEST RESULTS

##### 4.1 Visual Inspection:

No cracks or defects were found in the bund walls or floor and each bund appeared to be of sound construction

##### 4.2 Bund Integrity

	Initial Water Depth (10.05)	Final Water Depth (16.05)	Difference	Result
Bund No.1	0.405m	0.405m	0	PASS
Bund No.2	0.695m	0.695m	0	PASS

There was no drop in water level and no rainfall was recorded.

#### 5.0 CONCLUSION

Each bund is certified to have passed the integrity test as per Environmental Agency of England and Wales Technical Report P16 (equivalent to CIRIA 163).

Signed:   
Eamonn Mc Mahon  
B.E., M.Eng.Sc  
F.I.E.I., Chartered Engineer  
On behalf of P. Herr & Associates

29/02/16