



ANNUAL ENVIRONMENTAL **REPORT 2017**

TRAMORE WASTE DISPOSAL SITE

TRAMORE INTAKE & TRAMORE BURROWS

TRAMORE CO. WATERFORD

Waste Licence Register No. W0075-02

Report Compiled by;  
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## **Introduction**

Waterford County Council was granted a Waste License (Ref 75 – 1) by the Environmental Protection Agency for the continued operation of an existing unlined landfill and civic waste facility at Tramore Co. Waterford on 25<sup>th</sup> September 2001. This is the [fifteenth](#) Annual Environmental Report, which has been prepared to meet the requirements of Condition 11.8 of Waste License W0075-02 and includes the monitoring period [1<sup>st</sup> January 2016 to 31<sup>st</sup> December 2017](#).

The Civic Amenity Facility at Tramore Landfill was closed indefinitely on 20<sup>th</sup> November, 2009.

**1. Reporting Period**

This is the fifteenth Annual Environmental Report for the Tramore Landfill Facility, which covers the period 1<sup>st</sup> January 2017 to 31<sup>st</sup> December 2017.

**2. Waste Activities carried out at the Facility**

Storage of street residues in closed skip prior to transportation off site.

**Waste Management Act 1996: Third Schedule**

**Class 12. Repackaging prior to submission to any activity referred to in a preceding paragraph of this Schedule:**

No longer applicable

**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:**

No longer applicable

**Waste Management Act, 1996, Fourth Schedule**

**Class 2. Recycling or reclamation of organic substances, which are not used as solvents (including composting and other biological transformation processes):**

No longer applicable

**Class 3. Recycling or reclamation of metals and metal compounds:**

No longer applicable

**Class 4. Recycling or reclamation of other inorganic materials:**

No longer applicable

**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:**

No longer applicable

**Class 13. Storage of waste intended for submission to any activity referred to in a preceding paragraph of this Schedule, other than the temporary storage, pending collection, on the premises where such waste is produced:**

**3. Calculated Remaining Capacity of the Site**

The Landfill has ceased accepting waste after 31<sup>st</sup> December 2005.

**4. Year in which Final Capacity is expected to be reached**

Final capacity has been reached on the 31<sup>st</sup> December 2005.

**5. Licensed Methods of Deposition of Waste**

THE CIVIC AMENITY SITE WAS CLOSED INDEFINITELY ON 20<sup>th</sup> NOVEMBER, 2009

## 6. Environmental-Monitoring

### INTRODUCTION

This report is a compilation of environmental monitoring carried out on behalf of Waterford City and County Council at Tramore Landfill, principally during the period January 2017 to December 2017.

Monitoring of surface waters, groundwaters, and leachate quality, as well as ecological monitoring, was carried out in accordance with the waste licence 75-2, conditions 8, and schedule D.

Sampling sites are as set out in table 1, and appendix 1.

SURFACE WATER STATIONS	GROUNDWATER STATIONS	LEACHATE STATIONS	NOISE	TOXICITY ASSESSMENT	ECOLOGICAL SURVEY	SEDIMENT & SHELLFISH
SW 1,2,3,4,5,6  Weekly visual/odour inspection  Quarterly and annual chemical analysis	BH 2,5,8,9,10 RC 4,5 Monthly levels. Quarterly and annual chemical & microbiological analysis Note: BH2 to be redesignated a leachate borehole.	BH 1/1, 7 RC 6a LT1, LT2, LT3, LT4, LT5 Weekly levels. Quarterly and annual chemical analysis	B1, B2  Annual survey	Leachate  Annual assessment of toxicity of leachate using appropriate organisms.	Annual ecological / biological survey of backstrand. Survey of birdlife and habitats.	Annual chemical quality of sediments, cockles and mussels from backstrand. Microbiological quality of shellfish from backstrand.

Table 1. Sampling sites and monitoring requirements

### Baseline Monitoring

One of the purposes of compliance monitoring is to determine if there has been a release of contaminants to the environmental media, and to demonstrate compliance with landfill licence conditions. **Baseline monitoring** is monitoring which serves as a reference point to which later monitoring results are compared. For the purpose of this report, results obtained during the first licensed year of operation, September 2001 to September 2002, will be used as baseline monitoring data.

### Key Parameters

In line with EPA reporting recommendations<sup>1</sup>, results trends for key parameters are presented for surface waters (BOD), groundwaters (Ammonia) and leachates (Ammonia).

<sup>1</sup> EPA – Landfill Monitoring Manual, 2<sup>nd</sup> Ed, 2004



## Interference in metals analysis of aqueous samples from Tramore landfill and environs due to salinity.

The test method used to determine metals concentrations in aqueous samples from Tramore landfill is ICP-MS. Elements present in seawater can interfere with the test. The presence of chloride and other elements present in seawater combine with each other and the test carrier gas to form compounds which have the same atomic weights as some of the target test elements. The detector then wrongly identifies and measures these compounds as target test elements and thus gives falsely high results.

According to the Varian ICP-MS Application Note 32, the analysis of samples containing high levels of chloride typically produces polyatomic species in the plasma, which cause major interference in the most abundant isotopes of As V, Cr and Ni. The presence of other major elements such as Na, Ca and Mg in seawater can also produce polyatomic interference on isotopes of Cu, Co and Zn.

An example of this is the interference by chloride in the ICP-MS test for Arsenic. Chlorine, which has an atomic weight of c35, combines with the test carrier gas argon (mass 40). This Ar Cl complex has a combined mass of c75, which is close to atomic weight of Arsenic (75), and which leads to falsely high results.

A list of typical polyatomic interferences for the elements arsenic, chromium, copper and zinc are given in table 1.

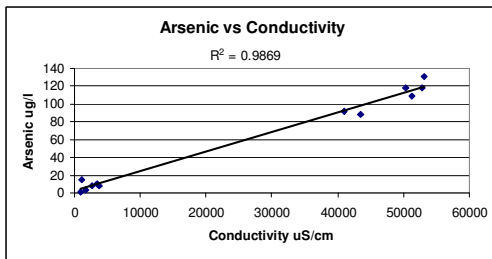
**Table 1. Typical polyatomic interference – extract from Varian ICP-MS Application note 32.**

Test target element	Polyatomic interference
<sup>75</sup> Arsenic	<sup>40</sup> Ar <sup>35</sup> Cl, <sup>40</sup> Ca <sup>35</sup> Cl
<sup>52</sup> Chromium	<sup>40</sup> Ar <sup>12</sup> C, <sup>40</sup> Ca <sup>12</sup> C, <sup>35</sup> Cl <sup>16</sup> O <sup>1</sup> H, <sup>38</sup> Ar <sup>14</sup> N
<sup>63</sup> Copper	<sup>40</sup> Ar <sup>23</sup> Na, <sup>40</sup> Ca <sup>23</sup> Na
<sup>64</sup> Zinc	<sup>32</sup> S <sup>16</sup> O <sub>2</sub> , <sup>32</sup> S <sub>2</sub> , <sup>36</sup> Ar <sup>14</sup> N <sub>2</sub> , <sup>40</sup> Ar <sup>23</sup> Na <sup>1</sup> H, <sup>40</sup> Ar <sup>24</sup> Mg

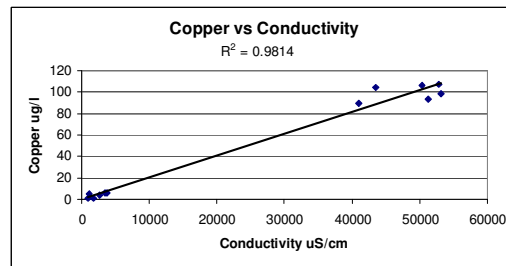
Examination of the Q2 2006 results of metals analysis from Tramore landfill provides evidence for such interference. Using conductivity as a proxy measure of salinity, it can be seen – see figures 1a-d - that there is a direct and strong correlation between salinity and measured metal concentration for arsenic, chromium,

copper and zinc. This holds true, even for open seawater samples, which would be expected to have very low levels of these metals.

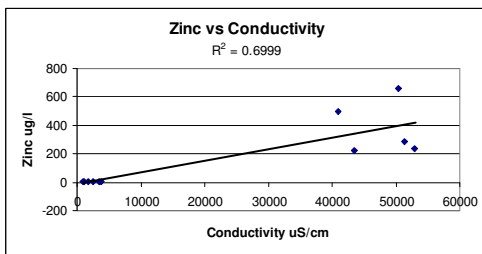
Thus the reported results for these metals in saline samples (conductivity > 5000 us/cm) are unreliable and should be disregarded.



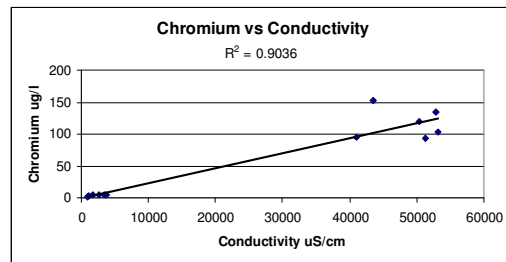
1a



1b



1c



1d

Figure 1a-1d. Relationship between metals concentrations and conductivity in aqueous samples from Tramore landfill and environs, for the 2<sup>nd</sup> quarter period 2006.

## **7.1. SURFACE WATER.**

### **7.1.1 Introduction**

The surface water sampling sites are SW 1, 2, 3,4,5,6, as per appendix 1. Sampling was carried out by Jim McGarry, Brownstown, Kilkieran, Co. Kilkenny. Samples were analysed by ALcontrol Laboratories, Unit 7-8 Hawarden Business Park, Manor Road, Hawarden, Deeside, UK in each quarter of 2017.

Results are presented in tables 7.1.1 to 7.1.4, and Appendix B.

There are difficulties involved in monitoring surface water pollution from landfills adjacent to estuaries, as the salinity of the samples can interfere with many of the tests, (*ammonia, COD, arsenic, copper*).

Additionally, many of the ions, which are considered indicators of leachate contamination, are also major components of sea/brackish water, (*chloride, sulphate, sodium, magnesium, calcium, boron*).

Following the convention of previous reports on Tramore landfill, the results are compared to the standards in the Drinking Water Regulations (SI no. 106, 2009), and Bathing Water Regulations (SI no. 155, 1992).

Additionally, water quality criteria used in a recent DOELG / EPA report (*“An Assessment of the Trophic Status of Estuaries and Bays in Ireland”*, DOELG/EPA, 2001) are used also. These standards are presented in the tables of results for comparison.

Where possible, results are also compared to results of baseline monitoring carried out between September '01 and September '02

### **7.1.2 Results**

Visual and odour examination indicated that there was no obvious contamination at any of the sites. There was no observed odour or floating materials, which would interfere with bathing water use. Some of the samples at sites SW1-3 from the inner back strand were cloudy, but this is normal due to the effect of tidal flushes on silt and sand.

The conductivity results indicate that sites S1 to S4 have varying degrees of brackishness, while sites SW5 and SW6 are saline.

pH and temperature are normal at all sites over the monitoring period and fall within relevant quality standards.

Dissolved oxygen levels were generally satisfactory at all the sites.

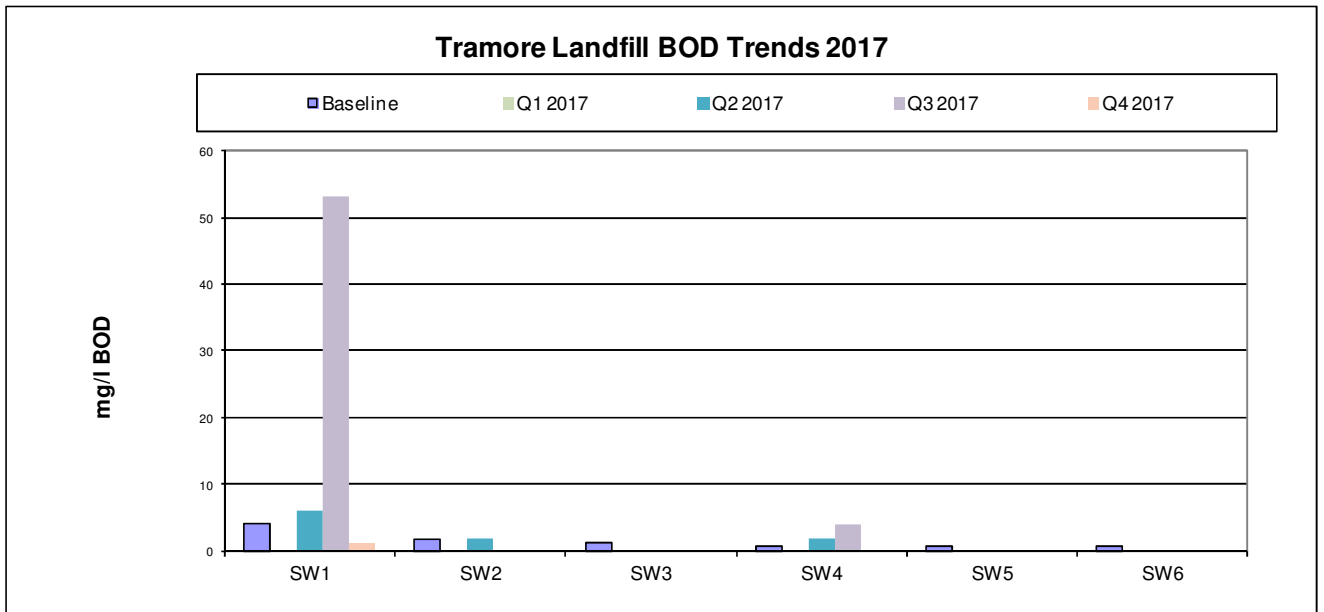
Suspended solids levels seem quite high at times at many of the sampling stations, and this may be due to test interference by salt or silt/sand entrainment in the samples, as the BOD values do not indicate the presence of significant amounts of organic matter.

Ammonia values were similar to the previous reporting period, with a decreasing trend being noted at SW1 and SW2.

## Key Parameter – BOD

The BOD test is a measure of the amount of oxygen consumed by microorganisms in breaking down organic matter in water.

Respiration by phytoplankton or their decay, can also lead to oxygen depletion during the BOD test resulting in a high BOD value. Natural seawaters are likely to have a BOD value < 2 mg/l BOD.



BOD Trends 2017

BOD was generally low at all the surface water sites during 2016, although elevated levels of BOD were found at SW1 during quarter 3.

### 7.1.3 Discussion

The results of analysis indicate a continued improvement at SW1 with regards to organic matter and nutrients. It is known that an off-site storm-water discharge discharges to SW1. A constructed wetland was installed in 2011 in order to attenuate contamination at this location. There is no indication of any effect from the landfill on the surface water sites.

### Quarter 1

SW1, SW2,SW3, SW4,SW5 and SW6 sites were sampled this round. BOD and ammonia were low at all sites. Suspended solids were elevated though saline or sand interference in the tests is suspected. SW5 in particular would be expected to have low suspended solids apart from possible suspension of sand. Elevated COD results were recorded at SW2, 3, 4, 5 and 6, but deemed to be due to saline interference in the test. Given the good physicochemical water quality, there was no evidence of impact from the landfill.

### Quarter 2

SW1, SW2,SW3, SW4,SW5 and SW6 sites were sampled this round. BOD was generally low at all sites. Suspended solids were elevated though saline or sand interference in the tests is suspected. SW5 in particular would be expected to have low suspended solids apart from possible suspension of sand. Elevated COD results were recorded at SW2, 3, 4, 5 and 6, but deemed to be due to saline interference in the test. Given the good physicochemical water quality, there was no evidence of impact from the landfill.

### Quarter 3

SW1, SW2,SW3, SW4,SW5 and SW6 sites were sampled this round BOD was generally low at all sites, although there was an elevated level at SW1. Suspended solids were elevated though saline or sand interference in the tests is suspected. SW5 in particular would be expected to have low suspended solids apart from possible suspension of sand. Elevated COD results were recorded at throughout, but are deemed to be due to saline interference in the test. Given the good physicochemical water quality, there was no evidence of impact from the landfill.

### Quarter 4

SW1,SW2, SW3, SW4,SW5 and SW6 sites were sampled this round. BOD was generally low at all sites. Suspended solids were elevated though saline or sand interference in the tests is suspected. Results were slightly elevated in comparison to the previous quarter. SW5 in particular would be expected to have low suspended solids apart from possible suspension of sand. Elevated COD results were recorded at throughout, but are deemed to be due to saline interference in the test. Given the good physicochemical water quality, there was no evidence of impact from the landfill.

## Surface Water Quality Standards

Reference Water quality standard	Parameter	Limits
SURFACE WATER REGS 2009	BOD	4 (Below is good)
SURFACE WATER REGS 2009	Dissolved Oxygen % Saturation	70-130% TRANSITIONAL 80-120 COASTAL
SURFACE WATER REGS 2009	Total Oxidised Nitrogen	2.6 mg/l N at 0 psu 0.25 mg/l N at 34.5 psu
BATHING WATER REGS 2008	E coli per 100 mls	Excellent <250 Good <500 Sufficient <1000 Poor >1000

**Table 7.1.1 Tramore Landfill Surface Water Monitoring Q1 2017**

Parameters	Units	Tramore Landfill W0075-02 Quarter 1 2017					
		Surface Water					
LABORATORY NUMBER		2908	2909	2910	2911	2912	2913
Sampling Location		SW 1	SW 2	SW 3	SW 4	SW 5	SW 6
Date sampled	8-9/3/2017	09-Mar	08-Mar	08-Mar	08-Mar	08-Mar	08-Mar
Sampled by	Jim McGarry	JMcG	JMcG	JMcG	JMcG	JMcG	JMcG
Time sampled		12:10	12:55	14:45	12:30	16:50	16:00
Visual Inspection/Odour		clear	clear	clear	clear	clear	clear
Temp	oC	9.3	10.1	10	10.7	9.4	9.5
Dissolved Oxygen	% sat	56	101	103	122	96	97
pH	units	7.1	8.1	8.1	8.4	7.7	7.9
Cond	uS/cm	1635	nm	nm	nm	nm	nm
Salinity	%	nm	29.6	33.5	28.8	26.9	26.3
Suspended solids, Total	<2 mg/l	<2	20.5	26.8	14.7	43.4	25.6
Ammoniacal Nitrogen as N	<0.2 mg/l	4.07	<0.2	<0.2	<0.2	<0.2	<0.2
BOD	mg/l	<5	<5	<5	<5	<5	<5
COD	<7 mg/l	23.65	388	159	540	528	458
Chloride( asCl)	<2 mg/l	269	17400	19000	17200	16100	15300

**Table 7.1.2 Surface Water Monitoring Q2 2017**

Parameters	Units	Tramore Landfill W0075-02 Quarter 2 2017					
		Surface Water					
LABORATORY NUMBER		3240	3241	3242	3243	3244	3245
Sampling Location		SW 1	SW 2	SW 3	SW 4	SW 5	SW 6
Date sampled	6-7/6/2017	07-Jun	06-Jun	06-Jun	07-Jun	07-Jun	07-Jun
Sampled by	Jim McGarry	JMcG	JMcG	JMcG	JMcG	JMcG	JMcG
Time sampled		13:40	18:00	12:50	14:00	13:20	13:00
Visual Inspection/Odour		light brown	clear	clear	clear	clear	clear
Temp	oC	13.5	14.8	15.6	15.5	14.8	14.1
Dissolved Oxygen	% sat	62	106	103	127	100	99
pH	units	7.1	8.2	8.2	8.5	8.1	8.1
Cond	uS/cm	1498	nm	nm	nm	nm	nm
Salinity	%	nm	34.7	22.3	32.1	34.9	35.1
Suspended solids, Total	<2 mg/l	15.7	23	310	33.6	28.8	33.2
Ammoniacal Nitrogen as N	<0.2 mg/l	4.96	<0.2	0.451	<0.2	<0.2	<0.2
BOD	mg/l	6	2	<5	2	<2	<2
COD	<7 mg/l	45.4	442	460	595	630	835
Arsenic	<0.5 ug/l	1.13	1.35	1.87	1.39	1.12	1.18
Chloride( asCl)	<2 mg/l	216	19700	13600	18200	19700	19700



**Table 7.1.3 Tramore Landfill Surface Water Monitoring Q3 2017**

Parameters	Tramore Landfill Quarter 3(Annual) 2017						
	Units	Surface Water					
<b>LABORATORY NUMBER</b>		<b>3733</b>	<b>3734</b>	<b>3735</b>	<b>3736</b>	<b>3737</b>	<b>3738</b>
<b>Sampling Location</b>		<b>SW 1</b>	<b>SW 2</b>	<b>SW 3</b>	<b>SW 4</b>	<b>SW 5</b>	<b>SW 6</b>
<b>Date sampled</b>	24-25/7/2017	24-Jul	24-Jul	24-Jul	24-Jul	25-Jul	25-Jul
<b>Sampled by</b>	Jim McGarry	JMcG	JMcG	JMcG	JMcG	JMcG	JMcG
<b>Time sampled</b>		15:50	18:40	12:00	18:10	20:15	20:00
		light					
		brown/					
		yes	clear	clear	clear	clear	clear
Visual Inspection/Odour		foul	/no	/no	/no	/no	/no
Temp	oC	16.9	19.4	21.8	2.7	17.6	19.2
Dissolved Oxygen	% sat	9	108	111	126	109	99
pH	units	6.5	8.2	8.1	8.1	8.3	8
Cond	uS/cm	980	nm	nm	nm	nm	nm
Salinity	%	nm	34.8	34.4	35.4	34.7	34.9
Suspended solids, Total	<2 mg/l	31.7	35.1	41.5	26.6	73.9	40.9
Ammoniacal Nitrogen as N	<0.2 mg/l	4.77	<0.2	<0.2	<0.2	<0.2	<0.2
BOD	mg/l	53	<5	<5	4	<2	<5
COD	<7 mg/l	68	564	504	374	892	576
Arsenic	<0.5 ug/l	3.18	6.64	7.9	3.45	1.87	1.91
Boron	<5 ug/l	nm	nm	nm	nm	nm	nm
Cadmium	<0.08 ug/l	<0.08	<0.48	<0.48	<0.08	<0.08	<0.08
Chromium	<1 ug/l	<1	<6	<6	<1	<1	<1
Copper	<0.3 ug/l	0.391	<1.8	<1.8	0.943	0.806	0.538
Lead	<0.2 ug/l	<0.2	<1.2	<1.2	<0.2	<0.2	<0.2
Manganese	<1 ug/l	491	6.73	60.5	26.8	3.75	2.28
Zinc	<1 ug/l	1.52	<6	<6	<1	<1	<1
Mercury	<0.01 ug/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sulphate	<2 mg/l	17.1	2760	2740	2810	2760	2740
Chloride( asCl)	<2 mg/l	142	19300	19500	19700	20000	20700
Phosphate(ortho) as P	<0.02 mg/l	0.359	<0.02	<0.02	<0.02	0.032	<0.02
Total Oxidised Nitrogen as N	<0.1 mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cyanide, total	<0.05 mg/l	nm	nm	nm	nm	nm	nm
Calcium	<0.012 mg/l	79.9	430	422	435	398	350
Sodium	<0.076 mg/l	95.3	10900	11500	12000	9950	8980
Magnesium	<0.036 mg/l	11.6	1290	1300	1390	1210	1060
Potassium	<1 mg/l	12.3	418	428	459	418	474
Iron	<0.019 mg/l	4.28	<1.9	<1.9	<1.9	<0.95	<0.95

**Table 7.1.4 Tramore Landfill Surface Water Monitoring Q4 2017**

Parameters	Units	Tramore Landfill Quarter 4 2017					
		Surface Water					
LABORATORY NUMBER		4121	4122	4123	4124	4125	4126
Sampling Location		SW 1	SW 2	SW 3	SW 4	SW 5	SW 6
Date sampled	7-9/11/2017	09-Nov	07-Nov	07-Nov	07-Nov	07-Nov	07-Nov
Sampled by	Jim McGarry	JMcG	JMcG	JMcG	JMcG	JMcG	JMcG
Time sampled		14:05	17:35	14:45	13:30	14:00	16:40
Visual Inspection/Odour		cloudy /light brown	clear	clear	clear	clear	clear
Temp	oC	10.9	9.4	10.3	11.6	11.6	11.2
Dissolved Oxygen	% sat	34	94	99	134	101	101
pH	units	7.0	7.9	8.1	8.2	8	8.1
Cond	uS/cm	1707	nm	nm	nm	nm	nm
Salinity	%	0.7	26.9	23.4	27.5	34.8	34.8
Suspended solids, Total	<2 mg/l	32.3	44.8	33.7	24.1	56.3	43.5
Ammoniacal Nitrogen as N	<0.2 mg/l	3.03	1.5	0.514	0.512	1.41	1.23
BOD	mg/l	4	2	1	<2	1	<2
COD	<7 mg/l	39.6	398	382	493	503	504
Arsenic	<0.5 ug/l	2.63	2.68	5.84	4.82	5.39	5.62
Chloride( asCl)	<2 mg/l	531	15800	14100	16000	19600	19300

## 7.2.2. Groundwater

### 7.2.1 INTRODUCTION

Samples were taken at sites BH2, BH5, BH8, BH9, RC4, RC6a, GW2, GW5.

Borehole locations are shown on appendix 1. Drilling records, where available, for groundwater boreholes are shown on table and in the Hydrogeological Review Survey in Appendix I.

Table 7.2.1 . Drilling records for groundwater boreholes.

Name	BH2	BH5	BH8	BH9	BH10A	RC4	RC5
Nominal Type	GW	GW	GW	GW	GW	GW	GW
Total Depth (m)	4.2	3.95	7.7	8.7	13	15.3	25
Strata (m)	Made ground: hardcore fill (0-0.5) Made ground; loose mixture of gravel and rubble with fill (0.5-1.0) Made Ground: soft black sandy silt with domestic refuse (1.0-1.7) Soft/loose mixture of silt and gravel: (1.7-2.5) medium dense well graded silty gravel: (2.5-3.0) Firm brown gravelly silty clay: (3.0-4.2)	Made ground; clay and sand fill (0-0.8) Made ground: medium dense silty sand with black domestic refuse (0.8-1.8) Made ground: firm to stiff light brown gravelly clay with traces of refuse (1.8-2.9) Very stiff light brown gravelly clay (2.9-3.95)	topsoil: (0-0.3) Soft grey brown sandy silty clay: (0.3-1.2) Firm grey brown sandy clay with some gravel: (1.2-1.9) Stiff to very stiff brown silty sandy gravelly clay with cobbles and boulders: (1.9-7.7)	Made ground: grey silty clay with wood, paper and plastic (0-0.4) Firm grey brown sandy clay with some gravel (0.4-2.2) Stiff to very stiff brown silty sandy gravelly clay with cobbles and boulders (2.2-7.4) Hard brown silty laminated clay with frequent cobble and boulder size fragments of shale (7.4-8.7)	Made ground : stiff brown silty gravelly clay with concrete, brick and cobbles (0-1.3) Made ground: brick, ash, wood, plastic, paper and steel (1.3-4.2) Soft grey very silty sandy clay with shells (4.2-10.2) Large limestone cobbles and boulders (11.8-13.0)	open hole (0-9.7 gravel (9.7-11.7 Siltstone (11.7-15.3	Overburden (0-20 Siltstone (20-25)
Response zone (m)	none given	not given	refers to installation sheet			12 to 14 m	21 to 24.5
Designation based on drill record				GW	GW	GW	GW

### 7.2.2 RESULTS

Results are presented in tables 7.2.2 to 7.2.5, and appendix D.

Groundwater monitoring results are compared with the Interim Guideline Values (IGVs) as outlined in the interim report by the environmental Protection agency, “*Towards Setting Guidelines for the Protection of Groundwater in Ireland*”.

Elevated values for *Boron, Calcium, Chloride, Conductivity, Potassium and Sodium* reflect the impact of saline intrusion on borehole water characteristics. Additionally, the salinity of the samples can interfere with some of the tests, (*ammonia, arsenic, copper*). Accordingly interpretation of test results for some parameters must bear this in mind.

Conductivity values were elevated in many of the boreholes, reflecting significant saline intrusion at this estuarine site. A discussion of the extent of saline intrusion is beyond the scope of this environmental report, however detailed studies<sup>2</sup> of saline intrusion into these boreholes was carried out in 2002 and 2006.

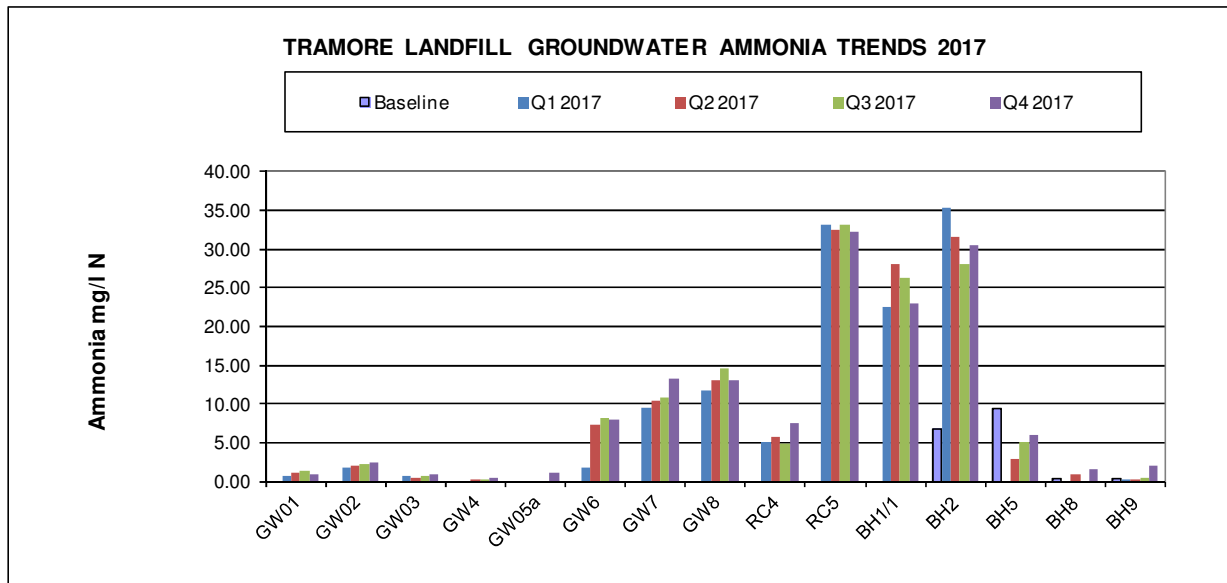
Heavy metals, list I/II organics, phenols and coliform bacteria were low at all boreholes throughout the monitoring period.

<sup>2</sup> Waterford County Council, Investigation into the Occurrence of Salinity Intrusion at Tramore Landfill Site, MCOS, 2002 and RPS 2006.

Key Parameter – Ammonia

## AMMONIA

Ammonia occurs naturally in water bodies, including estuarine and marine waters, arising from the microbiological decomposition of nitrogenous organic matter. Fish and other aquatic organisms also excrete ammonia. Therefore unpolluted waters contain ammonia, usually < 0.1 mg/l N, although groundwaters in reducing conditions can contain higher levels.



### Groundwater ammonia levels 2017

Ammonia levels were high (>5mg/l) in BH1, BH2, RC5, GW6, GW7 and GW8.

Results for 2017 were lower than baseline monitoring in most boreholes. Atypical results are outlined in yellow.

#### 7.2.3 DISCUSSION

The results of groundwater monitoring are in line with results from previous rounds of testing carried out since 1999. As indicated in previous reports, it appears that groundwater quality within the current working area is somewhat impacted by leachate from the landfill, as evidenced by elevated ammonia and iron levels at BH2, and RC4, though drilling records indicate that BH2 is characteristic of a leachate rather than groundwater borehole.

Heavy metals, List I/II Organics, and phenols were low at all boreholes throughout the monitoring period. As there are no groundwater abstractions in the area and given the very large dilution available in the receiving surface water estuarine environment, no significant environmental effects are expected.

## Groundwater Threshold Values

Reference standard	Parameter	Groundwater Threshold Values
EC Environmental Objectives (Groundwater) Regulations , S.I. No. 9 of 2010	Ammonia(mg/l N)	0.175
	Chloride mg/l	800
	Potassium mg/l	5
	Sodium mg/l	150
	Total Oxidised Nitrogen mg/l N	8.5

**Table 7.2.2 Tramore Landfill Groundwater Monitoring Q1 2017**

**Tramore Landfill W0075-02 Quarter 1 2017 Ground Water**

LABORATORY NUMBER		2914	2915	2916	2917	2918	2919	2920	2922	2923	2924	2925	2926	2927	2928	2929
Sampling Location		BH1	BH2	BH5	BH8	BH9	RC4	RC5	GW1	GW2	GW3	GW4	GW5	GW6	GW7	GW8
Date sampled	8-9/3/2017	09-Mar	08-Mar	08-Mar	09-Mar	09-Mar	08-Mar	09-Mar	08-Mar	08-Mar	08-Mar	09-Mar	09-Mar	09-Mar	09-Mar	09-Mar
Visual Inspection/Odour			brown													
clear-yes/no	odour-yes/no	brown/yes	w/sedi-ment/	yes/no	clear w/sed/	muddy brown /no	clear/	clear /no	light grey /yes	rusty brown/	clear/	clear w/sed/	clear w/sed/	light brown /no	brown no	brown/ no
Groundwater Level	m	2.7	4.7	2.6	6.2	6	4.5	22.3	5.7	6	1.4	3.2	7.1	3.2	7.3	4.2
Temp	oC	10	12.7	10	10.6	11.6	12.3	12.1	11.1	10	9.7	10.6	11.5	9.1	9.4	9.4
Dissolved Oxygen	% sat	54	85	76	92	58	72	57	72	93	53	73	99	51	52	55
pH	units	6.8	7	7.7	7.5	7.1	7.2	6.9	7.2	7.3	7.0	7.2	7.6	6.8	7.0	7.1
Cond	uS/cm	2750	nm	nm	3200	1088	nm	nm	nm	nm	nm	1141	987	2440	1845	1803
Salinity	%	nm	10.1	26.7	nm	nm	32.9	30.6	7.3	9.8	9.7	nm	nm	nm	nm	nm
Total Organic Carbon	<3 mg/l	nm	18.6	<6	nm	nm	<3	nm	9.16	11.3	10.1	nm	nm	nm	nm	nm
Ammoniacal Nitrogen as N	<0.2 mg/l	11.2	32.1	5	<0.2	0.643	5.15	33.1	0.746	1.88	0.573	<0.2	<0.2	1.79	9.4	11.6
Chloride( asCl)	<2 mg/l	359	5380	15200	732	132	18000	17500	3540	5430	5500	94.7	120	354	203	212
Total Oxidised Nitrogen	<0.1 mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.12	<0.1	<0.1	<0.1
Sodium	<0.076 mg/l	245	2960	14100	532	101	6710	8650	2370	2940	3570	76.4	74.9	153	104	142
Potassium	<1 mg/l	18.2	129	550	9.95	5.59	251	194	60.6	81.7	99.3	<1	<1	7.81	14.2	17.7
Iron	<0.019 mg/l	15.3	3.13	<1.9	<0.019	0.334	<1.9	1.44	<0.19	<0.19	0.959	<0.019	<0.019	6.65	7.04	6.38
Total Coliforms	No/100mls	0	0	0	0	0	0	0	12	0	9	0	0	0	0	0
E. coli	No/100mls	0	0	0	0	0	0	0	12	0	9	0	0	0	0	0
Phenols, Total detected 5 **	<0.025 mg/l	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025

**Atypical Results**

Comments:

v.little  
purge

\*\* Individual phenols are contained in the accompanying Certs of Analysis.



**Table 7.2.3 Tramore Landfill Groundwater Monitoring Q2 2017**

**Tramore Landfill Quarter 2 2017 Ground Water**

LABORATORY NUMBER	3246	3247	3248	3249	3250	3251	3252	3254	3255	3256	3257	3258	3259	3260	3261	
Sampling Location	BH1	BH2	BH5	BH8	BH9	RC4	RC5	GW1	GW2	GW3	GW4	GW5	GW6	GW7	GW8	
Date sampled	6-7/6/2017	06-Jun	06-Jun	06-Jun	07-Jun	07-Jun	06-Jun	06-Jun	06-Jun	06-Jun	06-Jun	06-Jun	06-Jun	06-Jun	06-Jun	
Sampled by	Jim McGarry	JMcG	JMcG	JMcG	JMcG	JMcG	JMcG	JMcG	JMcG	JMcG	JMcG	JMcG	JMcG	JMcG	JMcG	
Time sampled	11:55	17:35	12:35	11:35	11:55	18:05	14:25	16:05	13:35	13:15	15:25	15:10	17:15	16:25	16:45	
Visual Inspection/Odour clear- yes/no odour- yes/no														no/yes slight	cloudy/ no	grey / no
Ammoniacal Nitrogen as N	<0.2 mg/l	28	31.5	2.81	0.806	0.252	5.71	32.5	1.18	1.91	0.515	0.278	<0.2	7.38	10.4	13
Chloride	<2 mg/l	955	5010	15600	140	580	18500	17800	5070	5330	5340	89.9	115	257	215	200
Sodium	<0.076 mg/l	631	2820	8420	107	359	10400	11000	2710	2590	277	75.8	76.9	138	124	135
Potassium	<1 mg/l	35.7	127	307	6.91	9.14	358	216	86.1	78.2	8.42	1.32	1.16	13	15.5	19.1
Phenols, Total detected 5	<0.025 mg/l	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025
Arsenic	<0.5 ug/l	0.985	8.88	0.98	5.93	<0.5	1.6	3.22	2.35	2.95	2.08	<0.5	<0.5	174	5.16	6.02
Iron	<0.019 mg/l	6460	11000	68.3	93		668	1220	221	114	103	62.5	62	6920	11200	5830
Total Coliforms	No/100mls	0	0	0	>100	0	0	0	0	0	0	0	0	0	2	1
E. coli	No/100mls	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1
Saline Total Oxidised Nitrogen as N	<0.07 mg/l	0.108	0.143	1.6	<0.1	<0.1	0.122	0.095	0.309	0.184	0.238	0.15	0.579	0.131	0.15	0.122
Comments:			grey	v.little purge	sed	sed										

Atypical Results



**Table 7.2.4 Tramore Landfill Groundwater monitoring Q3 2017**

**Tramore Landfill Quarter 3 (annual) 2017 Ground Water Results**

Parameters	Units	BH1	BH2	BH5	BH8	BH9	RC4	RC5	GW1	GW2	GW3	GW4	GW5	GW6	GW7	GW8	
Sampling Location		BH1	BH2	BH5	BH8	BH9	RC4	RC5	GW1	GW2	GW3	GW4	GW5	GW6	GW7	GW8	
Date sampled	24-25/7/2017	24-Jul	25-Jul	24-Jul	24-Jul	24-Jul	25-Jul	24-Jul	24-Jul	24-Jul	24-Jul	24-Jul	24-Jul	24-Jul	24-Jul	24-Jul	
Visual Inspection/Odour																	
clear- yes/no									no/yes						cloudy	grey /	
odour- yes/no		no/yes	no/yes	no/yes	no/no	no/no	no/no	no/no	sl	no/no	no/no	no/no	no/no	yes/no	/	yes	yes
Ammoniacal Nitrogen as N	<0.2 mg/l	26.2	28	5	<0.2	0.437	4.9	33	1.34	2.15	0.617	0.349	<0.2	8.08	10.9	14.5	
Fluoride	<0.5 mg/l	<0.5	<0.5	0.698	<0.5	<0.5	1.06	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Arsenic	<0.5 ug/l	1.77	12.4	8.77	1.69	4.3	1.95	12.5	10.6	6.15	5.36	1.03	<0.5	154	0.961	7.67	
Boron	<5 ug/l	623	1470	2990	142	71	3150	1060	667	762	972	51.2	27.1	175	52.9	316	
Cadmium	<0.08 ug/l	<0.08	<0.08	<0.48	<0.08	<0.08	<0.08	<0.88	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	
Chromium	<1 ug/l	<1	<1	<6	<1	<1	<1	<11	<1	<1	<1	<1	<1	<1	<1	<1	
Copper	<0.3 ug/l	<0.3	<0.3	<1.8	<0.3	<0.3	0.408	<3.3	<0.3	0.304	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	
Lead	<0.2 ug/l	<0.2	<0.2	<1.2	<0.2	<0.2	<0.2	<2.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	
Manganese	<1 ug/l	936	1330	282	604	1550	5870	718	524	1050	230	517	258	1810	521	1990	
Zinc	<1 ug/l	1.4	4.98	<6	2.31	1.59	<1	<11	1.27	4.46	5.93	4.76	1.21	2.75	3.5	<1	
Mercury	<0.01 ug/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Sulphate	<2 mg/l	<2	479	2060	117	28.1	2490	1770	426	563	882	61.7	41.7	<2	7.2	<2	
Chloride( asCl)	<2 mg/l	767	5300	15900	650	116	19200	17900	3150	4960	6620	96.3	113	237	219	210	
Phosphate(ortho) as P	<0.02 mg/l	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.0486	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	
Total Oxidised Nitrogen as N	<0.1 mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.36	<0.1	<0.1	0.144	0.857	<0.1	<0.1	<0.1	
Cyanide, total	<0.05 mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Calcium	<0.012 mg/l	176	274	467	95.9	61.9	496	527	292	478	493	148	109	269	145	191	
Sodium	<0.076 mg/l	591	2780	9180	398	94.7	9820	10700	2060	2390	3630	91.4	85.3	153	91	163	
Magnesium	<0.036 mg/l	58.6	309	1030	47.7	22.2	1160	1160	211	313	384	28.3	23.2	30.2	28.1	35	
Potassium	<1 mg/l	31	142	345	8.87	5.02	385	229	69.2	78.5	103	1.41	1.2	16.2	1.38	23.3	
Iron	<0.019 mg/l	6.11	13.5	95.2	<0.019	0.0541	<0.95	<1.9	<0.19	<0.19	<0.19	<0.019	<0.019	4.19	<0.019	4.13	
Phenols, Total detected 5 **	<0.025 mg/l	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	
Total Coliforms	No/100mls	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
E. coli	No/100mls	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
<b>Atypical Results</b>																	

**Table 7.2.5 Tramore Landfill Groundwater monitoring Q4 2017**

**Tramore Landfill Quarter 4 2017 Ground Water Results**

Parameters	Units	4127	4128	4129	4130	4131	4132	4133	4135	4136	4137	4138	4139	4140	4141	4142
LABORATORY NUMBER		BH1	BH2	BH5	BH8	BH9	RC4	RC5	GW1	GW2	GW3	GW4	GW5	GW6	GW7	GW8
Sampling Location																
Date sampled	7-9/11/2017	09-Nov	09-Nov	07-Nov	09-Nov	09-Nov	09-Nov	07-Nov	07-Nov	07-Nov	07-Nov	09-Nov	09-Nov	09-Nov	09-Nov	09-Nov
Sampled by	Jim McGarry	JMcG	JMcG	JMcG	JMcG	JMcG	JMcG	JMcG	JMcG	JMcG	JMcG	JMcG	JMcG	JMcG	JMcG	JMcG
Time sampled		15:50	16:10	15:05	12:30	12:55	16:40	16:30	16:10	15:45	15:30	13:50	13:05	15:25	15:10	14:55
Visual Inspection/Odour		light	light		clear	clear	slightly					clear	clear	brown	light	slightly
clear- yes/no	odour-	brown	brown		w/sed	w/sed	brown	clear				w/sed/	w/sed/	slimy /	brown	brown
yes/no		/no	/no	no/no	/no	/no	/no	/yes	no/yes	yes/no	no/yes	no	no	yes	no	/ yes
Groundwater Level	m	2.4	5.6	2.6	6.2	5.8	11.4	21.8	5.0	5.7	1.4	3.1	6.9	2.9	7.1	4.1
Temp	oC	12.5	12.9	10.6	12.2	12.1	12.1	11.5	12.1	12.3	12.4	12.8	13.2	12.7	12.4	12.7
Dissolved Oxygen	% sat	17	83	69	34	23	36	28	32	79	17	48	35	14	18	12.6
pH	units	6.8	7	7.8	7	7	7.1	7	7.3	7.2	7.0	7.0	7.1	6.8	6.9	7.1
Cond	uS/cm	3020	nm	nm	3060	999	nm	nm	nm	nm	nm	1081	990	2280	1884	1953
Salinity	%	1.4	12.3	26.4	1.5	0.3	33.2	30.4	18.3	8.7	8.3	0.3	0.3	nm	nm	nm
Total Organic Carbon	<3 mg/l	7.62	8.63	<6	<3	<3	<3	<6	7.86	11	14.4	<3	<3	10.2	6.55	9.73
Ammoniacal Nitrogen as N	<0.2 mg/l	23	30.4	5.88	1.5	1.95	7.42	32.2	0.976	2.38	0.883	0.506	1.1	8.04	13.2	13.1
Arsenic	<0.5 ug/l	1.05	7.43	13.6	<0.5	2.46	<5.5	5.53	14	5.73	3.28	<0.5	<0.5	215	6.53	7.15
Chloride( asCl)	<2 mg/l	504	7080	16000	722	131	18700	17800	6910	4970	4680	91.6	110	265	220	243
Total Oxidised Nitrogen	<0.1 mg/l	<0.1	<0.1	0.475	0.154	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.417	0.998	<0.1	<0.1	<0.1
Sodium	<0.076 mg/l	314	3310	7650	380	106	9640	8440	3190	2160	2200	112	76.7	138	138	147
Potassium	<1 mg/l	27.8	154	326	9.74	4.6	361	212	122	72.9	76.3	2.46	1.13	17.4	17.4	19.1
Iron	<0.019 mg/l	5.6	16.8	<0.019	0.028	0.0653	<0.95	3.14	<0.019	<0.019	<0.019	<0.019	<0.019	4.08	4.08	4.79
Total Coliforms	No/100mls	0	0	0	0	3	0	>100	>100	>100	>100	0	6	0	0	0
E. coli	No/100mls	0	0	0	0	3	0	>100	>100	>100	>100	0	1	0	0	0
Phenols, Total detected 5	<0.025 mg/l	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025

## 7.3 LEACHATE

### 7.3.1 INTRODUCTION

Leachate boreholes, BH1, BH 7 and RC6 have been routinely sampled since Sept 2001.

Supplementary boreholes LT 1-5 were constructed in late 2001, and sampled since 2002.

Borehole locations are shown on appendix 1. Drilling records, where available, for groundwater boreholes are shown on table .

Table 7.3.1. Leachate borehole drilling records

Name	BH1/1	BH7A	LT1	LT2	LT3a	LT4a	LT5a	RC6A
Nominal Type	GW + L	leachate	L	L	L	L	L	L
Total Depth (m)	4.5	6	8.4	4.8	6	6	6	9
Strata (m)	Made ground: fill/clay with traces of rubble (0-1.7) Made ground: domestic refuse (1.7-3.7) Made ground: firm brown clay with traces of rubbish (3.7-4.2) Firm brown sandy gravelly clay: (4.2-4.5)	Made ground: clay with cobbles (0-0.6) Made ground:waste, bricks and metal (0.6-6)	Made ground rubble and clay (0-2.3) Made ground: domestic refuse (2.3 - 3.3) Made ground black domestic refuse (3.3 - 7.2) Made ground; mixture of rubbish and black silty sand (7.2 - 7.8) Loose grey silty sand with shells (7.8 - 8.4)	Made ground clay with occasional cobbles (0-1.2) Made ground: domestic refuse (1.2 - 4.5) Made ground silty refuse (domestic) (4.5 - 4.8)	Clay with cobbles (0-6)	Made ground clay occasional cobbles (0-0.7) Made ground: clay/waste (0.7 - 6)	Made ground: clay with gravel and boulder obs (0-2) Made ground: black silty clay (2 - 3) Made ground clay with traces of refuse (3 - 3.8) Made ground; domestic refuse (3.8 - 7.8) Made ground: mixture of	Made ground light brown clay with gravel, cobbles and concrete (0-1) Made ground: black silty clay with gravel and plastic (1-3.2) Firm light brown grey gravelly clay with cobbles (3.2 - 3.8) 7) Light brown clay with gravel and abundant cobbles (7-8.3) Light brown clay with gravel and large cobbles (8.3-9)
Response zone (m)	0.80m to 4.0m	3.5m to 6.0m	1.8 to 7.2	1.3 to 4.6	1.5 to 5.6	1.5 to 5.2	2.8 to 6.35	3 to 9
Designation based on drill record	Leachate	Leachate	Leachate	Leachate	Leachate	Leachate	Leachate	Leachate

Results of analysis are presented in tables 7.3.2 to 7.3.5, and appendix E, and are compared with the median of "typical" landfill leachate, as published in the EPA document "*Landfill Operational Practices*", 1998. Atypical results are outlined in yellow.

### 7.3.2 RESULTS

Saline intrusion is evident in many of the leachate boreholes, reflected in the high concentrations of ions associated with seawater, such as *chloride, sodium, magnesium calcium and boron*, and subsequent interference in some of the tests normally used to characterise landfill leachate, as discussed in the introduction.

Heavy metal concentrations (*cadmium, lead*) are generally low, being at about drinking water standard levels. There is a strong relationship between salinity and measured levels of zinc, copper, chromium and arsenic, which strongly indicate interference in tests due to salinity – see introduction.

## Key Parameter – Ammonia

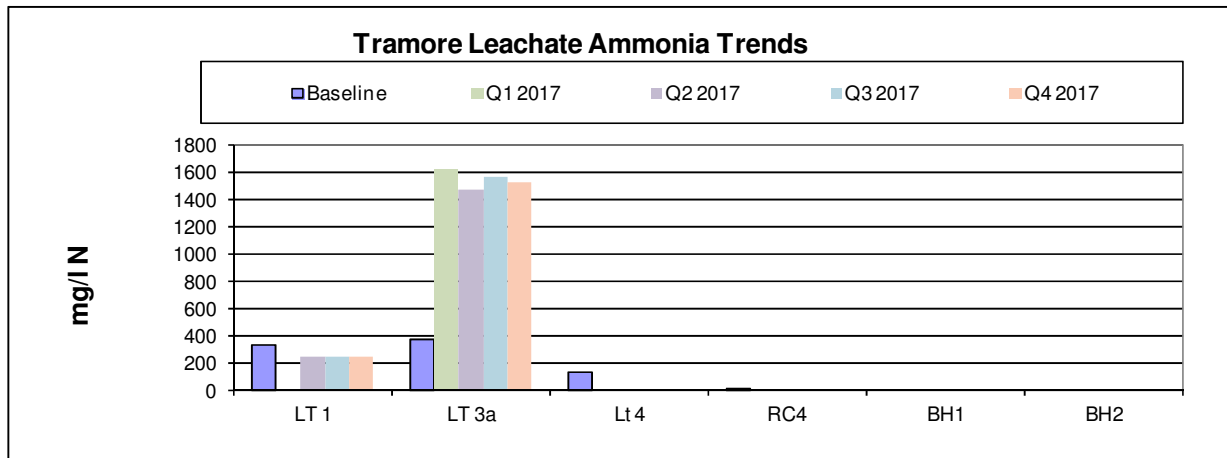


Fig 7.3.1 Leachate ammonia levels 2017

Many of the leachate boreholes were dry as a result of landfill capping and thus were not sampled in 2017.

Reference	Parameter	Typical Leachate Analysis (EPA, 1997)
EPA document "Landfill operational Practices", 1998	Ammonia mg/l N	453
	BOD mg/l O <sub>2</sub>	270
	COD mg/l O <sub>2</sub>	954
	Conductivity μS/cm	7180
	Iron μg/l	12100
	pH	7.1
	Potassium mg/l	492
	Sodium mg/l	688

**Table 7.3.2 Tramore Landfill Leachate Monitoring Q1 2017**

**Tramore Landfill Quarter 1 2017 Leachate Results**

Sampling Location		LT1	LT2	LT3A	LT4B/B	LT5
<b>Date sampled</b>	8-9/3/2017	09-Mar	09-Mar	09-Mar	09-Mar	09-Mar
<b>Sampled by</b>	Jim McGarry	JMcG	JMcG	JMcG	JMcG	JMcG
Visual Inspection/Odour		dry	dry	black/ pungent	well blocked	dry
Groundwater Level	m			1.2		
pH	units			7.4		
Cond	uS/cm			23100		
Salinity	%			nm		
BOD	mg/l			64		
Ammoniacal Nitrogen as N	<0.2 mg/l			1620		
COD	<7 mg/l			1600		
Chloride( asCl)	<2 mg/l			2730		
Total Oxidised Nitrogen	<0.1 mg/l			0.204		
<b>Atypical Results</b>						

**Table 7.3.3 Tramore Landfill Leachate Monitoring Q2 2017**

**Tramore Landfill Quarter 2 2017 Leachate Results**

Sampling Location		LT1	LT2	LT3A	LT4B/B	LT5
<b>Date sampled</b>	07/06/2017	07-Jun	07-Jun	07-Jun	07-Jun	07-Jun
<b>Sampled by</b>	Jim McGarry	JMcG	JMcG	JMcG	JMcG	JMcG
Visual Inspection/Odour		black/ yes slight	No sample	black/ pungent	well blocked	dry
Groundwater Level	m	2.1	0.5	1.3		
pH	units	6.9		7.5		
Cond	uS/cm	5640		23000		
Salinity	%	nm		13.7		
BOD	mg/l	95		103		
Ammoniacal Nitrogen as N	<0.2 mg/l	242		1470		
COD	<7 mg/l	449		1790		
Chloride( asCl)	<2 mg/l	553		2760		
Total Oxidised Nitrogen	<0.1 mg/l	1.550		<1		

**Table 7.3.5 Tramore Landfill Leachate Monitoring Q3 2017**

**Tramore Landfill Quarter 3 2017 Leachate Results**

<b>Parameters</b>	<b>Units</b>	<b>LT1</b>	<b>LT2</b>	<b>LT3A</b>	<b>LT4B/B</b>	<b>LT5</b>
Sampling Location		LT1	LT2	LT3A	LT4B/B	LT5
<b>Date sampled</b>	24-25/7/2017	25-Jul	25-Jul	25-Jul	25-Jul	25-Jul
<b>Sampled by</b>	Jim McGarry	JMcG	JMcG	JMcG	JMcG	JMcG
Visual Inspection/Odour		black/yes slight	No sample	black/pungent	well blocked	dry
Groundwater Level	m	2.0		1.3		
pH	units	7		nm		
Cond	uS/cm	5680		nm		
Salinity	%	nm		nm		
BOD	mg/l	16		69		
Ammoniacal Nitrogen as N	<0.2 mg/l	247		1570		
Fluoride	<0.5 mg/l	<0.5		1.76		
CODF, unfiltered	<7 mg/l	350		1640		
Boron	<5 ug/l	2070		1240		
Cadmium	<0.08 ug/l	<0.08		<0.08		
Chromium	<1 ug/l	6.23		<1		
Copper	<0.3 ug/l	<0.3		<0.3		
Lead	<0.2 ug/l	<0.2		<0.2		
Manganese	<1 ug/l	731		1.17		
Nickel	<0.4ug/l	6.28		1.77		
Zinc	<1 ug/l	4.17		<1		
Mercury	<0.01 ug/l	<0.01		<0.01		
Sulphate	<2 mg/l	<2		<2		
Chloride( asCl)	<2 mg/l	549		2720		
Phosphate(ortho) as P	<0.02 mg/l	<0.02		4.23		
Total Oxidised Nitrogen as N	<0.1 mg/l	0.689		0.535		
Cyanide, total	<0.05 mg/l	<0.05		<0.05		
Calcium	<0.012 mg/l	208		4.19		
Sodium	<0.076 mg/l	449		215		
Magnesium	<0.036 mg/l	96		24.6		
Potassium	<1 mg/l	180		105		
Iron	<0.019 mg/l	5.33		0.279		
Total Coliforms	No/100mls	0		0		
E. coli	No/100mls	0		0		

**Table 7.3.6 Tramore Landfill Leachate Monitoring Q4 2017**

**Tramore Landfill Quarter 4 2017 Leachate Results**

Parameters	Units	4143	4144	4145	4146	4147
<b>LABORATORY NUMBER</b>		<b>LT1</b>	<b>LT2</b>	<b>LT3A</b>	<b>LT4B/B</b>	<b>LT5</b>
Sampling Location						
<b>Date sampled</b>	09/11/2017	09-Nov	09-Nov	09-Nov	09-Nov	09-Nov
<b>Sampled by</b>	Jim McGarry	JMcG	JMcG	JMcG	JMcG	JMcG
<b>Time sampled</b>		17:15	11:20	16:55	11:15	12:15
Visual Inspection/Odour		grey/ no odour	No sample	black/ pungent	well blocked	dry
Groundwater Level	m	2.0		1.2		
pH	units	6.9		7.6		
Cond	uS/cm	5690		22800		
Salinity	%	3		13.5		
BOD	mg/l	32		146		
Ammoniacal Nitrogen as N	<0.2 mg/l	250		1530		
COD	<7 mg/l	365		2260		
Chloride( asCl)	<2 mg/l	548		2720		
Total Oxidised Nitrogen	<0.1 mg/l	0.816		<0.5		



## **7.4. Leachate Levels**

### **7.4.1 Introduction**

Leachate levels are determined weekly, by dip meter, at boreholes BH1/1, BH7, RC6, LT1, LT2, LT3, LT4, and LT5.

### **7.4.2 Results**

Results of monitoring are presented in tables 4.1 to 4.4. There were minor fluctuations in levels in BH7, LT1, and LT2. [LT 4 and LT5 were dry most of 2017.](#)

### **7.4.3 Discussion**

The variation in groundwater and leachate levels may be due to air pressure, changes in landfill water balance or tidal effects.

Tidal intrusion into the landfill boreholes was the subject of special reports in 2002 and 2006; Waterford County Council, *Investigation into the Occurrence of Salinity Intrusion at Tramore Landfill Site*, MCOS, 2002 and *Investigation into the possible occurrence of salinity intrusion at Tramore Landfill*, RPS 2006.



**Table 4.1 Tramore Landfill Leachate & Groundwater Levels Q1 2017**

Week	Date	Operator	BH 1/1	BH 2	BH4A	BH 5	BH 7b	BH 8	BH 9	GW 1	GW 2	GW 3	GW 4	GW 5	GW 6	GW 7	GW 8	LT1	LT2	LT3	LT4	LT5	RC4	RC5	RC6
1	03/01/2017	JMCK																5.27							
2	xx/01/2017	JMCK																							
3	xx/01/2017	JMCK																							
4	24/01/2017	LMCGM	1.61	1.67			1.67	1.58	1.07	1.32	1.69	1.44	1.16	0.84	1.47	2.69	2.22	2.76	dry	4.07	Dry	Dry	2.1	NT	NT
5	xx/02/2017																				Dry	Dry			
6	xx/02/2017																				Dry	Dry			
7	xx/02/2017																				Dry	Dry			
8	20/02/2017	LMCGM	1.76	1.74			1.67	1.62	1.22	1.92	1.94	1.56	1.06	1.24	1.82	2.94	2.42	2.69	2.40	3.97	DRY	DRY	2.15	NT	NT
9	xx/02/2017																				Dry	Dry			
10	xx/03/2017																				Dry	Dry			
11	xx/03/2017																				Dry	Dry			
12	23/03/2017	LMCGM	1.66	1.69			1.67	1.64	1.20	1.37	1.89	1.38	1.21	0.89	1.57	2.82	2.22	2.66	2.40	3.92	DRY	DRY	2.00	NT	
13	xx/03/2017																				Dry	Dry			

na No Access NT not taken

All levels refer to Ordnance Datum

**Table 4.2 Tramore Landfill Leachate & Groundwater Levels Q2 2017**

Week	Date	Operator	BH 1/1	BH 2	BH4A	BH 5	BH 7b	BH 8	BH 9	GW 1	GW 2	GW 3	GW 4	GW 5	GW 6	GW 7	GW 8	LT1	LT2	LT3	LT4	LT5	RC4	RC5	RC6
14	04/04/2017	JMcK	1.64				1.67											2.66	2.37	3.83	Dry	Dry			
15	13/04/2017	JMcK	1.58				1.61											2.68	2.39	3.93	Dry	Dry			
16	20/04/2017	LMCGM JMCK	1.51	1.67			1.57	1.42	1.01	1.27	1.59	1.34	0.88	0.99	1.12	3.64	2.02	2.66	2.4	3.78	Dry	Dry	2.12		
17	25/04/2017	JMcK	1.5				1.63											2.68	2.38	3.95	Dry	Dry			
18	03/05/2017	JMcK	1.41				1.62											2.65	2.39	3.86	Dry	Dry			
19	08/05/2017	JMcK	1.42				1.56											2.65	2.39	3.85	Dry	Dry			
20	15/05/2017	JMcK	1.52				1.55											2.67	2.39	3.98	Dry	Dry			
21	26/05/2017	JMcK	1.6				1.52											2.66	2.41	3.96	Dry	Dry			
22	30/05/2017	LMCGM JMCK	1.56	1.91			1.52	1.57	1.26	1.86	1.87	1.89	0.94	1.04	1.06	2.44	2.12	2.66	2.39	3.97	Dry	Dry	2.72	0.77	
23	08/06/2017	JMcK	2.04				1.52												2.72	3.92	Dry	Dry			
24	15/06/2017	JMcK	1.77				1.52											2.67	2.42	3.95	Dry	Dry			
25	21/06/2017	JMcK	1.64				1.48											2.67	2.42	3.98	Dry	Dry			
26	30/06/2017	LMCGM JMCK	1.57	1.8			1.55	1.52	1.13	1.65	1.78	1.54	1.15	0.8	1.09	2.46	2.04	2.76	2.40	3.97	Dry	Dry	0.23	0.53	

na No Access

All levels refer to Ordnance Datum

**Table 4.3 Tramore Landfill Leachate & Groundwater Levels Q3 2017**

Week	Date	Operator	BH 1/1	BH 2	BH4A	BH 5	BH 7b	BH 8	BH 9	GW 1	GW 2	GW 3	GW 4	GW 5	GW 6	GW 7	GW 8	LT1	LT2	LT3	LT4	LT5	RC4	RC5	RC6	
27	07/07/2017	JMcK	1.52				1.50											2.63	2.41	3.97	DRY	DRY				
28	10/07/2017	JMcK LMcGM	1.51	1.79			1.51	1.37	1.06	1.47	1.5	1.54	0.89	1.01	1.83	2.38	1.73	2.66	2.39	4			2.2	0.42	3.45	
29	XX/07/2017																									
30	XX/07/2017																									
31	XX/07/2017																									
32	XX/08/2017																									
33	XX/08/2017																									
34	XX/08/2017																									
35	XX/08/2017																									
36	XX/09/2017																									
37	XX/09/2017																									
38	XX/09/2017																									
39	XX/09/2017																									
Week	Date	Operator	BH 1/1	BH 2	BH4A	BH 5	BH 7b	BH 8	BH 9	GW 1	GW 2	GW 3	GW 4	GW 5	GW 6	GW 7	GW 8	LT1	LT2	LT3	LT4	LT5	RC4	RC5	RC6	

na No Access

All levels refer to Ordnance Datum

**Table 4.4 Tramore Landfill Leachate & Groundwater Levels Q4 2017**

Week	Date	Operator	BH 1/1	BH 2	BH4A	BH 5	BH 7b	BH 8	BH 9	GW 1	GW 2	GW 3	GW 4	GW 5	GW 6	GW 7	GW 8	LT1	LT2	LT3	LT4	LT5	RC4	RC5	RC6
40	05/10/2017	DR	2.01				1.77											2.86	2.50	4.17	Dry	Dry			
41	12/10/2017	DR	2.01				1.77											2.86	2.5	4.17	Dry	Dry			
42	20/12/2017	DR	1.91				1.57											2.86	2.5	4.17	Dry	Dry			
43	27/10/2017	DR	1.71	1.77		1.50	1.27	1.12	0.67	1.62	1.39	1.54	0.96	0.84	1.67	2.89	2.02	2.56	2.40	3.87	Dry	Dry	2.30	0.40	
44	03/11/2017	DR	2.01				1.67											2.86	2.50	4.17	Dry	Dry			
45	10/11/2017	DR	1.91				1.57											2.86	2.50	4.17	Dry	Dry			
46	17/11/2017	DR	2.01				1.77											2.76	2.4	4.17	Dry	Dry			
47	23/11/2017	DR	1.71	1.77			1.67	1.22	0.87	1.62	1.49	1.54	0.96	0.94	1.67	2.99	2.12	2.66	2.40	4.07	Dry	Dry	2.30	0.60	
48	30/11/2017	DR	1.91				1.37											2.86	2.5	4.17	Dry	Dry			
49	08/12/2017	DR	2.01	1.77			1.77	1.32	0.87	1.52	1.59	1.44	0.86	0.74	1.37	2.29	1.92	2.86	2.50	4.17	Dry	Dry			
50	15/12/2017	DR	1.51	1.77			1.37	1.22	0.97	1.62	1.59	1.54	1.16	0.94	1.57	2.59	2.12	2.66	2.40	4.07	Dry	Dry	2.20	0.60	
51	22/12/2017	DR	1.91				1.67											2.86	2.50	4.17	Dry	Dry			
52	29/12/2017	DR	1.71				1.57											2.86	2.50	4.17	Dry	Dry			
Week	Date	Operator	BH 1/1	BH 2	BH4A	BH 5	BH 7b	BH 8	BH 9	GW 1	GW 2	GW 3	GW 4	GW 5	GW 6	GW 7	GW 8	LT1	LT2	LT3	LT4	LT5	RC4	RC5	RC6

na No Access

All levels refer to Ordnance Datum

## 7.5. Landfill Gas

### 7.5.1 Introduction

The main landfill gases, Methane and Carbon dioxide, as well as Oxygen, were measured in monitoring boreholes within [BH1/1, BH2, BH7, BH10, RC4, L1, L2, L3, L4, L5] and outside [BH8, BH9, RC5] the landfill area, and in the former civic amenity site area.

### 7.5.2 Results

Results are presented in tables 7.5.1 to 7.5.4 and figure 7.5.1.

#### Key parameter – methane

Methane is a product of the breakdown of biodegradable material in the landfill. The methane levels detected during 2014 are presented in figs. 7.5.1a and 7.5.1b below.

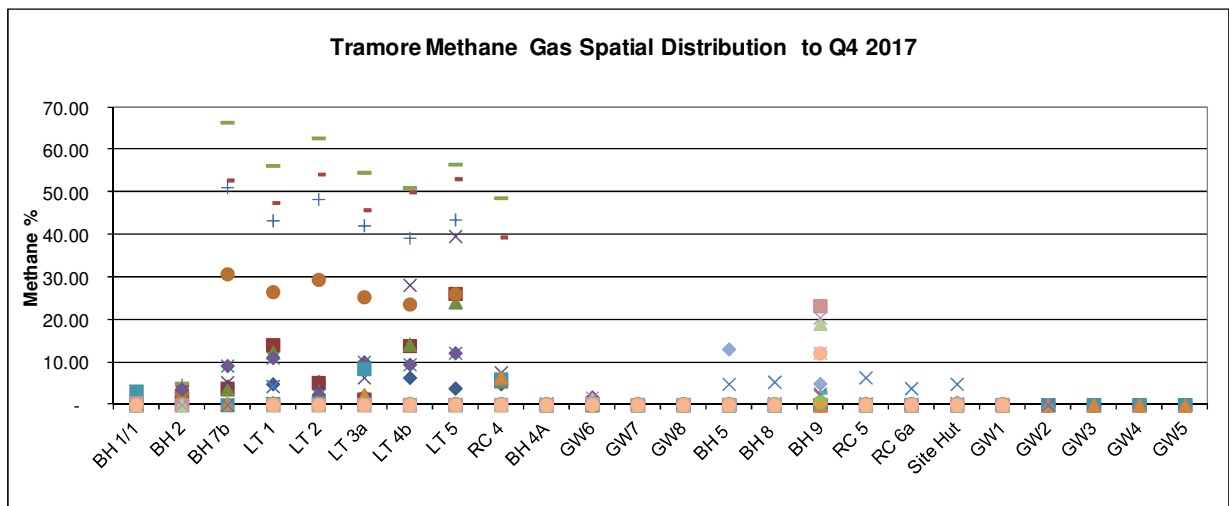


Fig 7.5.1a Methane spatial distribution 2017

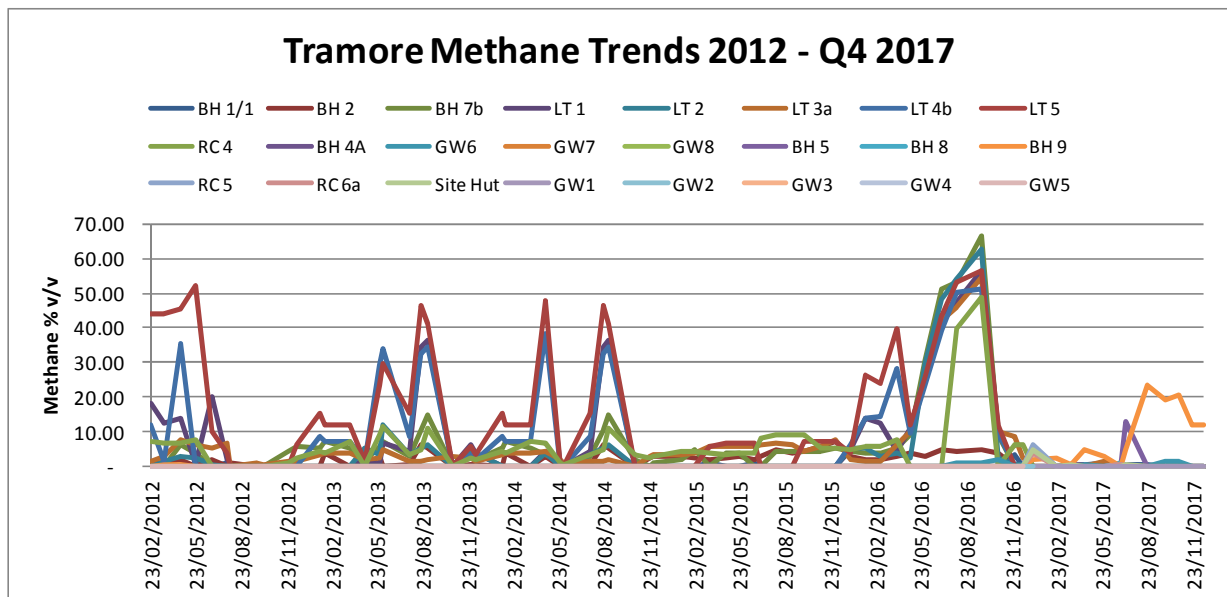


Fig 7.5.1b Methane temporal trends 2012 - 2017

### 7.5.3 Discussion

**Spatial distribution (Fig 7.5.1a):** Methane, consistent with the breakdown of organic waste, was present in some boreholes within the landfill area at levels up to 48% v/v (in LT5). There was no landfill gas detected in the site buildings (local area depot) or at boreholes outside the waste body area.

**Temporal trends (fig 7.5.1b):** In general, across the landfill, there is a trend of decreasing methane since 2007, and further monitoring will indicate ongoing trends.





Table 7.5.1 Gas Levels Q1 2017

Date	Operator	Gas	Site Hut	BH1/1	BH2	BH4	BH5	BH7B	BH8	BH9	GW 1	GW 2	GW3	GW4	GW5	GW6	GW7	GW8	LT1	LT2	LT3	LT4	LT5	RC4	RC5	RC6A	
03/01/2017	JMCK	CH <sub>4</sub>	NA																								
		CO <sub>2</sub>	NA																								
		O <sub>2</sub>	NA																								
		Air Pressure	NA																								
09/01/2016	JMCK	CH <sub>4</sub>	NA																								
		CO <sub>2</sub>	NA																								
		O <sub>2</sub>	NA																								
		Air Pressure	NA																								
16/01/2017	LMCGM	CH <sub>4</sub>	31.80	0.30	0.30	0.20		0.30	0.20	0.30	0.20	0.20	0.30	0.20	0.20	0.20	0.30	0.20	0.20	0.30	2.10	0.30	0.20	0.30	0.30	NT	
	JMCK	CO <sub>2</sub>	27.70	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	1.70	0.00	0.00	0.00	0.00	0.80	0.00	0.00	1.60	0.00	NT	
	JMCK	O <sub>2</sub>	1.00	20.00	20.40	20.10		20.30	20.10	20.40	20.20	20.20	20.30	20.30	20.40	19.80	20.10	20.20	20.40	20.20	20.00	20.40	20.40	18.60	20.20	NT	
	JMCK	Air Pressure	1023	1023	1023	1023	1023	1023	1023	1023	1023	1023	1023	1023	1023	1023	1023	1023	1023	1023	1023	1023	1023	1023	1023	1023	
23/01/2017	JMCK	CH <sub>4</sub>	31.80																								
		CO <sub>2</sub>	27.70																								
		O <sub>2</sub>	1.00																								
		Air Pressure	1023																								
30/01/2017	JMCK	CH <sub>4</sub>	34.40																								
		CO <sub>2</sub>	28.90																								
		O <sub>2</sub>	0.40																								
		Air Pressure	995																								
01/02/2017	JMCK	CH <sub>4</sub>	31.30																								
		CO <sub>2</sub>	26.80																								
		O <sub>2</sub>	1.20																								
		Air Pressure	1016																								
07/02/2017	JMCK	CH <sub>4</sub>	29.90																								
		CO <sub>2</sub>	26.20																								
		O <sub>2</sub>	1.80																								
		Air Pressure	1010																								
14/02/2017	LMCGM	CH <sub>4</sub>	30.5																								
	JMCK	CO <sub>2</sub>	26.9																								
	JMCK	O <sub>2</sub>	0.8																								
	JMCK	Air Pressure	1020																								
20/02/2017	JMCK	CH <sub>4</sub>	30.5	0.20	0.30	0.20		0.30	0.20	0.20	0.20	0.20	0.20	0.30	0.30	0.30	0.20	0.20	0.20	0.30	2.60	0.30	0.20	0.30	0.20	NT	
		JMCK	CO <sub>2</sub>	26.9	0.10	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	1.30	0.00	0.00	3.30	0.00	NT	
		JMCK	O <sub>2</sub>	0.8	19.90	20.00	19.90		19.90	19.90	20.00	20.00	19.90	19.90	20.00	20.00	20.00	20.00	20.00	20.00	20.00	17.00	20.00	20.00	16.20	20.00	NT
		JMCK	Air Pressure	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020
06/03/2017	JMCK	CH <sub>4</sub>	28.10																								
		CO <sub>2</sub>	26.20																								
		O <sub>2</sub>	1.90																								
		Air Pressure	1010																								
10/03/2017	JMCK	CH <sub>4</sub>	29.60																								
		CO <sub>2</sub>	27.00																								
		O <sub>2</sub>	0.90																								
		Air Pressure	1020																								
13/03/2017	JMCK	CH <sub>4</sub>	28.1																								
		CO <sub>2</sub>	25.8																								
		O <sub>2</sub>	1.2																								
		Air Pressure	1021																								
23/03/2017	JMCK	CH <sub>4</sub>	28.1	0.30	0.30	0.30		0.40	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.70	0.30	0.30	0.40	0.30	NT	
		JMCK	CO <sub>2</sub>	26	0.00	0.00	0.00		0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.60	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.00	NT	
		JMCK	O <sub>2</sub>	1.4	19.80	20.00	19.90		19.70	19.80	20.30	19.90	19.90	19.90	20.30	20.30	19.50	19.80	20.10	20.20	20.20	20.10	20.30	20.10	19.90	NT	
		JMCK	Air Pressure	1018	1018	1018	1018	1018	1018	1018	1018	1018	1018	1018	1018	1018	1018	1018	1018	1018	1018	1018	1018	1018	1018	1018	1018
Date	Operator	Gas	Site Hut	BH1/1	BH2	BH4	BH5	BH7B	BH8	BH9	GW 1	GW 2	GW3	GW4	GW5	GW6	GW7	GW8	LT1	LT2	LT3	LT4	LT5	RC4	RC5	RC6A	

Table 7.5.2 Gas Levels Q2 2017

Week No	Date	Operator	Gas	Site Hut	BH1/1	BH2	BH4	BH5	BH7B	BH8	BH9	GW 1	GW 2	GW3	GW4	GW5	GW6	GW7	GW8	LT1	LT2	LT3	LT4	LT5	RC4	RC5	RC6A				
14	04/04/2017		CH <sub>4</sub>	27.10																											
			CO <sub>2</sub>	25.40																											
			O <sub>2</sub>	1.30																											
			Air Pressure	1032																											
15	13/04/2017		CH <sub>4</sub>	27.70																											
			CO <sub>2</sub>	24.40																											
			O <sub>2</sub>	1.90																											
			Air Pressure	1021																											
16	20/04/2017		CH <sub>4</sub>	25.00	0.80	0.30	0.30		0.50	0.30	0.30	0.30	0.30	0.30	0.30	0.20	0.80	0.30	0.30	0.30	0.30	5.10	0.30	0.30	0.30	0.30	0.30	0.30			
			CO <sub>2</sub>	23.80	3.00	0.00	0.00		0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	1.10	0.00	0.00	0.00	0.00	2.30	0.00	0.00	0.00	0.00	0.00	0.00		
			O <sub>2</sub>	21.10	14.00	19.80	19.80		19.00	19.90	19.90	19.90	19.90	19.90	19.90	19.90	19.70	18.90	19.70	19.70	19.80	19.80	18.50	19.80	19.80	19.90	19.90	19.90	19.90		
			Air Pressure	1036																											
17	24/04/2017		CH <sub>4</sub>	28.70																											
			CO <sub>2</sub>	24.50																											
			O <sub>2</sub>	1.80																											
			Air Pressure	1020																											
18	03/05/2017		CH <sub>4</sub>	32.20																											
			CO <sub>2</sub>	22.80																											
			O <sub>2</sub>	1.50																											
			Air Pressure	1030																											
19	08/05/2017		CH <sub>4</sub>	30.60																											
			CO <sub>2</sub>	22.50																											
			O <sub>2</sub>	1.30																											
			Air Pressure	1030																											
20	15/05/2017		CH <sub>4</sub>	31.90																											
			CO <sub>2</sub>	23.10																											
			O <sub>2</sub>	1.20																											
			Air Pressure	1013																											
21	30/05/2017		CH <sub>4</sub>	32.70	0.90	0.10	0.00		0.20	0.00	1.37	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.20	0.10	0.10	2.90	0.10	0.10	0.10	0.10	0.10				
			CO <sub>2</sub>	22.80	1.70	0.00	0.10		0.10	0.00	0.10	0.00	0.00	0.00	0.00	0.10	5.10	0.00	0.10	0.00	0.00	1.20	0.00	0.00	0.00	0.00	0.00				
			O <sub>2</sub>	1.60	17.70	20.90	20.00		20.60	20.90	21.20	21.00	21.00	21.00	21.10	21.00	14.20	21.00	20.70	21.10	21.10	20.20	21.20	21.10	21.10	21.10	21.10				
			Air Pressure	1017																											
22	29/05/2017		CH <sub>4</sub>																												
			CO <sub>2</sub>																												
			O <sub>2</sub>																												
			Air Pressure																												
23	08/06/2017		CH <sub>4</sub>	36.50																											
			CO <sub>2</sub>	25.80																											
			O <sub>2</sub>	1.10																											
			Air Pressure	1002																											
24	15/06/2017		CH <sub>4</sub>	24.90																											
			CO <sub>2</sub>	24.10																											
			O <sub>2</sub>	1.90																											
			Air Pressure	1015																											
25	21/06/2017		CH <sub>4</sub>	34.90																											
			CO <sub>2</sub>	23.70																											
			O <sub>2</sub>	2.20																											
			Air Pressure	1013																											
26	26/06/2017		CH <sub>4</sub>	35.80	0.10	0.10	0.00		0.20	0.10	0.80	0.10	0.10	0.10	0.70	0.70	0.30	0.30	0.20	0.50	1.00	0.30	0.50	0.50	0.10	0.20					
			CO <sub>2</sub>	24.70	0.30	0.00	0.10		0.10	0.20	1.10	0.70	0.50	0.30	1.30	1.30	0.80	0.80	0.60	1.20	1.40	0.20	0.70	1.20	0.00	1.00					
			O <sub>2</sub>	1.39	20.80	20.90	20.00		20.80	20.60	21.00	20.80	20.90	20.90	20.80	20.80	20.80	20.80	20.90	20.70	20.80	21.00	20.90	20.70	20.90	20.70					
			Air Pressure	1013	1013	1013	1013	1013	1013	1013	1013	1013	1013	1013	1013	1013	1013	1013	1013	1013	1013	1013	1013	1013	1013	1013	1013	1013			

Table 7.5.3 Gas Levels Q3 2017

Week No	Date	Operator	Gas	Site Hut	BH1/1	BH2	BH4	BH5	BH7B	BH8	BH9	GW 1	GW 2	GW3	GW4	GW5	GW6	GW7	GW8	LT1	LT2	LT3	LT4	LT5	RC4	RC5	RC6A				
27	07/07/2017		CH <sub>4</sub>	32.50																											
			CO <sub>2</sub>	20.10																											
			O <sub>2</sub>	2.90																											
			Air Pressure	1019																											
28	10/07/2017		CH <sub>4</sub>	35.80																											
			CO <sub>2</sub>	24.70																											
			O <sub>2</sub>	1.91																											
			Air Pressure	1012																											
29	17/07/2017		CH <sub>4</sub>																												
			CO <sub>2</sub>																												
			O <sub>2</sub>																												
			Air Pressure																												
30	24/07/2017		CH <sub>4</sub>																												
			CO <sub>2</sub>																												
			O <sub>2</sub>																												
			Air Pressure																												
31	31/07/2017		CH <sub>4</sub>																												
			CO <sub>2</sub>																												
			O <sub>2</sub>																												
			Air Pressure																												
32	07/08/2017		CH <sub>4</sub>																												
			CO <sub>2</sub>																												
			O <sub>2</sub>																												
			Air Pressure																												
33	14/08/2017		CH <sub>4</sub>																												
			CO <sub>2</sub>																												
			O <sub>2</sub>																												
			Air Pressure																												
34	21/08/2017		CH <sub>4</sub>																												
			CO <sub>2</sub>																												
			O <sub>2</sub>																												
			Air Pressure																												
35	28/08/2017		CH <sub>4</sub>																												
			CO <sub>2</sub>																												
			O <sub>2</sub>																												
			Air Pressure																												
36	04/09/2017		CH <sub>4</sub>																												
			CO <sub>2</sub>																												
			O <sub>2</sub>																												
			Air Pressure																												
37	11/09/2017		CH <sub>4</sub>																												
			CO <sub>2</sub>																												
			O <sub>2</sub>																												
			Air Pressure																												
38	18/09/2017		CH <sub>4</sub>																												
			CO <sub>2</sub>																												
			O <sub>2</sub>																												
			Air Pressure																												
39	25/09/2017		CH <sub>4</sub>																												
			CO <sub>2</sub>																												
			O <sub>2</sub>																												
			Air Pressure																												
Week No	Date	Operator	Gas	Site Hut	BH1/1	BH2	BH4	BH5	BH7B	BH8	BH9	GW 1	GW 2	GW3	GW4	GW5	GW6	GW7	GW8	LT1	LT2	LT3	LT4	LT5	RC4	RC5	RC6A				

Table 7.5.4 Gas Levels Q4 2017

Week No	Date	Operator	Gas	Site Hut	BH1/1	BH2	BH4	BH5	BH7B	BH8	BH9	GW 1	GW 2	GW3	GW4	GW5	GW6	GW7	GW8	LT1	LT2	LT3	LT4	LT5	RC4	RC5	RC6A								
40	02/10/2017	DR	CH <sub>4</sub>	0.00																															
			CO <sub>2</sub>	0.00																															
			O <sub>2</sub>	20.90																															
			Air Pressure	1008																															
41	09/10/2017	DR	CH <sub>4</sub>	0.00																															
			CO <sub>2</sub>	0.00																															
			O <sub>2</sub>	20.90																															
			Air Pressure	1008																															
42	12/10/2017	DR	CH <sub>4</sub>	0.00																															
			CO <sub>2</sub>	0.00																															
			O <sub>2</sub>	20.90																															
			Air Pressure	1008																															
43	20/10/2017	DR	CH <sub>4</sub>	0.00																															
			CO <sub>2</sub>	0.00																															
			O <sub>2</sub>	20.90																															
			Air Pressure	991																															
44	27/10/2017	DR	CH <sub>4</sub>	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.70	0.00	0.00	0.00	0.00	20.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00							
			CO <sub>2</sub>	0.00	0.10	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.10	0.00	0.00	0.00	0.00	10.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
			O <sub>2</sub>	21.00	21.00	21.00		21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	15.00	21.00	21.00	21.00	21.00	21.00	13.50	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00				
			Air Pressure	1040	1040	1040		1040	1040	1040	1040	1040	1040	1040	1040	1040	1040	1040	1040	1040	1040	1040	1040	1040	1040	1040	1040	1040	1040	1040	1040				
45	06/11/2017	DR	CH <sub>4</sub>	0.00																															
			CO <sub>2</sub>	0.00																															
			O <sub>2</sub>	21.00																															
			Air Pressure	1017																															
46	13/11/2017	DR	CH <sub>4</sub>	0.00																															
			CO <sub>2</sub>	0.00																															
			O <sub>2</sub>	20.90																															
			Air Pressure	1007																															
47	23/11/2017	DR	CH <sub>4</sub>	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.20	0.00	0.00	0.00	0.00	0.00								
			CO <sub>2</sub>	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.60	0.00	0.00	0.00	0.00	5.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00						
			O <sub>2</sub>	20.90	20.90	20.90		20.90	20.90	20.90	20.90	20.90	20.90	20.90	20.90	20.90	20.90	20.40	20.90	20.90	20.90	20.90	16.40	20.90	20.90	20.90	20.90	20.90	20.90	20.90	20.90				
			Air Pressure	1002	1002	1002		1002	1002	1002	1002	1002	1002	1002	1002	1002	1002	1002	1002	1002	1002	1002	1002	1002	1002	1002	1002	1002	1002	1002	1002	1002			
48	27/11/2017	DR	CH <sub>4</sub>	0.00																															
			CO <sub>2</sub>	0.00																															
			O <sub>2</sub>	20.90																															
			Air Pressure	1007																															
49	04/12/2017	DR	CH <sub>4</sub>	0.00																															
			CO <sub>2</sub>	0.00																															
			O <sub>2</sub>	20.90																															
			Air Pressure	1025																															
50	15/12/2017	DR	CH <sub>4</sub>	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.20	0.00	0.00	0.00	0.00	0.00								
			CO <sub>2</sub>	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.60	0.00	0.00	0.00	0.00	5.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00						
			O <sub>2</sub>	20.90	20.90	20.90		20.90	20.90	20.90	20.90	20.90	20.90	20.90	20.90	20.90	20.90	20.40	20.90	20.90	20.90	20.90	16.40	20.90	20.90	20.90	20.90	20.90	20.90	20.90	20.90	20.90			
			Air Pressure	998	998	998		998	998	998	998	998	998	998	998	998	998	998	998	998	998	998	998	998	998	998	998	998	998	998	998	998			
51	23/12/2017	DR	CH <sub>4</sub>	0.00																															
			CO <sub>2</sub>	0.00																															
			O <sub>2</sub>	20.90																															
			Air Pressure	1024																															
52	29/12/2017	DR	CH <sub>4</sub>	0.00																															
			CO <sub>2</sub>	0.00																															
			O <sub>2</sub>	20.90																															
			Air Pressure	983																															

## 7.6 NOISE

### 7.6.1 Introduction

Noise monitoring was not carried out during the reporting period as there was little or no activity on site throughout the year. The most recent results for the site are attached. Activity on the site has decreased significantly since this round of testing and the licensee will formally apply to the Agency to have the noise monitoring requirements of the licence reviewed.

Daytime noise levels were recorded on 13/4/12 at two locations at Tramore Landfill Site, B1 and B2, as specified in the licence monitoring schedule D. These locations are shown in appendix 1. There are limits of 55 dB Leq(30) daytime, and 45 dB Leq(30) night-time imposed as a condition of the licence.

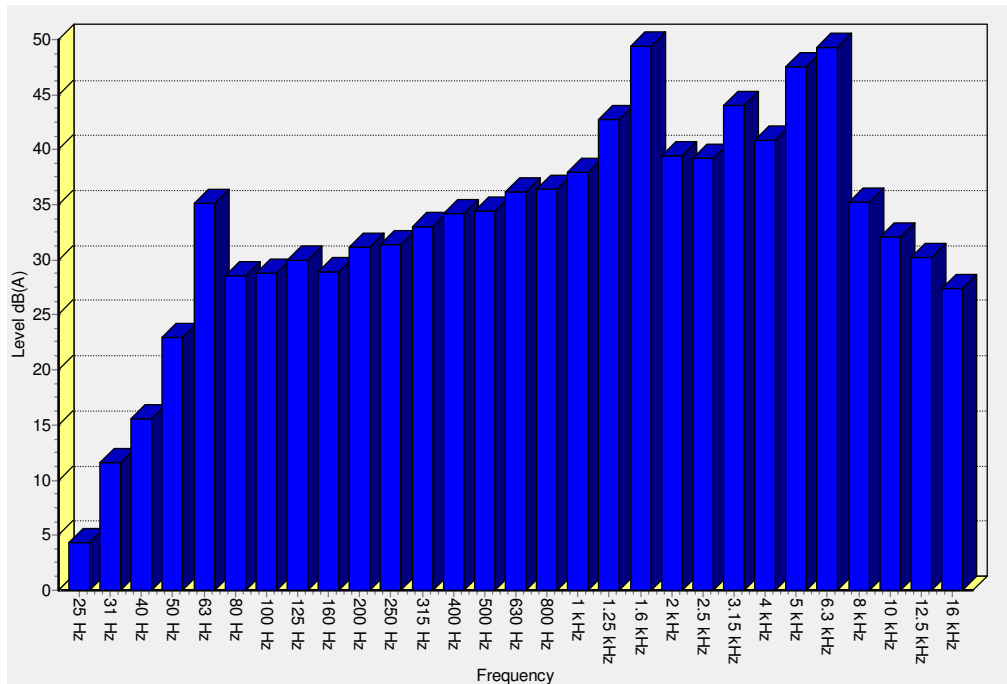
A Cirrus 800A Sound Level Meter was used. The meter was calibrated and checked with a 94 dB calibrator before and after each measurement. Broadband and Frequency Band analysis measurements were conducted at each location. A summary of 2012 results is presented in table 7.6.1, below. Noise monitoring at the landfill was not possible during 2016 due to extensive heavy machinery movements associated with rock armoury and car parking works on the adjoining stretch of beach and adjacent to the main entrance to the site.

### 7.6.2 Summary of 2014 Results / Discussion

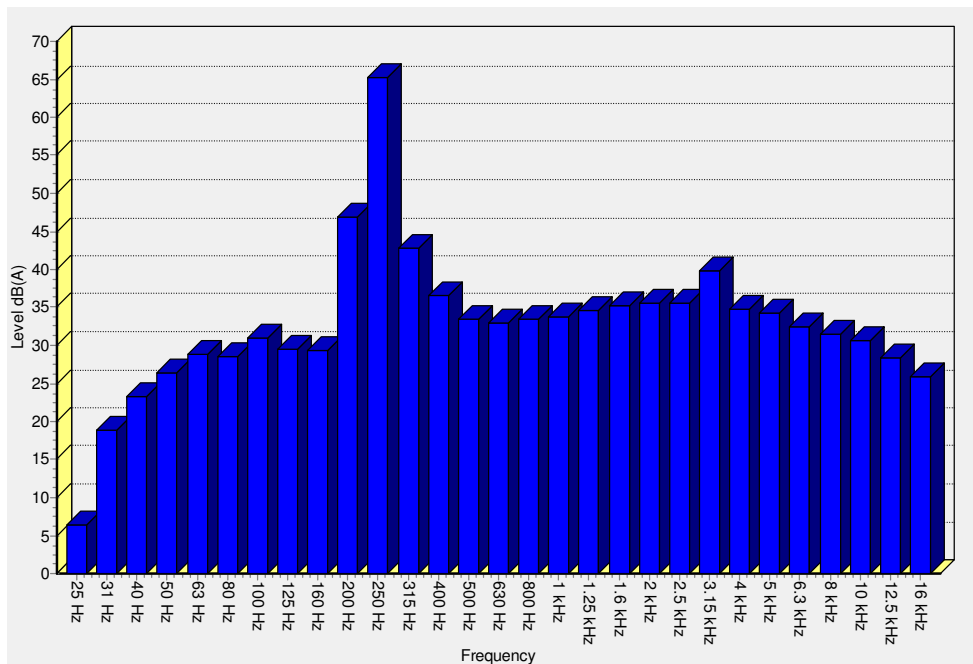
<i>Site</i>	<i>Date of Monitoring</i>	<i>Time of commencement of monitoring</i>	<i>L(A)eq[30mins]dB</i>
B1	28/5/14	13.13	57.5
B2	28/5/14	14.03	60.2

Table 7.6.1 Summary of noise measurements at Tramore landfill 28/5/14.

Average noise levels, LAEQ(30), at sites B1 and B2 were above the daytime limits of 55dB. As the landfill was not operating, this was deemed due to background and traffic noise. Night-time measurements were not made, as the landfill is not operational outside of daytime hours.



**B1 1/3 Octave Noise Analysis, (A weighting) 28/5/14**



**B2 1/3 Octave Noise Analysis, (A weighting) 28/5/14**

Frequency analysis at sites B1 and B2 indicated a broad range of frequencies, consistent with a variety of noise sources, such as wind and machinery and traffic. Some low frequency noise, of unknown origin but perhaps the noise from the seashore, at location B1 was evident. A single tone around 250hz at B2 was detected, source unknown.





### 7.7.1.2 RESULTS

Results of analysis are presented in table 1.

Table 7.8.1. Trace metal concentrations in shellfish samples from Tramore inner backstrand, December 2011 mg/Kg wet weight

PARAMETER mg/Kg wet weight *	Cockle flesh <i>Cardium edule</i>	Mussel flesh <i>Mytilis edulis</i>	Shellfish Quality Standards *	
	December 2011	December 2011	EU Regulation 221/2002/EC	SI No. 268 of 2006
Arsenic	2.8	4.4		5.6
Cadmium	0.098	0.279	1	0.93
Lead	0.294	0.465	1.5	1.4
Zinc	40.5	49.9		744

### 7.7.1.3 COMPARISON WITH STANDARDS

\*EU Commission Regulation 466/2001/EC (as amended by Regulation 221/2002/EC) came into effect on 5<sup>th</sup> April 2002. This set maximum levels for mercury, cadmium and lead in bivalve molluscs of 0.5mg kg<sup>-1</sup>, 1mg kg<sup>-1</sup>, and 1.5mg kg<sup>-1</sup> wet weight respectively.

The EC (Quality of shellfish waters) Regulations, SI No. 268 of 2006 contains guidelines values for heavy metals in shellfish flesh. These standards are specified as dry weight and corresponding wet weight values have been calculated for inclusion in table 7.8.1 above.

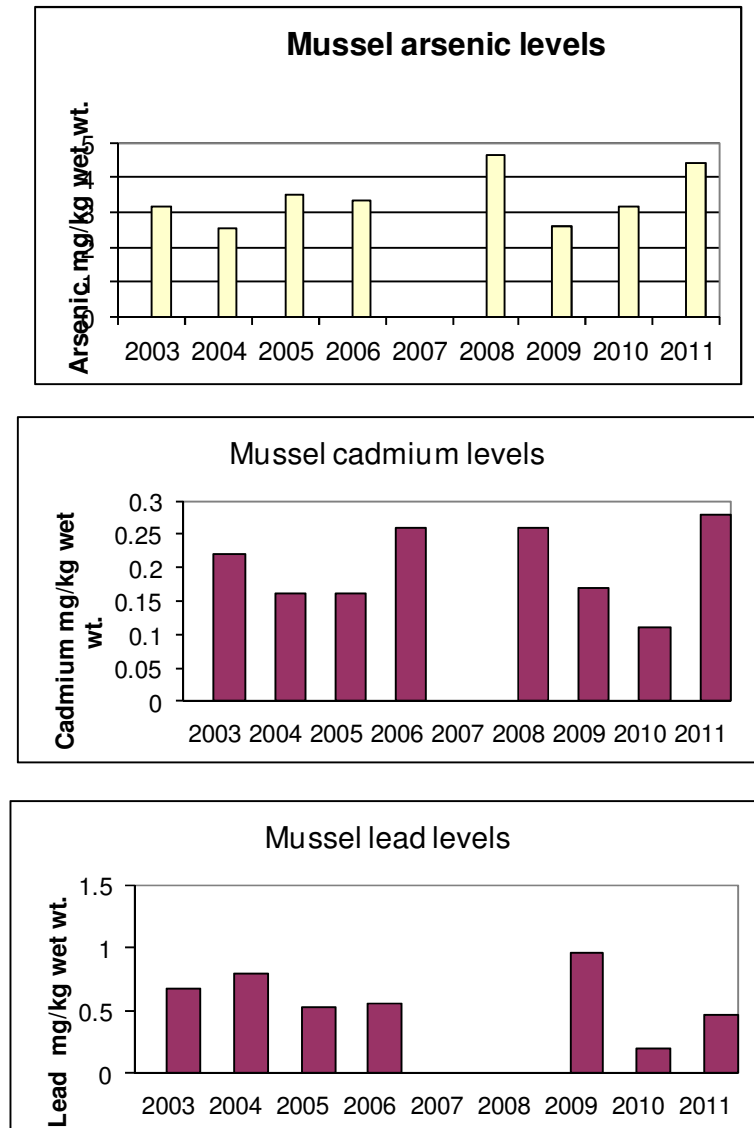
### Discussion

The metals levels in mussel and cockle samples from Tramore backstrand in December 2011 complied with EU and national shellfish quality standards. There were no activities carried out on-site which should cause a change in this status.

#### 7.7.1.4 TRENDS AND COMPARISON WITH PREVIOUS RESULTS

The results obtained for mussels and cockles in the 2011 survey are presented in figure 7.7.2 below for comparison with previous results for this site.

**Figure 7.7.2 Metal concentrations in mussels in Tramore backstrand for years 2003 to 2011**



#### 7.7.1.5 Discussion

Results for 2011 were similar to previous years. Some minor fluctuations from year to year are apparent, but there is no clear trend and the differences are likely due to natural variations. There were no activities carried out on-site which should cause a change in this status.

### 7.7.1.6 COMPARISON WITH OTHER SITES

Trace metal concentrations in mussel samples from Tramore inner backstrand are compared in table 7.8.2 with levels found in the following surveys;

- a) Marine Institute survey of 25 shellfish growing areas around the Irish coast, sampled 2004 and 2005.
- b) EPA surveys of Waterford and Wexford Harbours, 2004 and 2005.

**Table 7.7.2. Trace metal concentrations in mussels from Tramore backstrand, and at other estuarine and coastal sites**

	Tramore inner backstrand	Wexford Harbour,	Waterford Harbour	Metals levels in mussel samples from 25 locations on the Irish coast, Marine Institute Surveys 2004 - 2005 Refs 1 and 2		
mg/kg wet weight		EPA survey, Ref 3	EPA survey, Ref 3			
		2004	2005			
	07 December 2011	Mean of 4 samples	Mean of 4 samples	Mean	90% ile	Max
Arsenic	4.43	3.6	2.6			
Cadmium	0.28	0.3	0.25	<b>0.15</b>	<b>0.2</b>	<b>0.35</b>
Chromium	0.93	4	1.4	<b>0.18</b>	<b>0.33</b>	<b>0.66</b>
Copper	NR	2.2	2.9	<b>1.39</b>	<b>1.57</b>	<b>1.97</b>
Lead	0.47	1.3	2.1	<b>0.23</b>	<b>0.52</b>	<b>0.85</b>
Zinc	49.98	15.6	25.4	<b>15.69</b>	<b>19.1</b>	<b>27</b>

### 7.7.1.7 Discussion

Metals levels recorded in Tramore backstrand mussels in December 2011 were similar to that found at other estuarine and coastal sites around the country. There were no activities carried out on-on site which should cause a change in this status.

## **7.7.2 MICROBIOLOGICAL ANALYSIS**

### **7.7.2.1 Methods**

Samples of cockles and mussels were collected as described in section 7.8.1.1 above. Testing of intervalvular fluids for faecal coliforms was carried out at Waterford County Council Adamstown Laboratory. Results are compared with EC (Quality of Shellfish Waters) Regulations No. 268 of 2006, schedule 4.

### **7.7.2.2 Results**

Sample	Faecal coliforms per 100 mls	EC (Quality of Shellfish Waters) Regulations No. 268 of 2006
Tramore backstrand Cockles	<100	≤300 per 100 mls in intervalvular liquid
Tramore backstrand Mussels	<100	

### **7.7.2.3 Discussion**

The faecal coliform counts in cockles and mussels intervalvular liquid were in compliance with regulatory guidelines. There were no activities carried out on-site which should cause a change in this status.

## 7.8.2. Sediment.

### 7.8.2.1 Introduction

A composite sample of sediment (approx 2 kg) was taken on 7/12/11 at ten sampling points along a sampling zone adjacent to Tramore landfill, see fig 7.8.1 above. This was hand mixed on-site, and a portion (approx 200g) taken for analysis. The composite sample was dried at 105 deg for two days, and powdered with mortar and pestle in Waterford County Council's laboratory. Portions of the powdered samples were analysed for metals at Environmental Services Laboratory, Cork. QC and reference materials were processed with the samples.

### 7.8.2.2 Results

Parameter	Units	Tramore inner backstrand, December 2010	Sediment Quality Standards			
			Baseline *	Threshold **	ERL ***	Proposed Irish sediment guidance levels ****
Arsenic	mg/Kg dry wt.	5.8				
Cadmium	mg/Kg dry wt.	<0.5	0.5	1.5	5	1
Chromium	mg/Kg dry wt.	21.5	5	50	80	100
Copper	mg/Kg dry wt.	9.85	5	50	70	50
Iron	mg/Kg dry wt.	15,975				
Lead	mg/Kg dry wt.	13				50
Zinc	mg/Kg dry wt.	55.8	20	100	120	400

Table 4. Trace metal concentrations in sediment from Tramore inner backstrand, and comparison with environmental standards

### 7.8.2.3 Comparison with Standards.

Based on field investigations and literature data, Jeffrey et al (1995) ref 4, established baseline and threshold values for organic matter and heavy metals in estuarine sediments.

\* The baseline concentration is defined as “that of the natural unpolluted estuary and corresponds to the authors views of the pre-industrial situation for sediments”.

\*\* The threshold is “the pollutant concentration beyond which deleterious environmental change is observable”.

\*\*\* The National Oceanic and Atmospheric administration in USA (Long and Man, 1995) also established sediment quality guidelines. The guidelines are based on a review of numerous studies of the correlation between the toxicity of sediments and the content of pollutants. The ERL limits shown represent the concentration above which there may be a risk of deleterious impacts on fauna.

\*\*\*\* Proposed new Irish sediment guidance levels. Cronin et al, *Guidelines for the assessment of dredge material for disposal in Irish waters*. Marine Institute, 2006

### Discussion

Chromium, Copper and Zinc at Tramore were above baseline levels. However, all values were below threshold and ERL limits, and proposed Irish standards for non-contaminated sediment, and were well below concentration where deleterious impacts on fauna can be expected. There were no activities carried out on-site which should cause a change in this status.

## 7.8.2.4 Comparison with previous surveys and other sites

**Table 5. Trace metal concentration in sediment from Tramore inner backstrand and other estuarine and coastal sites**

Parameter	Units	Tramore Backstrand									Waterford Estuary ref 3	Wexford Hbr ref 3
		2011	2010	2008	2006	2005	2004	2003	2002	1998	2001	2004
Arsenic	mg/kg dry wt	5.8	8.5	6.1	4.96	5.2	5.2	7.1	5.6		8	10
Cadmium	mg/kg dry wt	<0.5	0.2	<0.5	0.063	0.1	<0.44	<0.04	0.123	0.42	0.04	0.3
Chromium	mg/kg dry wt	21.5	27.5	16.4	16.4	14.3				65.6	35	31
Copper	mg/kg dry wt	9.85	2.1	10.6	6.98	8.1	10.7	8.6	5.4	11	9.8	13
Iron	mg/kg dry wt	15975	15245	13094	12,880	9721	13106	14048	15500		17466	24689
Lead	mg/kg dry wt	13	14.7	19.4	9.6	11.3	14.5	11	15.1		26	20
Manganese	mg/kg dry wt		258	242	225	215	263	398	270		622	385
Zinc	mg/kg dry wt	55.8	54.8	52.6	41.2	34	48.5	35	51.4	55.3	141	83

### 7.8.2.5 Discussion

December 2011 Tramore backstrand sediment metal levels were similar to levels found at that site in previous years. The majority of sediment metal levels at Tramore backstrand were lower than that found in samples from Waterford and Wexford Estuaries. There were no activities carried out on-site which should cause a change in this status.

## **7.9 CONCLUSIONS – Impact of Tramore Landfill on Surrounding Environment**

There is no indication of any effect from the landfill on ambient surface waters.

The results of groundwater monitoring are in line with results from previous rounds of testing carried out since 1999. As indicated in previous reports, it appears that groundwater quality within the current working area is impacted by leachate from the landfill, with elevated ammonia and iron. However heavy metals and organic concentrations are low at all boreholes. Groundwater outside the landfill site was generally satisfactory.

Leachate quality was as expected for a landfill accepting mainly domestic and inert waste. Heavy metal and organic content were low. Based on chemical analysis, and available dilution, no significant environmental effect from landfill leachate is expected. Leachate boreholes appear to be drying up, most likely as an effect of landfill capping.

The metal concentrations and microbial quality in shellfish from Tramore inner backstrand in December 2011 and previous years complied with relevant shellfish quality standards and were similar to that found at other estuarine and coastal sites around the country. Monitoring results indicate that the landfill is having no significant impact on adjacent sediment and shellfish. There were no activities carried out on-site which should cause a change in this status.

The environmental monitoring carried out during 2016 indicates that the landfill had no detrimental impact on the surrounding environment.

## **7.10 Ecological Report and Survey**

As there were little or no works carried out within the body of the landfill during the reporting period it was felt that it was not necessary to carry out annual biological/ecological assessments. The licensee will formally apply to the Agency to have the requirement to have biological/ecological assessments carried out on an annual basis changed.

### **8. Topographic Survey**

As there were little or no works carried out within the body of the landfill during the reporting period it was felt that it was not necessary to carry out a further topographical survey from that previously submitted. The licensee will formally apply to the Agency to have the requirement to have a topographical survey carried out on an annual basis changed.

### **9. Slope Stability Assessment**

As no significant works were carried out on the main landfill body during the reporting period there was no significant slope slippage in 2015. The licensee will formerly apply to the Agency to have the frequency at which the Slope Stability Assessment carried out reduced.

## **10. Proposed Development of the Facility and Timescales for such development**

### **a) Landfill Capping and Restoration**

A Closure Restoration and Aftercare Plan was sent to the EPA during 2009 and capping was completed in 2009.

### **b) Landfill Gas Management**

Under condition 3.12.1 of the Waste Licence “infrastructure for the active collection and flaring of landfill gas has been installed at the facility. The flare compound is an enclosed type design”. The gas collection system was installed in tandem with the final capping of the landfill. Gas wells were bored in 2006 and the quantity of gas in these boreholes was recorded. The permanent flare was installed in April 2009. Gas field balancing is now carried out at regular intervals and a telemetry system to alert the licensee of flare irregularities has also been installed. The licensee has now reached an agreement with the flare manufacturers Automatic Flare Systems Ltd to carry out



monitoring of the flare unit in accordance with Condition 6.1 and Schedule C.1.2 of the licence.

Unfortunately there have been ongoing problems with analysis of gas levels throughout the reporting period due to the failure of the gas analyser within the flare network. Gas levels throughout the year have been assessed using the GA5000 hand held analyser. The licensee is currently in the process of reviewing analysis options in this regard with the options being to either to replace the existing analyser or replace the entire flare with a lo-cal option. Flare servicing reports are included in Appendix H

### **11. Volume of leachate produced and volume of leachate transported / discharged offsite.**

The annual volume of leachate generated was estimated for the Waste Licence Application in 1998 to be in the order of 14087m<sup>3</sup>. A saline intrusion study was conducted on the Landfill in 2005 and submitted to the Agency. A leachate extraction system has been installed in tandem with the final capping of the landfill. Leachate extraction wells were bored in 2006 and wells were monitored. These wells are now connected and pumping trials began in early 2009. A leachate tank was installed which collects leachate pumped from these wells. This leachate will be transported to Tramore Waste Water Treatment Plant. Leachate levels, which were generally low appear to have been reduced further due to the capping works, which will keep rainwater from entering the landfill, also the pumping of the leachate wells will reduce the leachate head. Leachate will be brought to the Tramore Waste Water Treatment plant under agreement in accordance with Condition No. 5.8.1 of the facility licence.

There was an extremely low volume of leachate produced on site during the reporting period and the leachate storage tank was only emptied on one occasion. The removal records are included in Appendix J

### **12. Report on Development works undertaken during the Reporting Period Remediation of Landfill**

No significant works other than those covered by agreed equipment maintenance contracts were carried out on site during the reporting period.

### **13. Annual Water Balance Calculation and Interpretation**

The annual water balance could not be determined as the site is subject to saline intrusion. Meteorological data from Johnstown Castle weather station is collected for the facility on a daily basis. (Appendix E).

**14. Report on the progress towards achievement of the Environmental Objectives and Targets contained in the previous year's report.** *(Please refer to the <sup>AER</sup> 2008 for the previous year's Objectives and Targets).*

1. All site infrastructures have been maintained to the standards outlined in Condition 3 of the Waste Licence.
2. The effect of environmental nuisances was kept to a minimum during the reporting period. There had been an increase in unauthorised dumping in and around the site boundaries since the closure of the Civic Amenity site but our litter wardens have remained on top of this and the occurrences have lessened as a result of the ongoing works on the adjacent relief road.
3. Monitoring sites within the landfill area, had none or only trace levels of methane and carbon dioxide (<1%).
4. The Monitoring Programme as outlined under condition 8 and Schedule D of the Waste Licence has been maintained during the reporting period and all reports have been submitted to the Agency.
5. [There is a comprehensive set of records for 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013,2014, 2015,2016 and 2017 held at the Council Office.](#)
6. No emergency or significant complaint occurred on site during the reporting period

**15. Schedule of Environmental Objectives and Targets for the forthcoming year**

**Objective 1** – To maintain site infrastructure to the standards outlined in Condition 3 of the Waste Licence

**Target 1.1** - Any defect to the existing infrastructure will be repaired / replaced as quickly as possible on an ongoing basis.

**Objective 2** – To minimise the effect of environmental nuisances

**Target 2.1** – To implement the procedures outlined in Condition 7 of the Waste Licence on an ongoing basis throughout the year. Waterford County Council have

endeavoured to achieve compliance with this condition and have to date been successful.

**Objective 3** – That no specified emissions from the facility, shall exceed the limit values, set out in Condition 6 and Schedule C of the Waste Licence.

**Objective 4** – To maintain the Monitoring Programme as outlined in Condition 8 and Schedule D of the Waste Licence.

**Target 4.1** – To carry out the monitoring programme as outlined in Condition 8 and Schedule D of the Waste Licence.

**Target 4.2** – To submit Monitoring Reports to the Agency within the timescale as outlined in Schedule E of the Waste Licence.

**Objective 5** – To establish good record keeping and that all records are held at the facility office to comply with Condition 10 of the Waste Licence.

**Objective 6** – That no emergency situation occurs on the site.

**Target 6.1** – Ensure the contingency arrangements as outlined in Condition 9 of the Waste Licence are implemented throughout the year and to follow the procedure set out in the Emergency Response Procedures.

**Objective 7** – Ensure the there is sufficient funds available to comply with Condition 12 of the Waste Licence.

The gate fee was the only avenue available to Waterford County Council to raise funds to ensure financial stability of the facility. As the Civic Amenity Facility has now been enclosed indefinitely the licensee will endeavour to identify other means of funding the facility.

## **16. Reported Incidents and Complaints Summary**

### **16.1 Incidents**

With regard to Condition 11.3 of the issued licence no incidents took place during the reporting period.

### **16.2 Complaints**

No complaints were received during the reporting period.

## **17. Reports on Financial Provisions**

Waterford County Council is responsible for providing annual fees to the Agency for monitoring and inspection of the site. The annual fee for 2017 for landfill monitoring was €46,000 and €22,704. for the licence. With regard to the details of financial provisions required under Condition 12.2.1 which are to be set aside in relation to the prevention of environmental damage and in order to underwrite the costs for remedial actions following anticipated events or incidents the licensee will establish, through consultation with the Agency, a timeframe for the provision and value of the required fund.

## **18. Management and Staffing Structure of the Facility**

This can be viewed in **Appendix F** – Management Structure of Waterford City and County Council.

## **19. Programme for Public Information**

A record of all monitoring results and reports are maintained both at the facility office and within the Environment Section of Waterford City and County Council at the Civic Offices in Dungarvan Co. Waterford. As the site office has been removed from the site and the Tramore Area Office has closed, all records will be accessible in Dungarvan or Waterford City.

## **20. Reports on Training of Staff**

Both the Facility Manager and Deputy Manager have completed the Fás Waste Management Training Course and Fás Safe Pass program along with the IOSS Safety Managers course.

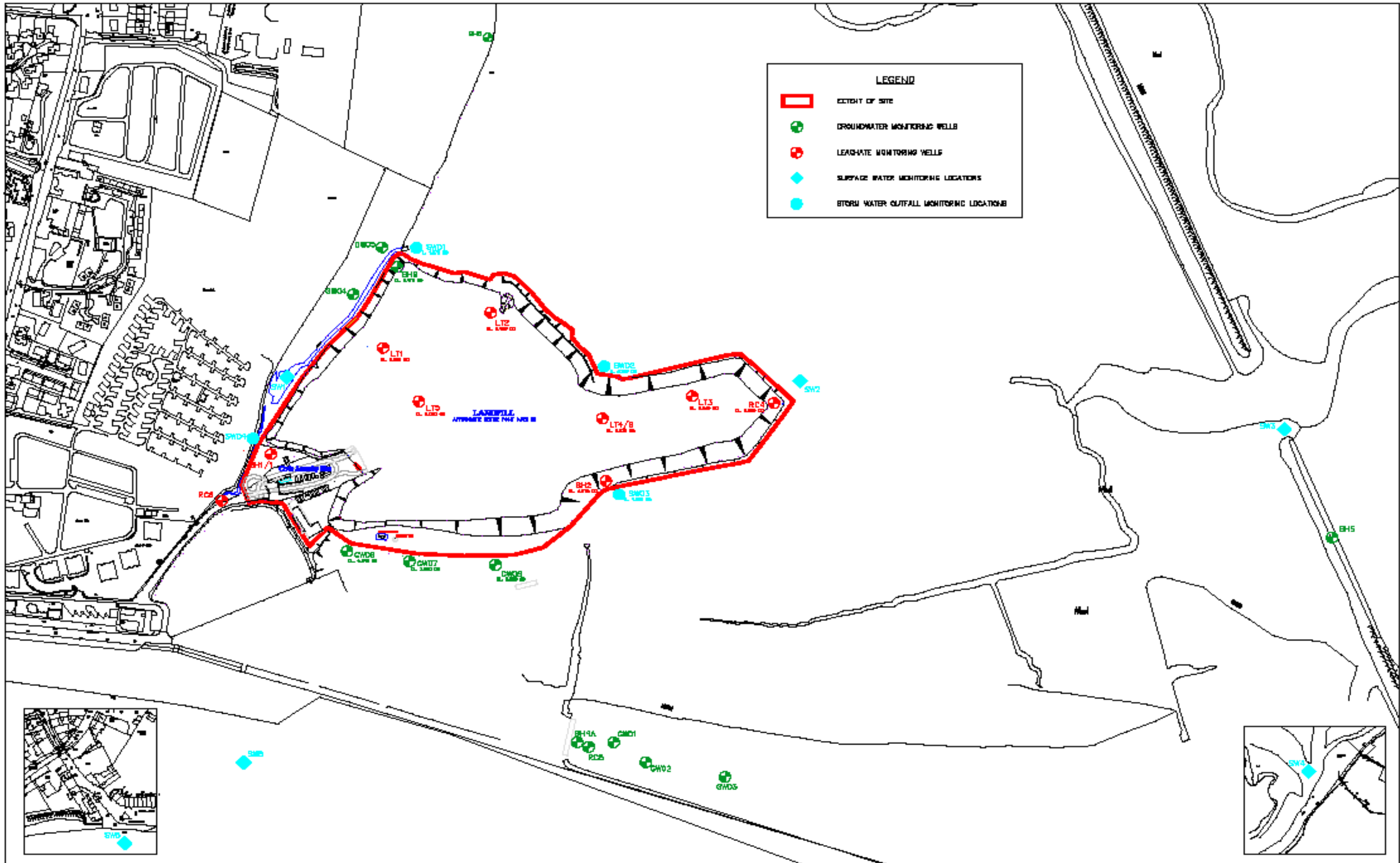
## **21. Maintenance Program**

The licensee had adopted an electronic Preventative Maintenance Program (PEMAC by MJM Technologies). This Program covers all aspects of site maintenance and

include monitoring and reporting, health and safety, maintenance and all training. All records and schedules are also maintained using the Project Vision maintenance system.

**Appendix A**

Monitoring Locations



**LEGEND**

	BODY OF SITE
	GROUNDWATER MONITORING WELLS
	LEACHATE MONITORING WELLS
	SURFACE WATER MONITORING LOCATIONS
	STORM WATER OUTFALL MONITORING LOCATIONS



**WATERFORD COUNTY COUNCIL**  
 Comhairle Chontae Phart Laige  
 Civic Offices, Davitt's Quay, Dungarvan  
 Tel: 053 22000  
 Fax: 053 46048

**TRAMORE LANDFILL SURFACE WATER MONITORING AND GROUNDWATER/LEACHATE MONITORING WELL LOCATIONS**

Drawn by	David Regan
Drawing No.	TRM1 1
Date	December 2010
Scale	Not to Scale

**Appendix B**  
Surface Water Results



Parameters	Units	Tramore Landfill W0075-02 Quarter 1 2017					
		Surface Water					

LABORATORY NUMBER		2908	2909	2910	2911	2912	2913
Sampling Location		SW 1	SW 2	SW 3	SW 4	SW 5	SW 6
Date sampled	8-9/3/2017	09-Mar	08-Mar	08-Mar	08-Mar	08-Mar	08-Mar
Sampled by	Jim McGarry	JMcG	JMcG	JMcG	JMcG	JMcG	JMcG
Time sampled		12:10	12:55	14:45	12:30	16:50	16:00

Visual Inspection/Odour		clear	clear	clear	clear	clear	clear
Temp	oC	9.3	10.1	10	10.7	9.4	9.5
Dissolved Oxygen	% sat	56	101	103	122	96	97
pH	units	7.1	8.1	8.1	8.4	7.7	7.9
Cond	uS/cm	1635	nm	nm	nm	nm	nm
Salinity	%	nm	29.6	33.5	28.8	26.9	26.3
Suspended solids, Total	<2 mg/l	<2	20.5	20.8	14.7	43.4	25.0
Ammoniacal Nitrogen as N	<0.2 mg/l	4.07	<0.2	<0.2	<0.2	<0.2	<0.2
BOD	mg/l	<5	<5	<5	<5	<5	<5
COD	<7 mg/l	23.65	388	159	540	528	458
Chloride( asCl)	<2 mg/l	269	1/400	19000	1/200	16100	15300

**Parameters**                      **Units**                      **Tramore Landfill W0075-02 Quarter 2 2017**  
**Surface Water**

<b>LABORATORY NUMBER</b>		<b>3240</b>	<b>3241</b>	<b>3242</b>	<b>3243</b>	<b>3244</b>	<b>3245</b>
<b>Sampling Location</b>		<b>SW 1</b>	<b>SW 2</b>	<b>SW 3</b>	<b>SW 4</b>	<b>SW 5</b>	<b>SW 6</b>
<b>Date sampled</b>	6-7/6/2017	07-Jun	06-Jun	06-Jun	07-Jun	07-Jun	07-Jun
<b>Sampled by</b>	Jim McGarry	JMcG	JMcG	JMcG	JMcG	JMcG	JMcG
<b>Time sampled</b>		13:40	18:00	12:50	14:00	13:20	13:00

Visual Inspection/Odour		light brown	clear	clear	clear	clear	clear
Temp	oC	13.5	14.8	15.6	15.5	14.8	14.1
Dissolved Oxygen	% sat	62	106	103	127	100	99
pH	units	7.1	8.2	8.2	8.5	8.1	8.1
Cond	uS/cm	1498	nm	nm	nm	nm	nm
Salinity	%	nm	34.7	22.3	32.1	34.9	35.1
Suspended solids, Total	<2 mg/l	15.7	23	310	33.6	28.8	33.2
Ammoniacal Nitrogen as N	<0.2 mg/l	4.96	<0.2	0.451	<0.2	<0.2	<0.2
BOD	mg/l	6	2	<5	2	<2	<2
COD	<7 mg/l	45.4	442	460	595	630	835
Arsenic	<0.5 ug/l	1.13	1.35	1.87	1.39	1.12	1.18
Chloride( asCl)	<2 mg/l	216	19700	13600	18200	19700	19700

Parameters	Tramore Landfill Quarter 3(Annual) 2017						
	Units	Surface Water					
LABORATORY NUMBER		3733	3734	3735	3736	3737	3738
Sampling Location		SW 1	SW 2	SW 3	SW 4	SW 5	SW 6
Date sampled	24-25/7/2017	24-Jul	24-Jul	24-Jul	24-Jul	25-Jul	25-Jul
Sampled by	Jim McGarry	JMcG	JMcG	JMcG	JMcG	JMcG	JMcG
Time sampled		15:50	18:40	12:00	18:10	20:15	20:00
Visual Inspection/Odour	light brown/yes	foul	clear	clear	clear	clear	clear
Temp	oC	16.9	19.4	21.8	2.7	17.6	19.2
Dissolved Oxygen	% sat	9	108	111	126	109	99
pH	units	6.5	8.2	8.1	8.1	8.3	8
Cond	uS/cm	980	nm	nm	nm	nm	nm
Salinity	%	nm	34.8	34.4	35.4	34.7	34.9
Suspended solids, Total	<2 mg/l	31.7	35.1	41.5	26.6	73.9	40.9
Ammoniacal Nitrogen as N	<0.2 mg/l	4.77	<0.2	<0.2	<0.2	<0.2	<0.2
BOD	mg/l	53	<5	<5	4	<2	<5
COD	<7 mg/l	68	564	504	374	892	576
Arsenic	<0.5 ug/l	3.18	6.64	7.9	3.45	1.87	1.91
Boron	<5 ug/l	nm	nm	nm	nm	nm	nm
Cadmium	<0.08 ug/l	<0.08	<0.48	<0.48	<0.08	<0.08	<0.08
Chromium	<1 ug/l	<1	<6	<6	<1	<1	<1
Copper	<0.3 ug/l	0.391	<1.8	<1.8	0.943	0.806	0.538
Lead	<0.2 ug/l	<0.2	<1.2	<1.2	<0.2	<0.2	<0.2
Manganese	<1 ug/l	491	6.73	60.5	26.8	3.75	2.28
Zinc	<1 ug/l	1.52	<6	<6	<1	<1	<1
Mercury	<0.01 ug/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sulphate	<2 mg/l	17.1	2760	2740	2810	2760	2740
Chloride( asCl)	<2 mg/l	142	19300	19500	19700	20000	20700
Phosphate(ortho) as P	<0.02 mg/l	0.359	<0.02	<0.02	<0.02	0.032	<0.02
Total Oxidised Nitrogen as N	<0.1 mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cyanide, total	<0.05 mg/l	nm	nm	nm	nm	nm	nm
Calcium	<0.012 mg/l	79.9	430	422	435	398	350
Sodium	<0.076 mg/l	95.3	10900	11500	12000	9950	8980

Parameters		Tramore Landfill Quarter 4 2017					
Units		Surface Water					
LABORATORY NUMBER		4121	4122	4123	4124	4125	4126
Sampling Location		SW 1	SW 2	SW 3	SW 4	SW 5	SW 6
Date sampled	7-9/11/2017	09-Nov	07-Nov	07-Nov	07-Nov	07-Nov	07-Nov
Sampled by	Jim McGarry	JMcG	JMcG	JMcG	JMcG	JMcG	JMcG
Time sampled		14:05	17:35	14:45	13:30	14:00	16:40
Visual Inspection/Odour		cloudy /light brown	clear	clear	clear	clear	clear
Temp	oC	10.9	9.4	10.3	11.6	11.6	11.2
Dissolved Oxygen	% sat	34	94	99	134	101	101
pH	units	7.0	7.9	8.1	8.2	8	8.1
Cond	uS/cm	1707	nm	nm	nm	nm	nm
Salinity	%	0.7	26.9	23.4	27.5	34.8	34.8
Suspended solids, Total	<2 mg/l	32.3	44.8	33.7	24.1	56.3	43.5
Ammoniacal Nitrogen as N	<0.2 mg/l	3.03	1.5	0.514	0.512	1.41	1.23
BOD	mg/l	4	2	1	<2	1	<2
COD	<7 mg/l	39.6	398	382	493	503	504
Arsenic	<0.5 ug/l	2.63	2.68	5.84	4.82	5.39	5.62
Chloride( asCl)	<2 mg/l	531	15800	14100	16000	19600	19300

**Appendix C**  
Ground Water Results

**Tramore Landfill W0075-02 Quarter 1 2017 Ground Water**

LABORATORY NUMBER		2914	2915	2916	2917	2918	2919	2920	2922	2923	2924	2925	2926	2927	2928	2929
Sampling Location		BH1	BH2	BH5	BH8	BH9	RC4	RC5	GW1	GW2	GW3	GW4	GW5	GW6	GW7	GW8
Date sampled		8-9/3/2017	09-Mar	08-Mar	08-Mar	09-Mar	09-Mar	08-Mar	09-Mar	08-Mar	08-Mar	08-Mar	09-Mar	09-Mar	09-Mar	09-Mar
Visual Inspection/Odour			brown		clear	muddy			light	rusty		clear	clear	light		
clear-yes/no	odour-	brown/	w/sedi-	yes /	w/sed /	brown	clear/	clear	grey	brown/	clear/	w/sed /	w/sed /	brown	brown	brown/
yes/no		yes	ment/	no	no	/ no	no	/no	/yes	no	no	no	no	/ no	no	no
Groundwater Level	m	2.7	4.7	2.6	6.2	6	4.5	22.3	5.7	6	1.4	3.2	7.1	3.2	7.3	4.2
Temp	oC	10	12.7	10	10.6	11.6	12.3	12.1	11.1	10	9.7	10.6	11.5	9.1	9.4	9.4
Dissolved Oxygen	% sat	54	85	76	92	58	72	57	72	93	53	73	99	51	52	55
pH	units	6.8	7	7.7	7.5	7.1	7.2	6.9	7.2	7.3	7.0	7.2	7.6	6.8	7.0	7.1
Cond	uS/cm	2750	nm	nm	3200	1088	nm	nm	nm	nm	nm	1141	987	2440	1845	1803
Salinity	%	nm	10.1	26.7	nm	nm	32.9	30.6	7.3	9.8	9.7	nm	nm	nm	nm	nm
Total Organic Carbon	<3 mg/l	nm	18.6	<6	nm	nm	<3	nm	9.16	11.3	10.1	nm	nm	nm	nm	nm
Ammoniacal Nitrogen as N	<0.2 mg/l	11.2	32.1	5	<0.2	0.643	5.15	33.1	0.746	1.88	0.573	<0.2	<0.2	1.79	9.4	11.6
Chloride( asCl)	<2 mg/l	359	5380	15200	732	132	18000	17500	3540	5430	5500	94.7	120	354	203	212
Total Oxidised Nitrogen	<0.1 mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.12	<0.1	<0.1	<0.1
Sodium	<0.076 mg/l	245	2960	14100	532	101	6710	8650	2370	2940	3570	76.4	74.9	153	104	142
Potassium	<1 mg/l	18.2	129	550	9.95	5.59	251	194	60.6	81.7	99.3	<1	<1	7.81	14.2	17.7
Iron	<0.019 mg/l	15.3	3.13	<1.9	<0.019	0.334	<1.9	1.44	<0.19	<0.19	0.959	<0.019	<0.019	6.65	7.04	6.38
Total Coliforms	No/100mls	0	0	0	0	0	0	0	12	0	9	0	0	0	0	0
E. coli	No/100mls	0	0	0	0	0	0	0	12	0	9	0	0	0	0	0
Phenols, Total detected 5 **	<0.025 mg/l	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025

**Atypical Results**

Comments: v.little purge

\*\* Individual phenols are contained in the accompanying Certs of Analysis.

### Tramore Landfill Quarter 2 2017 Ground Water

LABORATORY NUMBER	3246	3247	3248	3249	3250	3251	3252	3254	3255	3256	3257	3258	3259	3260	3261
Sampling Location	BH1	BH2	BH5	BH8	BH9	RC4	RC5	GW1	GW2	GW3	GW4	GW5	GW6	GW7	GW8
Date sampled	6-7/6/2017	06-Jun	06-Jun	06-Jun	07-Jun	07-Jun	06-Jun	06-Jun	06-Jun	06-Jun	06-Jun	06-Jun	06-Jun	06-Jun	06-Jun
Sampled by	Jim McGarry	JMcG	JMcG	JMcG	JMcG	JMcG	JMcG	JMcG	JMcG	JMcG	JMcG	JMcG	JMcG	JMcG	JMcG
Time sampled		11:55	17:35	12:35	11:35	11:55	18:05	14:25	16:05	13:35	13:15	15:25	15:10	17:15	16:25

Visual Inspection/Odour clear- yes/no odour- yes/no	yes/yes	no/no	yes/no	no/no	no/no	yes/no	yes/no	no/no	no/no	no/no	no/no	no/no	no/no	no/yes slight	cloudy/ no	grey/ no
Ammoniacal Nitrogen as N	<0.2 mg/l	28	31.5	2.81	0.806	0.252	5.71	32.5	1.18	1.91	0.515	0.278	<0.2	7.38	10.4	13
Chloride	<2 mg/l	955	5010	15600	140	580	18500	17800	5070	5330	5340	89.9	115	257	215	200
Sodium	<0.076 mg/l	631	2820	8420	107	359	10400	11000	2710	2590	277	75.8	76.9	138	124	135
Potassium	<1 mg/l	35.7	127	307	6.91	9.14	358	216	86.1	78.2	8.42	1.32	1.16	13	15.5	19.1
Phenols, Total detected 5	<0.025 mg/l	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025
Arsenic	<0.5 ug/l	0.985	8.88	0.98	5.93	<0.5	1.6	3.22	2.35	2.95	2.08	<0.5	<0.5	174	5.16	6.02
Iron	<0.019 mg/l	6460	11000	68.3	93		668	1220	221	114	103	62.5	62	6920	11200	5830
Total Coliforms	No/100mls	0	0	0	>100	0	0	0	0	0	0	0	0	0	2	1
E. coli	No/100mls	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1
Saline Total Oxidised Nitrogen as N	<0.07 mg/l	0.108	0.143	1.6	<0.1	<0.1	0.122	0.095	0.309	0.184	0.238	0.15	0.579	0.131	0.15	0.122
Comments:			grey	v.little purge	sed	sed										

Atypical Results

### Tramore Landfill Quarter 3 (annual) 2017 Ground Water Results

Parameters	Units	BH1	BH2	BH5	BH8	BH9	RC4	RC5	GW1	GW2	GW3	GW4	GW5	GW6	GW7	GW8
Sampling Location		BH1	BH2	BH5	BH8	BH9	RC4	RC5	GW1	GW2	GW3	GW4	GW5	GW6	GW7	GW8
Date sampled	24-25/7/2017	24-Jul	25-Jul	24-Jul	24-Jul	24-Jul	25-Jul	24-Jul	24-Jul	24-Jul	24-Jul	24-Jul	24-Jul	24-Jul	24-Jul	24-Jul
Visual Inspection/Odour																
clear- yes/no																
odour- yes/no		no/yes	no/yes	no/yes	no/no	no/no	no/no	no/no	sl	no/no	no/no	no/no	no/no	yes/no	cloudy / yes	grey / yes
Ammoniacal Nitrogen as N	<0.2 mg/l	26.2	28	5	<0.2	0.437	4.9	33	1.34	2.15	0.617	0.349	<0.2	8.08	10.9	14.5
Fluoride	<0.5 mg/l	<0.5	<0.5	0.698	<0.5	<0.5	1.06	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Arsenic	<0.5 ug/l	1.77	12.4	8.77	1.69	4.3	1.95	12.5	10.6	6.15	5.36	1.03	<0.5	154	0.961	7.67
Boron	<5 ug/l	623	1470	2990	142	71	3150	1060	667	762	972	51.2	27.1	175	52.9	316
Cadmium	<0.08 ug/l	<0.08	<0.08	<0.48	<0.08	<0.08	<0.08	<0.88	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
Chromium	<1 ug/l	<1	<1	<6	<1	<1	<1	<11	<1	<1	<1	<1	<1	<1	<1	<1
Copper	<0.3 ug/l	<0.3	<0.3	<1.8	<0.3	<0.3	0.408	<3.3	<0.3	0.304	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Lead	<0.2 ug/l	<0.2	<0.2	<1.2	<0.2	<0.2	<0.2	<2.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Manganese	<1 ug/l	936	1330	282	604	1550	5870	718	524	1050	230	517	258	1810	521	1990
Zinc	<1 ug/l	1.4	4.98	<6	2.31	1.59	<1	<11	1.27	4.46	5.93	4.76	1.21	2.75	3.5	<1
Mercury	<0.01 ug/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sulphate	<2 mg/l	<2	479	2060	117	28.1	2490	1770	426	563	882	61.7	41.7	<2	7.2	<2
Chloride( asCl)	<2 mg/l	767	5300	15900	650	116	19200	17900	3150	4960	6620	96.3	113	237	219	210
Phosphate(ortho) as P	<0.02 mg/l	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.0486	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Total Oxidised Nitrogen as N	<0.1 mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.36	<0.1	<0.1	0.144	0.857	<0.1	<0.1	<0.1
Cyanide, total	<0.05 mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Calcium	<0.012 mg/l	176	274	467	95.9	61.9	496	527	292	478	493	148	109	269	145	191
Sodium	<0.076 mg/l	591	2780	9180	398	94.7	9820	10700	2060	2390	3630	91.4	85.3	153	91	163
Magnesium	<0.036 mg/l	58.6	309	1030	47.7	22.2	1160	1160	211	313	384	28.3	23.2	30.2	28.1	35
Potassium	<1 mg/l	31	142	345	8.87	5.02	385	229	69.2	78.5	103	1.41	1.2	16.2	1.38	23.3
Iron	<0.019 mg/l	6.11	13.5	95.2	<0.019	0.0541	<0.95	<1.9	<0.19	<0.19	<0.19	<0.019	<0.019	4.19	<0.019	4.13
Phenols, Total detected 5 **	<0.025 mg/l	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025
Total Coliforms	No/100mls	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E. coli	No/100mls	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Atypical Results



### Tramore Landfill Quarter 4 2017 Ground Water Results

Parameters	Units	4127	4128	4129	4130	4131	4132	4133	4135	4136	4137	4138	4139	4140	4141	4142
LABORATORY NUMBER		BH1	BH2	BH5	BH8	BH9	RC4	RC5	GW1	GW2	GW3	GW4	GW5	GW6	GW7	GW8
Sampling Location																
Date sampled	7-9/11/2017	09-Nov	09-Nov	07-Nov	09-Nov	09-Nov	09-Nov	07-Nov	07-Nov	07-Nov	07-Nov	09-Nov	09-Nov	09-Nov	09-Nov	09-Nov
Sampled by	Jim McGarry	JMcG	JMcG	JMcG	JMcG	JMcG	JMcG	JMcG	JMcG	JMcG	JMcG	JMcG	JMcG	JMcG	JMcG	JMcG
Time sampled		15:50	16:10	15:05	12:30	12:55	16:40	16:30	16:10	15:45	15:30	13:50	13:05	15:25	15:10	14:55
Visual Inspection/Odour		light	light		clear	clear	slightly					clear	clear	brown	light	slightly
clear- yes/no	odour-	brown	brown		w/sed	w/sed	brown	clear				w/sed/	w/sed/	slimy /	brown	brown
yes/no		/no	/no	no/no	/no	/no	/no	/yes	no/yes	yes/no	no/yes	no	no	yes	no	/ yes
Groundwater Level	m	2.4	5.6	2.6	6.2	5.8	11.4	21.8	5.0	5.7	1.4	3.1	6.9	2.9	7.1	4.1
Temp	oC	12.5	12.9	10.6	12.2	12.1	12.1	11.5	12.1	12.3	12.4	12.8	13.2	12.7	12.4	12.7
Dissolved Oxygen	% sat	17	83	69	34	23	36	28	32	79	17	48	35	14	18	12.6
pH	units	6.8	7	7.8	7	7	7.1	7	7.3	7.2	7.0	7.0	7.1	6.8	6.9	7.1
Cond	uS/cm	3020	nm	nm	3060	999	nm	nm	nm	nm	nm	1081	990	2280	1884	1953
Salinity	%	1.4	12.3	26.4	1.5	0.3	33.2	30.4	18.3	8.7	8.3	0.3	0.3	nm	nm	nm
Total Organic Carbon	<3 mg/l	7.62	8.63	<6	<3	<3	<3	<6	7.86	11	14.4	<3	<3	10.2	6.55	9.73
Ammoniacal Nitrogen as N	<0.2 mg/l	23	30.4	5.88	1.5	1.95	7.42	32.2	0.976	2.38	0.883	0.506	1.1	8.04	13.2	13.1
Arsenic	<0.5 ug/l	1.05	7.43	13.6	<0.5	2.46	<5.5	5.53	14	5.73	3.28	<0.5	<0.5	215	6.53	7.15
Chloride( asCl)	<2 mg/l	504	7080	16000	722	131	18700	17800	6910	4970	4680	91.6	110	265	220	243
Total Oxidised Nitrogen	<0.1 mg/l	<0.1	<0.1	0.475	0.154	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.417	0.998	<0.1	<0.1	<0.1
Sodium	<0.076 mg/l	314	3310	7650	380	106	9640	8440	3190	2160	2200	112	76.7	138	138	147
Potassium	<1 mg/l	27.8	154	326	9.74	4.6	361	212	122	72.9	76.3	2.46	1.13	17.4	17.4	19.1
Iron	<0.019 mg/l	5.6	16.8	<0.019	0.028	0.0653	<0.95	3.14	<0.019	<0.019	<0.019	<0.019	<0.019	4.08	4.08	4.79
Total Coliforms	No/100mls	0	0	0	0	3	0	>100	>100	>100	>100	0	6	0	0	0
E. coli	No/100mls	0	0	0	0	3	0	>100	>100	>100	>100	0	1	0	0	0
Phenols, Total detected 5	<0.025 mg/l	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025

**Appendix D**  
Leachate Results

### Tramore Landfill Quarter 1 2017 Leachate Results

Sampling Location		LT1	LT2	LT3A	LT4B/B	LT5
<b>Date sampled</b>	8-9/3/2017	09-Mar	09-Mar	09-Mar	09-Mar	09-Mar
<b>Sampled by</b>	Jim McGarry	JMcG	JMcG	JMcG	JMcG	JMcG
Visual Inspection/Odour		dry	dry	black/ pungent	well blocked	dry
Groundwater Level	m			1.2		
pH	units			7.4		
Cond	uS/cm			23100		
Salinity	%			nm		
BOD	mg/l			64		
Ammoniacal Nitrogen as N	<0.2 mg/l			1620		
COD	<7 mg/l			1600		
Chloride( asCl)	<2 mg/l			2730		
Total Oxidised Nitrogen	<0.1 mg/l			0.204		
<b>Atypical Results</b>						

### Tramore Landfill Quarter 2 2017 Leachate Results

Sampling Location		LT1	LT2	LT3A	LT4B/B	LT5
<b>Date sampled</b>	07/06/2017	07-Jun	07-Jun	07-Jun	07-Jun	07-Jun
<b>Sampled by</b>	Jim McGarry	JMcG	JMcG	JMcG	JMcG	JMcG
Visual Inspection/Odour		black/ yes slight	No sample	black/ pungent	well blocked	dry
Groundwater Level	m	2.1	0.5	1.3		
pH	units	6.9		7.5		
Cond	uS/cm	5640		23000		
Salinity	%	nm		13.7		
BOD	mg/l	95		103		
Ammoniacal Nitrogen as N	<0.2 mg/l	242		1470		
COD	<7 mg/l	449		1790		
Chloride( asCl)	<2 mg/l	553		2760		
Total Oxidised Nitrogen	<0.1 mg/l	1.550		<1		

### Tramore Landfill Quarter 3 2017 Leachate Results

Parameters	Units	LT1	LT2	LT3A	LT4B/B	LT5
Sampling Location		LT1	LT2	LT3A	LT4B/B	LT5
Date sampled	24-25/7/2017	25-Jul	25-Jul	25-Jul	25-Jul	25-Jul
Sampled by	Jim McGarry	JMcG	JMcG	JMcG	JMcG	JMcG
Visual Inspection/Odour		black/ yes slight	No sample	black/ pungent	well blocked	dry
Groundwater Level	m	2.0		1.3		
pH	units	7		nm		
Cond	uS/cm	5680		nm		
Salinity	%	nm		nm		
BOD	mg/l	16		69		
Ammoniacal Nitrogen as N	<0.2 mg/l	247		1570		
Fluoride	<0.5 mg/l	<0.5		1.76		
CODF, unfiltered	<7 mg/l	350		1640		
Boron	<5 ug/l	2070		1240		
Cadmium	<0.08 ug/l	<0.08		<0.08		
Chromium	<1 ug/l	6.23		<1		
Copper	<0.3 ug/l	<0.3		<0.3		
Lead	<0.2 ug/l	<0.2		<0.2		
Manganese	<1 ug/l	731		1.17		
Nickel	<0.4ug/l	6.28		1.77		
Zinc	<1 ug/l	4.17		<1		
Mercury	<0.01 ug/l	<0.01		<0.01		
Sulphate	<2 mg/l	<2		<2		
Chloride( asCl)	<2 mg/l	549		2720		
Phosphate(ortho) as P	<0.02 mg/l	<0.02		4.23		
Total Oxidised Nitrogen as N	<0.1 mg/l	0.689		0.535		
Cyanide, total	<0.05 mg/l	<0.05		<0.05		
Calcium	<0.012 mg/l	208		4.19		
Sodium	<0.076 mg/l	449		215		
Magnesium	<0.036 mg/l	96		24.6		
Potassium	<1 mg/l	180		105		
Iron	<0.019 mg/l	5.33		0.279		
Total Coliforms	No/100mls	0		0		
E. coli	No/100mls	0		0		

## Tramore Landfill Quarter 4 2017 Leachate Results

Parameters	Units	4143	4144	4145	4146	4147
<b>LABORATORY NUMBER</b>		<b>LT1</b>	<b>LT2</b>	<b>LT3A</b>	<b>LT4B/B</b>	<b>LT5</b>
Sampling Location						
<b>Date sampled</b>	09/11/2017	09-Nov	09-Nov	09-Nov	09-Nov	09-Nov
<b>Sampled by</b>	Jim McGarry	JMcG	JMcG	JMcG	JMcG	JMcG
<b>Time sampled</b>		17:15	11:20	16:55	11:15	12:15
Visual Inspection/Odour		grey/ no odour	No sample	black/ pungent	well blocked	dry
Groundwater Level	m	2.0		1.2		
pH	units	6.9		7.6		
Cond	uS/cm	5690		22800		
Salinity	%	3		13.5		
BOD	mg/l	32		146		
Ammoniacal Nitrogen as N	<0.2 mg/l	250		1530		
COD	<7 mg/l	365		2260		
Chloride( asCl)	<2 mg/l	548		2720		
Total Oxidised Nitrogen	<0.1 mg/l	0.816		<0.5		

**Appendix E**  
Meteorological Data

**JohnstownII**

**date:** 00 to 00 utc

**rain:** Precipitation Amount (mm)

**maxtp:** Maximum Air Temperature (C)

**mintp:** Minimum Air Temperature (C)

**gmin:** 09utc Grass Minimum Temperature (C)

**soil:** Mean 10cm soil temperature (C)

date	rain	maxtp	mintp	gmin	soil
01-jan-2017	10.2	9.8	2.5	0.7	7.225
02-jan-2017	0.7	6.0	1.2	0.0	5.578
03-jan-2017	0.0	5.4	-0.4	-4.5	4.309
04-jan-2017	0.0	6.9	1.9	-4.8	4.684
05-jan-2017	0.0	9.2	4.5	0.9	5.815
06-jan-2017	17.1	10.9	8.3	4.9	7.666
07-jan-2017	0.2	10.9	7.7	4.3	8.453
08-jan-2017	0.1	10.0	6.9	1.4	8.278
09-jan-2017	1.3	9.9	4.9	6.6	8.110
10-jan-2017	0.2	11.9	4.3	0.6	7.113
11-jan-2017	0.0	11.6	4.9	3.7	7.332
12-jan-2017	1.7	5.5	0.7	1.7	5.450
13-jan-2017	0.0	4.7	0.6	-2.0	3.708
14-jan-2017	0.0	7.9	1.4	-2.4	3.987
15-jan-2017	0.0	10.7	5.3	1.9	6.010
16-jan-2017	0.0	10.8	6.8	2.0	6.920
17-jan-2017	0.3	9.4	7.1	2.0	7.384
18-jan-2017	0.2	9.1	7.2	4.7	7.524
19-jan-2017	0.0	8.4	4.6	-2.6	7.198
20-jan-2017	0.0	7.6	2.3	-3.3	5.990
21-jan-2017	0.0	4.9	1.2	-6.8	4.404
22-jan-2017	0.0	8.7	3.2	0.6	5.150
23-jan-2017	0.0	10.1	4.7	-3.0	5.378
24-jan-2017	2.3	9.6	8.4	-0.2	6.943
25-jan-2017	0.0	10.1	7.4	6.1	7.390
26-jan-2017	0.0	7.6	5.1	4.3	6.204

27-jan-2017	3.8	9.6	5.3	4.4	6.556
28-jan-2017	0.1	7.7	2.0	-1.3	5.828
29-jan-2017	13.2	8.6	1.9	-4.5	5.423
30-jan-2017	4.0	10.8	7.0	4.9	7.237
31-jan-2017	8.2	10.9	7.8	7.9	8.718

**JohnstownII**  
**date: 00 to 00 utc**  
**rain: Precipitation Amount (mm)**



**maxtp: Maximum Air Temperature (C)**  
**mintp: Minimum Air Temperature (C)**  
**gmin: 09utc Grass Minimum Temperature (C)**  
**soil: Mean 10cm soil temperature (C)**

date	rain	maxtp	mintp	gmin	soil
01-feb-2017	3.4	10.5	6.2	2.4	8.088
02-feb-2017	4.5	11.0	8.4	6.7	8.985
03-feb-2017	12.4	8.5	2.0	2.0	7.182
04-feb-2017	2.9	5.8	0.5	-4.5	5.125
05-feb-2017	0.0	8.2	0.2	-6.5	4.447
06-feb-2017	14.7	10.8	1.5	-6.1	5.163
07-feb-2017	0.2	7.0	3.0	-1.1	5.573
08-feb-2017	0.0	8.7	1.2	-3.3	4.835
09-feb-2017	0.0	6.6	3.1	-2.6	5.180
10-feb-2017	0.1	4.4	2.3	0.5	4.367
11-feb-2017	3.7	5.8	1.3	-0.7	4.189
12-feb-2017	1.5	5.9	3.0	1.2	4.501
13-feb-2017	0.6	9.2	4.7	1.9	5.489
14-feb-2017	4.7	9.2	6.1	5.1	6.358
15-feb-2017	0.5	11.2	5.4	5.5	7.494
16-feb-2017	1.5	9.5	4.5	-1.3	6.977
17-feb-2017	2.2	10.3	8.4	6.9	7.988
18-feb-2017	0.0	10.3	7.2	8.6	8.577
19-feb-2017	0.6	12.6	6.7	5.3	8.780
20-feb-2017	0.0	13.8	9.7	7.5	9.690
21-feb-2017	0.5	13.4	9.7	7.0	9.898
22-feb-2017	4.4	11.1	9.2	8.6	9.932
23-feb-2017	1.7	9.7	2.8	3.9	8.370
24-feb-2017	0.5	8.5	2.6	-0.2	6.694
25-feb-2017	3.8	10.1	6.8	6.1	8.238
26-feb-2017	2.6	11.0	5.1	1.5	8.292
27-feb-2017	2.3	7.5	0.5	-1.3	6.785
28-feb-2017	0.3	9.5	-0.0	-4.6	5.504



**JohnstownII****date: 00 to 00 utc****rain: Precipitation Amount (mm)****maxtp: Maximum Air Temperature (C)****mintp: Minimum Air Temperature (C)****gmin: 09utc Grass Minimum Temperature (C)****soil: Mean 10cm soil temperature (C)**

date	rain	maxtp	mintp	gmin	soil
01-mar-2017	4.0	9.5	2.8	-1.3	6.008
02-mar-2017	0.0	9.8	2.6	-1.2	5.674
03-mar-2017	4.7	10.1	6.1	5.0	7.133
04-mar-2017	1.0	7.0	4.2	3.8	7.041
05-mar-2017	8.2	8.5	2.9	0.9	6.236
06-mar-2017	7.0	8.8	3.0	-1.3	6.077
07-mar-2017	3.3	10.2	1.8	-1.5	6.164
08-mar-2017	0.5	11.1	7.9	5.9	8.435
09-mar-2017	1.4	12.8	6.7	2.9	9.027
10-mar-2017	1.0	10.5	9.1	5.7	9.350
11-mar-2017	1.3	11.4	8.2	8.4	9.632
12-mar-2017	2.4	12.5	3.1	7.0	9.580
13-mar-2017	0.0	14.5	4.3	-2.9	9.266
14-mar-2017	0.0	15.1	7.9	2.7	10.285
15-mar-2017	0.6	12.4	4.5	-1.4	9.708
16-mar-2017	3.2	10.8	3.2	7.0	9.695
17-mar-2017	0.1	12.5	2.9	-1.0	8.098
18-mar-2017	0.0	14.7	10.0	8.2	10.295
19-mar-2017	0.1	12.7	9.8	8.6	10.510
20-mar-2017	5.4	11.6	1.9	6.8	10.042
21-mar-2017	3.8	6.8	1.0	-1.1	7.089
22-mar-2017	3.0	7.4	1.3	0.6	7.158
23-mar-2017	0.5	9.7	4.2	2.5	7.826
24-mar-2017	0.0	9.7	5.4	2.5	8.278
25-mar-2017	0.0	12.2	4.4	0.1	8.541

26-mar-2017	0.0	12.3	7.1	1.8	8.747
27-mar-2017	0.0	11.9	6.6	-0.3	9.516
28-mar-2017	2.0	11.9	7.0	2.7	9.642
29-mar-2017	8.0	11.5	10.2	7.9	10.380
30-mar-2017	11.9	11.2	10.3	10.0	10.653
31-mar-2017	5.4	11.9	7.5	8.4	10.903

**JohnstownII**

**date:** 00 to 00 utc

**rain:** Precipitation Amount (mm)

**maxtp:** Maximum Air Temperature (C)

**mintp:** Minimum Air Temperature (C)

**gmin:** 09utc Grass Minimum Temperature (C)

**soil:** Mean 10cm soil temperature (C)

date	rain	maxtp	mintp	gmin	soil
01-apr-2017	1.7	13.1	6.2	1.4	10.212
02-apr-2017	0.0	12.2	3.7	-1.7	9.998
03-apr-2017	2.6	10.8	7.8	4.8	9.775
04-apr-2017	0.1	11.9	6.0	2.5	10.240
05-apr-2017	0.0	11.4	4.8	-0.9	9.575
06-apr-2017	0.0	11.1	7.7	4.1	10.438
07-apr-2017	0.0	12.0	4.4	4.0	11.355
08-apr-2017	0.0	13.8	3.6	-3.0	11.033

09-apr-2017	0.1	13.9	7.3	1.1	11.017
10-apr-2017	0.0	12.6	3.6	-1.1	10.260
11-apr-2017	0.0	12.4	4.3	-1.1	9.843
12-apr-2017	0.0	15.1	7.0	4.1	10.573
13-apr-2017	0.0	11.9	7.1	4.9	10.850
14-apr-2017	2.6	13.0	7.5	6.7	11.270
15-apr-2017	0.0	12.2	6.6	2.7	10.545
16-apr-2017	0.1	14.2	5.1	2.5	10.452
17-apr-2017	0.0	12.3	6.6	4.4	11.130
18-apr-2017	0.0	12.6	4.2	-0.0	11.870
19-apr-2017	0.0	13.5	7.2	1.0	12.577
20-apr-2017	0.0	14.2	10.4	8.2	12.927
21-apr-2017	0.0	13.7	10.2	8.4	12.833
22-apr-2017	0.0	12.4	9.4	7.0	12.677
23-apr-2017	0.0	12.5	7.3	3.4	12.895
24-apr-2017	0.5	13.2	2.2	4.4	12.163
25-apr-2017	1.2	11.6	2.0	-2.0	9.903
26-apr-2017	0.0	9.0	0.9	-1.9	9.414
27-apr-2017	0.0	11.7	3.3	-0.5	10.172
28-apr-2017	0.0	10.0	6.8	5.4	10.983
29-apr-2017	1.2	11.5	7.0	5.0	10.800
30-apr-2017	7.4	10.9	4.1	7.5	10.420

JohnstownII  
date: 00 to 00 utc

**rain:** Precipitation Amount (mm)  
**maxtp:** Maximum Air Temperature (C)  
**mintp:** Minimum Air Temperature (C)  
**gmin:** 09utc Grass Minimum Temperature (C)  
**soil:** Mean 10cm soil temperature (C)

date	rain	maxtp	mintp	gmin	soil
01-may-2017	0.1	14.8	4.1	-1.7	10.950
02-may-2017	0.1	13.3	7.0	2.3	13.030
03-may-2017	0.0	13.4	8.0	3.3	13.147
04-may-2017	0.0	13.0	8.8	5.5	12.628
05-may-2017	0.0	12.7	8.1	6.8	12.688
06-may-2017	0.0	11.9	8.3	8.3	12.698
07-may-2017	0.0	15.0	7.8	3.8	14.750
08-may-2017	0.0	12.2	6.7	2.2	14.645
09-may-2017	0.0	12.6	5.1	-0.6	15.070
10-may-2017	0.0	14.9	3.2	-3.1	15.290
11-may-2017	0.3	13.8	5.1	-0.1	14.375
12-may-2017	9.8	12.2	9.0	7.4	13.530
13-may-2017	7.4	13.5	8.6	7.7	12.773
14-may-2017	0.2	14.2	7.5	3.3	12.908
15-may-2017	30.8	13.4	11.2	10.0	13.050
16-may-2017	1.8	14.9	9.3	12.0	14.193
17-may-2017	0.0	14.1	7.0	3.0	13.597
18-may-2017	0.0	13.9	4.2	-0.7	13.632
19-may-2017	0.0	14.0	6.2	0.9	13.815
20-may-2017	0.5	14.4	8.2	6.7	14.703
21-may-2017	0.6	14.4	10.9	7.2	14.613
22-may-2017	0.0	15.8	10.5	8.1	15.080
23-may-2017	0.1	18.8	12.4	11.5	16.403
24-may-2017	0.0	16.7	10.2	9.9	16.495
25-may-2017	0.1	21.0	10.1	5.9	18.298
26-may-2017	0.0	22.2	12.6	7.9	19.070
27-may-2017	9.9	17.3	11.6	8.0	16.888

28-may-2017	1.9	13.6	10.2	6.9	15.300
29-may-2017	3.6	17.0	10.6	9.9	15.717
30-may-2017	0.1	17.4	12.7	11.5	16.948
31-may-2017	0.3	17.1	11.2	6.6	16.677

JohnstownII  
date: 00 to 00 utc  
rain: Precipitation Amount (mm)  
maxtp: Maximum Air Temperature (C)

**mintp: Minimum Air Temperature (C)**  
**gmin: 09utc Grass Minimum Temperature (C)**  
**soil: Mean 10cm soil temperature (C)**

date	rain	maxtp	mintp	gmin	soil
01-jul-2017	0.0	18.9	8.6	4.0	16.038
02-jul-2017	0.0	16.9	8.9	3.1	17.443
03-jul-2017	0.0	18.6	13.5	11.8	18.560
04-jul-2017	0.0	18.4	14.4	14.1	19.290
05-jul-2017	0.0	18.0	12.3	9.6	19.677
06-jul-2017	0.0	20.6	11.9	8.5	20.080
07-jul-2017	0.6	18.5	13.3	10.3	19.105
08-jul-2017	0.0	19.3	13.2	9.4	19.475
09-jul-2017	0.0	19.7	13.8	12.6	20.897
10-jul-2017	0.4	17.6	13.4	12.4	19.575
11-jul-2017	7.4	14.7	11.5	11.9	17.882
12-jul-2017	0.0	19.2	10.4	7.9	18.380
13-jul-2017	0.1	18.6	9.9	5.0	17.802
14-jul-2017	0.0	17.7	11.6	9.6	18.163
15-jul-2017	1.0	19.4	14.5	13.7	19.028
16-jul-2017	0.3	19.5	13.1	15.6	20.153
17-jul-2017	0.0	19.4	11.7	8.9	20.895
18-jul-2017	0.0	21.6	13.8	10.4	21.170
19-jul-2017	10.4	18.0	10.6	14.3	19.100
20-jul-2017	5.9	16.5	9.8	8.3	16.870
21-jul-2017	10.2	16.1	10.6	10.9	16.615
22-jul-2017	1.6	17.3	10.6	8.6	18.140
23-jul-2017	0.0	20.0	13.5	12.7	17.958
24-jul-2017	0.0	23.0	14.3	10.2	19.320
25-jul-2017	0.9	19.9	13.6	11.0	20.080
26-jul-2017	10.1	19.0	11.1	15.6	18.525
27-jul-2017	0.6	17.1	10.6	7.3	16.695
28-jul-2017	7.6	18.1	11.9	10.9	15.635



29-jul-2017	0.0	17.2	11.9	9.5	16.360
30-jul-2017	3.1	16.6	10.8	8.7	15.993
31-jul-2017	0.0	16.8	11.6	9.4	16.253

JohnstownII  
date: 00 to 00 utc  
rain: Precipitation Amount (mm)  
maxtp: Maximum Air Temperature (C)  
mintp: Minimum Air Temperature (C)

**gmin: 09utc Grass Minimum Temperature (C)**  
**soil: Mean 10cm soil temperature (C)**

date	rain	maxtp	minip	gmin	soil
01-aug-2017	0.0	17.0	11.4	9.1	17.003
02-aug-2017	6.5	18.0	13.3	12.7	17.272
03-aug-2017	4.3	18.3	12.4	13.1	16.865
04-aug-2017	11.2	17.1	11.7	7.8	16.318
05-aug-2017	0.4	18.0	11.2	9.4	16.110
06-aug-2017	3.7	15.7	9.1	4.8	14.948
07-aug-2017	1.1	16.8	11.1	9.5	15.500
08-aug-2017	4.2	17.0	10.4	9.5	15.983
09-aug-2017	0.1	18.5	10.3	6.7	15.753
10-aug-2017	0.0	17.8	9.3	6.4	15.855
11-aug-2017	0.5	18.0	11.5	8.2	16.130
12-aug-2017	0.0	19.0	11.6	9.2	16.103
13-aug-2017	4.1	18.4	10.3	6.6	16.612
14-aug-2017	13.2	17.0	11.8	12.9	16.565
15-aug-2017	0.2	18.0	10.3	8.0	16.085
16-aug-2017	9.1	16.2	12.9	11.1	15.892
17-aug-2017	1.4	17.7	11.3	11.3	16.612
18-aug-2017	3.1	15.8	9.8	7.9	14.685
19-aug-2017	0.0	17.0	10.2	8.1	14.205
20-aug-2017	4.0	15.9	9.5	5.2	14.220
21-aug-2017	2.7	17.3	14.6	14.3	16.243
22-aug-2017	0.4	19.0	14.1	14.3	16.827
23-aug-2017	0.1	17.8	12.4	10.9	16.890
24-aug-2017	0.1	17.9	11.8	9.3	16.460
25-aug-2017	1.0	17.6	13.0	10.9	16.450
26-aug-2017	0.0	19.6	13.5	11.6	17.350
27-aug-2017	0.1	19.1	14.9	14.0	17.825
28-aug-2017	0.7	17.9	14.3	14.8	17.635
29-aug-2017	0.0	15.6	10.4	8.1	16.097

30-aug-2017	0.0	17.1	10.4	8.7	16.235
31-aug-2017	3.0	17.1	8.9	6.2	15.863

**JohnstownII**

date: 00 to 00 utc

rain: Precipitation Amount (mm)

maxtp: Maximum Air Temperature (C)

mintp: Minimum Air Temperature (C)

gmin: 09utc Grass Minimum Temperature (C)

soil: Mean 10cm soil temperature (C)

date	rain	maxtp	mintp	gmin	soil
01-sep-2017	0.1	18.8	9.0	6.9	15.790
02-sep-2017	10.5	16.3	9.2	4.9	15.380
03-sep-2017	32.4	19.5	13.9	12.9	17.160
04-sep-2017	5.1	17.0	13.1	15.5	17.380
05-sep-2017	10.6	18.1	11.6	13.0	16.372
06-sep-2017	0.0	17.4	11.2	8.7	15.658
07-sep-2017	1.5	17.0	11.9	9.9	15.523
08-sep-2017	5.7	16.6	10.4	11.7	15.443
09-sep-2017	0.3	17.6	9.1	7.4	14.347
10-sep-2017	2.0	16.8	10.7	10.1	14.210
11-sep-2017	2.4	16.2	10.0	8.5	13.665
12-sep-2017	7.6	14.9	8.4	6.5	13.012
13-sep-2017	4.6	14.4	7.5	7.1	12.413
14-sep-2017	0.0	15.6	7.8	5.7	11.960
15-sep-2017	0.0	15.6	9.2	7.6	12.783
16-sep-2017	1.3	12.1	8.2	7.2	11.845
17-sep-2017	0.1	15.0	7.5	7.0	12.783
18-sep-2017	0.0	17.0	8.4	5.6	12.752
19-sep-2017	0.0	16.0	8.5	5.9	13.343
20-sep-2017	16.5	15.7	11.4	13.1	14.475
21-sep-2017	4.9	15.1	9.6	8.2	13.712
22-sep-2017	7.1	16.1	11.4	6.5	13.760
23-sep-2017	10.0	15.7	12.9	9.9	14.352
24-sep-2017	1.0	18.8	11.0	13.0	15.325
25-sep-2017	0.1	16.5	9.9	5.9	14.400

26-sep-2017	0.0	15.6	11.3	10.5	14.885
27-sep-2017	24.3	14.8	10.9	11.8	14.175
28-sep-2017	5.2	15.2	8.5	5.1	13.675
29-sep-2017	2.3	14.5	9.3	9.6	13.515
30-sep-2017	5.2	11.8	9.7	7.7	12.932

**JohnstownII**

**date:** 00 to 00 utc

**rain:** Precipitation Amount (mm)

**maxtp:** Maximum Air Temperature (C)

**mintp:** Minimum Air Temperature (C)

**gmin:** 09utc Grass Minimum Temperature (C)

**soil:** Mean 10cm soil temperature (C)

date	rain	maxtp	mintp	gmin	soil
01-oct-2017	0.9	17.2	10.9	11.1	14.000
02-oct-2017	0.0	13.9	6.9	8.2	12.615
03-oct-2017	0.0	13.6	6.4	4.4	11.243
04-oct-2017	0.0	14.3	8.4	5.8	11.833
05-oct-2017	0.3	15.5	6.7	8.5	12.680
06-oct-2017	0.1	13.7	4.6	0.6	11.278
07-oct-2017	0.0	15.1	8.6	11.7	12.845
08-oct-2017	0.1	14.2	8.7	6.0	12.352
09-oct-2017	0.5	14.4	8.9	4.8	12.665
10-oct-2017	1.1	15.2	13.1	12.8	13.658
11-oct-2017	5.3	15.9	9.1	12.8	13.622
12-oct-2017	1.3	15.3	7.6	4.2	12.235
13-oct-2017	12.4	15.6	15.0	12.7	14.472
14-oct-2017	1.9	16.0	13.8	14.8	14.740
15-oct-2017	0.1	15.6	13.7	12.8	14.350
16-oct-2017	1.4	17.2	11.1	13.2	13.762
17-oct-2017	0.0	14.1	6.6	5.5	11.635
18-oct-2017	1.8	13.6	6.3	0.0	11.198
19-oct-2017	7.4	13.7	10.4	10.4	12.680
20-oct-2017	13.0	13.7	4.6	-0.4	11.005
21-oct-2017	2.8	14.6	8.2	9.8	11.597
22-oct-2017	0.5	13.0	6.6	3.8	10.230
23-oct-2017	1.9	14.7	11.7	9.3	12.618
24-oct-2017	9.9	14.5	11.5	11.4	13.283
25-oct-2017	0.3	14.0	8.3	2.5	12.203
26-oct-2017	1.7	13.6	11.2	9.9	12.717
27-oct-2017	0.1	14.7	7.2	3.9	11.885
28-oct-2017	0.0	14.1	7.9	3.6	11.790
29-oct-2017	0.0	14.2	6.5	10.4	12.260
30-oct-2017	0.0	12.8	5.7	1.7	10.465

31-oct-2017	0.0	13.1	11.3	9.1	11.653
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**JohnstownII**

date: 00 to 00 utc

rain: Precipitation Amount (mm)

maxtp: Maximum Air Temperature (C)

mintp: Minimum Air Temperature (C)

gmin: 09utc Grass Minimum Temperature (C)

soil: Mean 10cm soil temperature (C)

date	rain	maxtp	mintp	gmin	soil
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01-nov-2017	0.0	13.6	7.8	5.9	11.065
02-nov-2017	0.0	13.0	7.8	3.2	10.680
03-nov-2017	0.0	11.0	9.0	4.0	11.177
04-nov-2017	0.0	10.2	3.8	4.0	9.528
05-nov-2017	0.0	10.2	2.6	1.7	7.540
06-nov-2017	0.8	12.7	2.8	-2.6	8.767
07-nov-2017	9.6	12.4	3.5	4.6	9.224
08-nov-2017	1.2	10.6	2.0	-2.6	7.488
09-nov-2017	0.6	12.1	7.6	-0.0	9.657
10-nov-2017	6.8	12.0	8.3	3.4	9.600
11-nov-2017	10.6	12.5	5.9	6.4	10.892
12-nov-2017	0.4	8.0	3.0	-0.5	8.024
13-nov-2017	0.6	10.2	1.6	-1.7	6.911
14-nov-2017	0.4	12.9	9.3	5.3	9.733
15-nov-2017	0.0	12.6	9.0	6.2	10.222
16-nov-2017	0.2	11.4	3.7	7.9	9.469
17-nov-2017	0.0	8.4	1.4	-4.1	6.777
18-nov-2017	1.9	10.9	6.7	-0.4	8.572
19-nov-2017	0.3	11.8	6.2	4.7	8.887
20-nov-2017	2.1	12.9	11.0	7.1	10.852
21-nov-2017	7.3	12.8	11.1	9.9	11.350
22-nov-2017	26.7	13.7	4.3	11.6	11.680
23-nov-2017	0.1	8.3	2.9	0.5	7.948
24-nov-2017	0.0	7.3	0.5	-3.9	5.931
25-nov-2017	0.0	5.7	-0.2	-4.6	4.437
26-nov-2017	0.3	10.5	1.6	-1.0	5.163
27-nov-2017	2.4	10.6	4.4	3.2	7.024
28-nov-2017	0.0	6.4	2.6	-0.5	5.100
29-nov-2017	0.1	4.7	1.4	-0.6	4.086
30-nov-2017	0.0	6.1	1.6	-1.1	4.158



JohnstownII

date: 00 to 00 utc

rain: Precipitation Amount (mm)

maxtp: Maximum Air Temperature (C)

mintp: Minimum Air Temperature (C)

gmin: 09utc Grass Minimum Temperature (C)

soil: Mean 10cm soil temperature (C)

date	rain	maxtp	mintp	gmin	soil
01-dec-2017	0.0	5.4	0.9	-1.7	3.418

02-dec-2017	0.1	8.6	3.6	-0.8	5.039
03-dec-2017	0.0	9.3	4.7	3.2	6.640
04-dec-2017	0.0	8.5	4.0	-2.1	6.093
05-dec-2017	0.1	10.4	5.5	3.3	6.876
06-dec-2017	7.5	12.3	10.0	3.4	8.648
07-dec-2017	5.4	12.3	1.1	2.8	7.675
08-dec-2017	0.0	4.2	0.6	-1.9	3.901
09-dec-2017	2.4	5.6	0.1	-4.8	3.751
10-dec-2017	34.3	6.4	-0.2	-0.4	4.924
11-dec-2017	0.0	4.5	-1.9	-3.7	2.933
12-dec-2017	4.7	8.0	-0.0	-4.6	3.513
13-dec-2017	3.9	8.2	1.6	-0.0	5.009
14-dec-2017	0.6	5.5	1.4	-0.3	3.623
15-dec-2017	0.0	6.8	1.4	1.1	4.113
16-dec-2017	0.0	7.3	-0.6	-5.9	3.671
17-dec-2017	0.3	11.3	5.6	0.0	6.456
18-dec-2017	0.0	9.9	3.0	-2.3	5.714
19-dec-2017	2.3	10.6	8.7	-0.2	7.902
20-dec-2017	1.2	11.8	10.0	9.6	9.180
21-dec-2017	5.1	10.7	9.1	9.0	9.380
22-dec-2017	0.2	12.5	8.5	6.3	9.592
23-dec-2017	0.1	9.9	7.0	7.5	8.908
24-dec-2017	1.1	10.7	9.5	7.5	9.477
25-dec-2017	9.4	10.7	2.3	9.2	8.319
26-dec-2017	3.6	5.7	1.8	-0.7	5.292
27-dec-2017	0.0	4.2	1.2	-0.9	3.747
28-dec-2017	0.9	6.8	-2.1	-8.0	3.108
29-dec-2017	17.6	10.1	4.3	-3.9	4.769
30-dec-2017	4.3	11.6	7.7	2.6	7.077
31-dec-2017	2.5	11.5	4.2	4.4	6.797



**Appendix F**

Management Structure



**Appendix G**

Pollutant Release Transfer Register



[Guidance to completing the PRTR workbook](#)

# PRTR Returns Workbook

Version 1.1.19

<b>REFERENCE YEAR</b>	2017
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## 1. FACILITY IDENTIFICATION

Parent Company Name	Waterford City & County Council
Facility Name	Tramore Waste Disposal Site
PRTR Identification Number	W0075
Licence Number	W0075-02

### Classes of Activity

No.	class name
-	Refer to PRTR class activities below

Address 1	Tramore Intake & Tramore Burrows
Address 2	Tramore
Address 3	
Address 4	
	Waterford
Country	Ireland
Coordinates of Location	-7.13286 52.1616
River Basin District	IESE
NACE Code	3821
Main Economic Activity	Treatment and disposal of non-hazardous waste
<b>AER Returns Contact Name</b>	David Regan
<b>AER Returns Contact Email Address</b>	dregan@waterfordcouncil.ie
<b>AER Returns Contact Position</b>	Executive Technician
<b>AER Returns Contact Telephone Number</b>	058 22112
<b>AER Returns Contact Mobile Phone Number</b>	086 8307065
<b>AER Returns Contact Fax Number</b>	058 45606
<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>	0
<b>Number of Employees</b>	1
<b>User Feedback/Comments</b>	No 50% +/- variance
<b>Web Address</b>	www.waterfordcouncil.ie

## 2. PRTR CLASS ACTIVITIES

Activity Number	Activity Name
50.1	General
50.1	General

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

Is it applicable?	No
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) ?	No
--	----

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

4.1 RELEASES TO AIR

[Link to previous years emissions data](#)

| PRTR#: W0075 | Facility Name : Tramore Waste Disposal Site | Filename : Tramore PRTR W0075\_2017.xlsm | Return Year : 2017 |

05/07/2018 12:13

**SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS**

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

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

**SECTION B : REMAINING PRTR POLLUTANTS**

RELEASERS TO AIR		Please enter all quantities in this section in KGs						
No. Annex II	POLLUTANT Name	M/C/E	METHOD Method Used		ADD EMISSION POINT	QUANTITY		
			Method Code	Designation or Description		Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year
01	Methane (CH4)	M	OTH	Estimated from Flare data and Landgem Model	52500.0	52500.0	0.0	0.0
03	Carbon dioxide (CO2)	M	OTH	Estimated from Flare data and Landgem Model	1165000.0	1165000.0	0.0	0.0
07	Non-methane volatile organic compounds (NMVOC)	M	OTH	Estimated from Flare data and Landgem Model	15500.0	15500.0	0.0	0.0

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

**EMISSIONS (As required in your Licence)**

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

ADD NEW ROW | DELETE ROW \* \* 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:	Tramore Waste Disposal Site				
	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)	320000.0	E	OTH	Landgem	N/A
Methane flared	265000.0	E	OTH	Landgem	250.0 (Total Flaring Capacity)
Methane utilised in engine/s	0.0				0.0 (Total Utilising Capacity)
Net methane emission (as reported in Section A above)	52500.0	E	OTH	Landgem	N/A



5. ONSITE TREATMENT & OFFSITE TRANSFERS OF WASTE

| PRTR#: W0075 | Facility Name : Tramore Waste Disposal Site | Filename : Tramore PRTR W0075\_2017.xlsm | Return Year : 2017 |

05/07/2018 12:13

Please enter all quantities on this sheet in Tonnes

3

Transfer Destination	European Waste Code	Hazardous	Quantity (Tonnes per Year)	Description of Waste	Waste Treatment Operation	Method Used		Location of Treatment	Haz Waste : Name and Licence/Permit No of Next Destination Facility Non Haz Waste: Name and Licence/Permit No of Recover/Disposer	Haz Waste : Address of Next Destination Facility Non Haz Waste: Address of Recover/Disposer	Name and License / Permit No. and Address of Final Recoverer / Disposer (HAZARDOUS WASTE ONLY)	Actual Address of Final Destination i.e. Final Recovery / Disposal Site (HAZARDOUS WASTE ONLY)
						M/C/E	Method Used					
Within the Country	19 07 03	No	76.88 in 19 07 02	landfill leachate other than those mentioned	D15	M	Volume Calculation	Offsite in Ireland	Irish Water,D0015-01	Waste Water Treatment Plant,Crobally Upper,Tramore,Waterford,Ireland	Drehid Landfill,Kilnagh Upper,Carbury,Co. Kildare,Ireland	
Within the Country	20 03 03	No	50.97	street-cleaning residues	D8	C	Volume Calculation	Offsite in Ireland	Born Na Mona,W0201-01			

**Appendix H**

Landfill Gas Survey and Flare Service Reports

## A survey of landfill sites to determine the quantity of methane flared and or recovered in utilisation plants for 2017

Please choose from the drop down menu the license number for your site	<input type="text" value="W0075"/>
Please choose from the drop down menu the name of the landfill site	<input type="text" value="Tramore"/>
Please enter the number of flares operational at your site in 2017	<input type="text" value="1"/>
Please enter the number of engines operational at your site in 2017	<input type="text" value="0"/>
Total methane flared	<input type="text" value="52,488"/> kg/year
Total methane utilised in engines	<input type="text" value="0"/> kg/year

**Please note that the closing date for receipt of completed surveys is 31/03/2018**

### Introduction

The Office of Environmental Sustainability (OES) of the Environmental Protection Agency acts as the inventory agency in Ireland with responsibility for compiling and reporting national greenhouse gas inventories to the European Commission and the United Nations Framework Convention on Climate Change. In addition to meeting international commitments Ireland's national greenhouse gas inventory informs national agencies and Government departments as they face the challenge to curb emissions and meet Ireland's emission reduction targets under the Effort Sharing Decision (No. 406/2009/EC). The national inventory also informs data suppliers, making them aware of the importance of their contributions to the inventory process and a means of identifying areas where input data may be improved.

It is on this basis that the Environmental Protection Agency is asking landfill operators to partake in this survey so that the most up to date information on methane flaring and recovery in utilisation plants at landfills sites is used in calculating the contribution of the landfill sector to national greenhouse gas emissions

The Environmental Protection Agency wishes to thank you for partaking in this survey. If you have any questions about the survey and how to complete it please view the "Help sheet" worksheet. If however, your query is not answered by viewing the "Help sheet" worksheet please contact:

[LFGProject@epa.ie](mailto:LFGProject@epa.ie)

Once completed please send the completed file as an attachment clearly stating the name and or license number of the landfill site (e.g. W000 Xanadu landfill\_2017) to:

[LFGProject@epa.ie](mailto:LFGProject@epa.ie)

to be filled in by licensee      calculated by spreadsheet

**Flare No. 1**

Flare type ? Other ▼ If "other" enter flare description here

Is the flare an open or enclosed flare ? Enclosed ▼ Rated flare capacity ? 250 ▼ m3/hr

Month /year commissioned ? April ▼ 2009 ▼

Month decommissioned if decommissioned in 2017 ? Select ▼

What is the function of the flare ? Extraction from capped area ▼ If "other" enter flare function here

Monthly	Method M/C/E	Runtime days/month	Runtime hrs/day	Downtime hrs	Total runtime hrs/month	Average Inlet Pressure (mbg)	Average Inlet Temp °C	Average Flow Rate (m <sup>3</sup> /hr)	Average CH <sub>4</sub> %v/v	Average CO <sub>2</sub> %v/v	Average O <sub>2</sub> %v/v	Combustion efficiency (%)	Total CH <sub>4</sub> m <sup>3</sup>	Total CH <sub>4</sub> kgs
January	E	30	24.0	0.0	720	-21	10	34	27.50	21.00	2.00	98.0	6,597	4,461
February	E	27	24.0	0.0	648	-21	10	34	27.50	21.00	2.00	98.0	5,938	4,015
March	E	30	24.0	0.0	720	-21	10	34	27.50	21.00	2.00	98.0	6,597	4,461
April	E	29	24.0	0.0	696	-21	10	34	27.50	21.00	2.00	98.0	6,377	4,312
May	E	30	24.0	0.0	720	-21	10	34	27.50	21.00	2.00	98.0	6,597	4,461
June	E	29	24.0	0.0	696	-21	10	34	27.50	21.00	2.00	98.0	6,377	4,312
July	E	30	24.0	0.0	720	-21	10	34	27.50	21.00	2.00	98.0	6,597	4,461
August	E	30	24.0	0.0	720	-21	10	34	27.50	21.00	2.00	98.0	6,597	4,461
September	E	29	24.0	0.0	696	-21	10	34	27.50	21.00	2.00	98.0	6,377	4,312
October	E	30	24.0	0.0	720	-21	10	34	27.50	21.00	2.00	98.0	6,597	4,461
November	E	29	24.0	0.0	696	-21	10	34	27.50	21.00	2.00	98.0	6,377	4,312
December	E	30	24.0	0.0	720	-21	10	34	27.50	21.00	2.00	98.0	6,597	4,461
<b>Total</b>					<b>8,472</b>								<b>77,629</b>	<b>52,488</b>

**Please note: Only fill the "Yearly" table if data is not available or cannot be calculated nor estimated on a monthly basis**

Yearly	Method M/C/E	Runtime days/year	Runtime hrs/day	Downtime hrs	Total runtime hrs/year	Average Inlet Pressure (mbg)	Average Inlet Temp °C	Average Flow Rate m <sup>3</sup> /hr	Average CH <sub>4</sub> %v/v	Average CO <sub>2</sub> %v/v	Average O <sub>2</sub> %v/v	Combustion efficiency (%)	Total CH <sub>4</sub> m <sup>3</sup>	Total CH <sub>4</sub> kgs
<b>2017</b>					<b>0</b>		<b>10</b>					<b>98.0</b>	<b>0</b>	<b>0</b>



# Automatic Flare Services

Tramore Landfill Site  
Leachate / Condensate Pumps Maintenance Report

18<sup>th</sup> – 19<sup>th</sup> April 2017

**Automatic Flare Systems Ltd**

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**Leachate /  
 Condensate**

**Pumps Maintenance Report**

<b>Site: Tramore Landfill</b>			<b>Date :17/04/17</b>		
<b>1</b>	<b>Pump location</b>	KOP-1	KOP-2	KOP-3	KOP-4
1.0	Pulse count	017817	058345	002312	000705
1.1	Well Depth	3.00m	3.00m	3.00m	3.80
1.2	Leachate Level	N/A	N/A	N/A	N/A
1.3	Pump Depth	2.90m	2.90m	2.90m	2.90m
<b>2</b>	<b>Well chamber</b>				
2.0	Air regulator	OK	OK	OK	OK
2.1	Pulse Counter	OK	OK	OK	OK
2.2	Pulse Tube	OK	OK	OK	OK
2.3	Drain supply line	Drained	Drained	Drained	Drained
2.4	Drain / clean filter	OK	OK	OK	OK
2.5	Pressure gauge	OK	OK	OK	OK
2.6	Supply line	OK	OK	OK	OK
2.7	Exhaust line	OK	OK	OK	OK
2.8	Discharge line	OK	OK	OK	OK
2.9	Sample point	OK	OK	OK	OK
2.10	Dip point	OK	OK	OK	OK
2.11	Securing bolts	Corroded	OK	OK	OK
2.13	Well chamber	OK	OK	OK	OK
<b>3</b>	<b>Pump</b>				
3.0	Inlet valve	OK	OK	OK	OK
3.1	Exhaust valve	OK	OK	OK	OK
3.2	Non return valve	OK	OK	OK	OK
3.3	Foot valve	OK	OK	OK	OK
3.4	Float	OK	OK	OK	OK
3.5	Slider	OK	OK	OK	OK
<b>4</b>	<b>Test Result</b>				
4.0	Air pressure	3-bar	3-bar	3-bar	3-bar
4.1	Discharge / pulse	N/A	N/A	N/A	N/A
	<b>Parts Fitted</b>				
	<b>Parts Required</b>	4 x 8mm s/s bolts @ 60mm 4 x s/s nuts 4 x s/s flat washers		1x32mm/1"bsp C/C 1x1"to1/4bsp union 1x 1/4 bsp valve 1x 1/4 bsp push fit	
	<b>Report</b>	Top hat bolts corroded and 2 missing		Air leak from 32mm connector/push fit	



## Leachate / Condensate Pumps Maintenance Report

Site: Tramore Landfill			Date : 18/04/17		
<b>1</b>	<b>Pump location</b>	GE 1.3	GE 1.6	GE 2.1	GE 2.4
1.0	Pulse count	000071	000213	000012	000075
1.1	Well Depth	6.90m	Not Measured	4.25m	6.50m
1.2	Leachate Level	6.60m	Not Measured	Dry	6.30m
1.3	Pump Depth	6.80m	Not Measured	4.15m	6.48m
<b>2</b>	<b>Well chamber</b>				
2.0	Air regulator	OK	OK	OK	OK
2.1	Pulse Counter	Not counting	OK	OK	OK
2.2	Pulse Tube	Not pulsing	OK	OK	OK
2.3	Drain supply line	Drained	Drained	Drained	Drained
2.4	Drain / clean filter	OK	OK	OK	OK
2.5	Pressure gauge	OK	OK	OK	OK
2.6	Supply line	OK	OK	OK	OK
2.7	Exhaust line	OK	OK	OK	OK
2.8	Discharge line	OK	OK	OK	OK
2.9	Sample point	OK	OK	OK	OK
2.10	Dip point	OK	OK	OK	OK
2.11	Securing bolts	OK	OK	OK	OK
2.13	Well chamber	OK	OK	OK	OK
<b>3</b>	<b>Pump</b>				
3.0	Inlet valve	OK	OK	OK	OK
3.1	Exhaust valve	OK	OK	OK	OK
3.2	Non return valve	OK	OK	OK	OK
3.3	Foot valve	OK	OK	OK	OK
3.4	Float	OK	OK	OK	OK
3.5	Slider	OK	OK	OK	OK
<b>4</b>	<b>Test Result</b>				
4.0	Air pressure	4-bar	4-bar	3-bar	4-bar
4.1	Discharge / pulse	N/A	N/A	N/A	N/A
	<b>Parts Fitted</b>				
	<b>Parts Required</b>				
	<b>Report</b>	Freed off Pulse counter plunger.	Chamber locking bar missing.	Slight air leak control valve	Freed off seized Air supply valve
		Dry	Dry	Dry	

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## Leachate / Condensate Pumps Maintenance Report

Site: Tramore Landfill			Date : 18/04/17		
<b>1</b>	<b>Pump location</b>	GE 2.7	GE 3.4	GE 3.6	GE 3.7
1.0	Pulse count	000708	000255	000081	000756
1.1	Well Depth	4.60m	5.80m	8.20m	9.90m
1.2	Leachate Level	4.00m	5.00m	8.20m	8.50m
1.3	Pump Depth	4.50m	5.60m	8.15m	9.00m
<b>2</b>	<b>Well chamber</b>				
2.0	Air regulator	OK	OK	OK	OK
2.1	Pulse Counter	OK	OK	OK	OK
2.2	Pulse Tube	OK	OK	OK	OK
2.3	Drain supply line	Drained	Drained	Drained	Drained
2.4	Drain / clean filter	OK	OK	OK	OK
2.5	Pressure gauge	OK	OK	OK	OK
2.6	Supply line	OK	OK	OK	OK
2.7	Exhaust line	OK	OK	OK	OK
2.8	Discharge line	OK	OK	OK	OK
2.9	Sample point	OK	OK	OK	OK
2.10	Dip point	OK	OK	OK	OK
2.11	Securing bolts	Corroded	OK	OK	OK
2.12	Well chamber	OK	OK	OK	OK
<b>3</b>	<b>Pump</b>				
3.0	Inlet valve	OK	OK	OK	OK
3.1	Exhaust valve	OK	OK	OK	OK
3.2	Non return valve	OK	OK	OK	OK
3.3	Foot valve	OK	OK	OK	OK
3.4	Float	OK	OK	OK	OK
3.5	Slider	OK	OK	OK	OK
<b>4</b>	<b>Test Result</b>				
4.0	Air pressure	3-bar	3-bar	5-bar	5-bar
4.1	Discharge / pulse	N/A	N/A	N/A	N/A
<b>5</b>	<b>Parts Fitted</b>				
<b>6</b>	<b>Parts Required</b>	4 x 6mm s/s bolts @ 60mm 4 x s/s nuts 4 x s/s flat washers			
<b>7</b>	<b>Report</b>	Leachate discharge non return valve stuck open, cleaned out obstruction.	Pump slider sticking. Freed off slider	Air supply pressure low from source	
					Dry



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**Leachate / Condensate Pumps Maintenance Report**

Site: Tramore Landfill			Date : 18/04/17		
<b>1</b>	<b>Pump location</b>	GE 3.10	GE 4.3	GE 4.7	GE 4.9
1.0	Pulse count	081591	000017	000783	000065
1.1	Well Depth	6.25m	7.40m	8.30m	8.50m
1.2	Leachate Level	5.25m	5.10m	7.80m	6.90m
1.3	Pump Depth	5.75m	7.20m	7.90m	7.20m
<b>2</b>	<b>Well chamber</b>				
2.0	Air regulator	OK	OK	OK	OK
2.1	Pulse Counter	OK	OK	OK	OK
2.2	Pulse Tube	OK	OK	OK	OK
2.3	Drain supply line	Drained	Drained	Drained	Drained
2.4	Drain / clean filter	OK	OK	OK	OK
2.5	Pressure gauge	OK	OK	OK	internal
2.6	Supply line	OK	OK	OK	OK
2.7	Exhaust line	OK	OK	OK	OK
2.8	Discharge line	OK	Seized valve	OK	OK
2.9	Sample point	OK	OK	OK	OK
2.10	Dip point	OK	OK	OK	OK
2.11	Securing bolts	OK	OK	Corroded	Corroded
2.13	Well chamber	OK	OK	OK	OK
<b>3</b>	<b>Pump</b>				
3.0	Inlet valve	OK	OK	OK	OK
3.1	Exhaust valve	OK	OK	OK	OK
3.2	Non return valve	OK	OK	OK	OK
3.3	Foot valve	OK	OK	OK	OK
3.4	Float	OK	OK	OK	OK
3.5	Slider	OK	OK	OK	OK
<b>4</b>	<b>Test Result</b>				
4.0	Air pressure	3-bar	5-bar	5-bar	5-bar
4.1	Discharge / pulse	N/A	N/A	N/A	N/A
	<b>Parts Fitted</b>				
	<b>Parts Required</b>		1 x 32mm non return valve. 1 x 32mm (3/4bsp) stop valve	4 x 6mm s/s bolts @ 60mm 4 x s/s nuts 4 x s/s flat washers	4 x 6mm s/s bolts @ 60mm 4 x s/s nuts 4 x s/s flat washers
	<b>Report</b>		Discharge stop valve seized Non return valve stuck open.	Top hat bolts corroded	Top hat bolts corroded

**GAS FIELD BALANCING SHEET**



<b>Site:</b>	<b>Tramore</b>	<b>Total Flare Hrs</b>	37773
<b>Date:</b>	02/05/2017	<b>Flare Automatic Operating Hrs Settings</b>	Flare running
<b>Name:</b>	Steve Hindle	<b>Flare Temperature °C</b>	1006
<b>Equipment Used :</b>	GA5000	<b>Blower motor setting</b>	18% reduced to 15.5%
<b>Serial No :</b>	G500854	<b>Flow Arrival m^3hr</b>	50m^3hr
<b>Last Calibration Date :</b>		<b>Flow after balance m^3hr</b>	40m^3hr
<b>Calibration Due Date :</b>		<b>Flow Leaving m^3hr</b>	40m^3hr

1	2	3	4	5	6	9	10	12	13	14	15	16
ID	Date/Time	CH4 %	CO2 %	O2 %	BALANCE %	RESIDUAL NITROGEN %	CO ppm	H2S ppm	SUCTION PRESSURE mb	COMMENTS	START VALVE POSITION %	FINISH VALVE POSITION %
TM FLARE	02/05/2017 15:13	25.2	22.1	2.3	50.4	41.71	0	0	-16.38		100	100
TMGE2-01	02/05/2017 15:33	20.7	22.3	0.8	56.2	53.18	0	0	-14.24		10	0
TMGE2-02	02/05/2017 15:36	0	0.5	20.2	79.3	2.94	0	0	-0.88		0	0
TMGE2-03	02/05/2017 15:38	29	22.1	4.4	44.5	27.87	0	0	-1.56		0	0
TMGE2-04	02/05/2017 15:41	29.5	25.4	0.5	44.6	42.71	0	2	-1.81		0	5
TMGE2-05	02/05/2017 15:43	0	4.7	15.5	79.8	21.21	0	0	-11.34		0	0
TMGE2-06	02/05/2017 15:44	0.1	7.2	13.7	79	27.21	0	0	0.08		0	0
TMGE2-07	02/05/2017 15:47	0	2	18.8	79.2	8.14	0	0	-1.07		0	0
TMGE2-08	02/05/2017 15:49	0.4	3.3	15.5	80.8	22.21	0	0	0.19		0	0
TMGE1-01	02/05/2017 15:59	0.9	17.7	1	80.4	76.62	0	0	-2.4		0	0
TMGE1-02	02/05/2017 16:01	0	0.2	20.4	79.4	2.29	0	0	-0.07		0	0
TMGE1-03	02/05/2017 16:04	1.2	18.3	0.3	80.2	79.07	0	0	-3.92		0	0
TMGE1-04	02/05/2017 16:06	0	0.3	20.2	79.5	3.14	0	0	0.26		0	0
TMGE1-05	02/05/2017 16:07	2.1	2.8	18.3	76.8	7.63	0	0	-16.33		0	0
TMGE1-06	02/05/2017 16:09	0.8	3	17.8	78.4	11.12	0	0	-10.9		0	0
TMGE1-07	02/05/2017 16:11	12.2	20.2	1.6	66	59.95	0	1	-0.88		0	0
TMGE1-08	02/05/2017 16:14	17.9	21.9	0.3	59.9	58.77	0	3	-0.71		0	0
TMGE1-09	02/05/2017 16:17	14.5	19.9	0.9	64.7	61.3	0	0	-0.85		0	0
TMGE4-01	02/05/2017 16:22	33	21.7	3.8	41.5	27.14	0	1	-16.48		20	20
TMGE4-02	02/05/2017 16:23	54.4	30.1	1.5	14	8.33	0	0	-16.13		20	100
TMGE4-03	02/05/2017 16:25	8.4	4.8	17.2	69.6	4.58	2	0	0.44		0	0
TMGE4-04	02/05/2017 16:27	33.6	25.8	1.3	39.3	34.39	2	1	-16.1		40	20
TMGE4-05	02/05/2017 16:29	23.5	11.6	12.1	52.8	7.06	0	2	-14.24		0	0
TMGE4-06	02/05/2017 16:31	39.8	26.1	2.9	31.2	20.24	1	0	-15.76		60	20
TMGE4-07	02/05/2017 16:33	0	0.1	20.4	79.5	2.39	0	0	0.16		0	0
TMGE4-08	02/05/2017 16:36	4.1	3.8	17	75.1	10.84	1	0	-0.35		0	0
TMGE4-09	02/05/2017 16:37	0.2	10.7	9.5	79.6	43.69	0	0	-15.35		0	0
TMGE4-10	02/05/2017 16:40	2.2	4.9	16	76.9	16.42	0	0	0.26		0	0
TMGE3-01	02/05/2017 16:45	29.6	23.9	0.4	46.1	44.59	1	3	-16.29		10	10
TMGE3-02	02/05/2017 16:46	33.5	25.4	0.4	40.7	39.19	1	9	-2.92		10	10
TMGE3-03	02/05/2017 16:47	43.8	27.7	0.1	28.4	28.02	2	16	-17.54		60	60
TMGE3-04	02/05/2017 16:49	8.9	6	16.2	68.9	7.66	4	1	-0.57		0	0
TMGE3-05	02/05/2017 16:51	22.7	19.7	1.9	55.7	48.52	2	10	-0.83		0	0
TMGE3-06	02/05/2017 16:58	25.4	23.2	1	50.4	46.62	1	0	0.33		0	0
TMGE3-07	02/05/2017 17:01	25.3	22.7	0.1	51.9	51.52	1	8	-0.68		0	0
TMGE3-08	02/05/2017 17:02	33.1	20.9	0.2	45.8	45.04	1	41	-15.36		0	0
TMGE3-09	02/05/2017 17:03	19.8	22	0.2	58	57.24	2	18	-3.03		10	0
TMGE3-10	02/05/2017 17:08	26.4	15	7.7	50.9	21.79	3	1	0.08		0	0
TM_FLARE	02/05/2017 17:13	34.6	24.3	1.3	39.8	34.89	3	6	-20.59		100	100

# SERVICE SHEET

Page No 1

JOB NO  
Tramore



## Automatic Flare Systems Ltd

Unit 8, Ensign Business Centre  
Coventry CV4 8JA  
United Kingdom  
Tel: +44 (0)24 7647 4877  
Fax: +44 (0)24 7647 4834  
www.afs-group.co.uk

SITE: Tramore, Co Waterford

DATE: 04-05-2017

### HEALTH AND SAFETY NOTICE

WEAR A HEAD HAT AND REFLECTIVE VEST OR JACKET ON OPERATIVE SITES

WEAR A PROTECTIVE FACE MASK WHEN WORKING IN AN AREA WHERE THERE IS ANY POSSIBILITY OF BREATHING IN CERAMIC INSULATING DUST

### TO BE COMPLETED FOR ALL HIRE INSTALLATION, SERVICE AND REPAIR VISITS

1. RECORD ALL INSTRUMENT READINGS AND VALVE SETTINGS ON ARRIVAL
2. RECORD ALL CHANGES AND REPAIRS MADE
3. RECORD ALL PARTS, MATERIALS & COMPONENTS FITTED OR USED
4. CHECK THAT PRESSURE AND VACUUM GAUGES ARE ZEROED
5. RECORD ALL INSTRUMENT READINGS AND VALVE SETTINGS ON DEPARTURE
6. LEAVE SITE CLEAN AND TIDY
7. NOTE FUTURE REMEDIAL ACTION NEEDED AND SEE THAT IT IS CARRIED OUT

### FLARE AUTO TIMER SETTINGS

DAY	START	STOP
SUNDAY		
MONDAY		
TUESDAY		
WEDNESDAY		
THURSDAY		
FRIDAY		
SATURDAY		

ENGINEERS NAME

Steve Hindle

UF10-250

ARRIVAL: **Flare running**

HOURS RUN	BOOSTER	27456	CH4	32.4	%	CO2	20.4	%
37819 hrs clock	FLARE	27412	O2	1.4	%	PRESSURE	2.0	mbar

INLET VALVE SETTING % OPEN

NO 1	100%	NO 2	N/A	NO 3	N/A	NO 4	N/A	NO 5	N/A	NO 6	N/A
------	------	------	-----	------	-----	------	-----	------	-----	------	-----

MAIN CONTROL VALVE SETTING % OPEN

100%

INLET VACUUM GAUGE READINGS STARING SIDE NEAREST KNOCKOUT POT

NO 1	-19.0	NO 2	N/A	NO 3	N/A	NO 4	N/A	NO 5	N/A	NO 6	N/A
------	-------	------	-----	------	-----	------	-----	------	-----	------	-----

(mbarg)

INLET TEMP	12.0	°C	INLET VACUUM PRIOR TO KO POT FILTER	-20.0	MBAR
VACUUM AFTER KO POT FILTER	-20.0	MBAR	VACUUM AFTER INLET FLAME ARRESTER	N/A	MBAR
OUTLET PRESSURE AFTER GAS BOOSTER	2.0	MBAR	OUTLET GAS TEMP	19	°C
PRESSURE AFTER SLAM SHUT	Gauge stuck	MBAR	PRESSURE AFTER OUTLET FLAME ARRESTER	0 gauge sticking	
TOTAL FLOW	N/A	m <sup>3</sup>	BLOWER SPEED	15.5	%
DAMPER POSTION	N/A	%			
FLOW RATE	40	m <sup>3</sup> /hr	MEASURING INSTRUMENT	OPFM	
FLAME TEMP	999	°C	MOTOR TEMP (drive bearing)	24	°C
FLAME QUALITY	OK		AMBIENT TEMP	N/A	°C

MANOMETER LIQUID LEVEL WITH RIG SHUT DOWN

AMBIENT PRESSURE

N/A

MBAR

TYPE OF LIQUID: PERFLOW

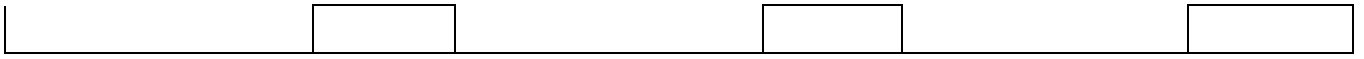
RED SG - 0.8

EMISSIONS ANALYSER CO CELL

N/A

EMISSIONS ANALYSER NOX CELL

N/A



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CHECK FOR LEAKS WITH GAS DETECTOR

None

CONDENSATE DRAIN SYSTEM CHECK

Yes

DRAINS CORRECTLY

Yes

KNOCKOUT POT FILTER CLEAN

N/A

COMMENTS

BOOSTER MODEL AND SERIAL NO Transatr Vac TAV4471

MOTOR & FAN SEAL GREASED

N/A

BOOSTER CORRECT ROTATION

Yes

NOTE: USE SHELL ALVANIA 3, GREASE EVERY SERVICE **IMPORTANT DO NOT OVERGREASE**

BOOSTER OIL CHANGED (EVERY 5000 HOURS, USE 20W50 ENGINE OIL IN DONKIN V50

N/A

BOOSTER FLEXIBLE CONNECTORS

OK

MOUNTINGS

OK

BEARING NOISE

OK

BOLTS TIGHT

Yes

SLAMSHUT SPRING

OK

GAUGES ZEROED

Yes

FLAME ARRESTER INLET

N/A

OUTLET

OK

PILOT

Fault

PILOT LIGHT FUNCTION

Cleaned & set

UV SENSOR FUNCTION

Cleaned

CONDITION OF THERMOCOUPLER

OK

DAMPER OPERATION

OK

CONDITION OF BURNER CUPS

N/A

CONDITION OF FLARE LINING

N/A

LOUVERS CONDITION

OK

INTERIOR LIGHT

OK

EXTERIOR LIGHT

N/A

ALL INDICATOR BULBS FUNCTION

Yes

ELECTRICAL CONNECTIONS CHECKED FOR TIGHTNESS

Yes

HINGES & VALVES LUBRICATED

Yes

PRESSURE SWITCH FUNCTION

SUCTION

N/A

SETTING

N/A

VENT

N/A

SETTING

N/A

BOOSTER

Yes

SETTING

1.0 mbar

OTHER (specify)

N/A

SETTING

N/A

BURNER

N/A

SETTING

N/A

SETTING

COMMENTS

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CHECK SIGNAL, CONTROL AND TELEMETRY FUNCTION	N/A
SIGNAL, CONTROL & TELEMETRY REPORT FILLED OUT AS APPROPRIATE	N/A
REPORT ALL & ANY CHANGES MADE TO TELEMETRY SYSTEM	None
REPORT ALL & ANY CHANGES MADE TO CONTROL PROGRAMME	None
CH4 ANALYSER OPERATION	Fault
O2 ANALYSER OPERATION	Fault
CO2 ANALYSER OPERATION	Fault
CO EMISSION ANALYSER	Fault
REPORT ALL & ANY REPAIRS	None
REPORT ALL & ANY PARTS REPLACED OR NEW PARTS FITTED INCLUDING PART NOS & SUFFICIENT DETAIL FOR THEM TO BE INVOICED	
COMMENTS	NEW PARTS FITTED
Gas Data analyser not working investigated and found the Lambda DPP50-15 240 VAC > 15VDC transformer has failed and requires a new one.	
Drained Flare's compressor	
Container very badly rusting, holes are now appearing in the sides	
Would recommend a replacement or welding of new panels to close the	
Holes. This is only going to get worse with time!!!!	

### GAS ANALYSER CALIBRATION REPORT:

GAS USED: 1954 Compressed Gas.		Methane (CH4) 50 % concentration		Carbon Dioxide: Remaining Balance	
Before Calibration:	CH4	N/A %	CO2	N/A %	
After Calibration:	CH4	N/A %	CO2	N/A %	
Comments:	None				
GAS USED: 1954 Compressed Gas.		Oxygen (O <sub>2</sub> ) 20.9% Concentration		Nitrogen: Remaining Balance	
Before Calibration:	O <sub>2</sub>	N/A %			
After Calibration:	O <sub>2</sub>	N/A %			
Comments:	None				

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### REPORT ANY FURTHER REPAIRS OR ACTION NEEDED:

Requires replacement of 3 x 1/4' BSP valves and suction gauge. Old ones seized, blocked and not working.

Requires replacement of 3 x 1/4' BSP valves and pressure gauge. Old ones seized, blocked or sticking, not working.

Gas Data analyser not working investigated and found the Lambda DPP50-15 240 VAC > 15VDC transformer has failed and requires a new one.

Ignitor and carriage badly corroded. Requires new carriage and new ignitor.

To maintain the quality of gas the flow was reduced at the flare from 40m<sup>3</sup>hr to 30m<sup>3</sup>hr.

The production & quality of gas from the gas field has reduced to the level that the Flare has reached its minimum Flow rate to maintain a flare stack temperature of 1000C.

**Recommend** – Replace the Flare with a Low-cal flare or install a timer on existing flare and run part time.

### DEPARTURE REPORT:

FLARE HOURS RUN: 37819

RUN RIG FOR 30 MINUTES BEFORE TAKING READINGS

CH4	33.0	%	CO2	25.7	%	O2	2.8	%	CO	N/A
-----	------	---	-----	------	---	----	-----	---	----	-----

### INLET VALVE SETTING % OPEN

NO 1	100%	NO 2	N/A	NO 3	N/A	NO 4	N/A	NO 5	N/A	NO 6	N/A
------	------	------	-----	------	-----	------	-----	------	-----	------	-----

### MAIN CONTROL VALVE SETTING % OPEN

100%

### INLET VACUUM GAUGE READINGS STARTING SIDE NEAREST KNOCKOUT POT

(mbar)

NO 1	- 14.0	NO 2	N/A	NO 3	N/A	NO 4	N/A	NO 5	N/A	NO 6	N/A
------	--------	------	-----	------	-----	------	-----	------	-----	------	-----

INLET TEMP	8	°C	INLET VACUUM PRIOR TO KO POT FILTER	-14.0	MBAR
VACUUM AFTER KO POT FILTER	-14.0	MBAR	VACUUM AFTER INLET FLAME ARRESTER	N/A	MBAR
OUTLET PRESSURE AFTER GAS BOOSTER	2.0	MBAR	OUTLET GAS TEMP	18	°C
PRESSURE AFTER SLAM SHUT	Gauge Stuck		PRESSURE AFTER OUTLET FLAME ARRESTER	Gauge Sticking	
OTHER			BLOWER SPEED %	14.5	%
DAMPER POSITION	N/A	%	MANOMETER READING	30	m <sup>3</sup> hr
FLOW RATE	30	m <sup>3</sup> hr	FLAME QUALITY	OK	
FLAME TEMP	1003	°C	HAS RIG & COMPOUND BEEN LEFT CLEAN	Yes	

### NAMES OF ALL AFS & SUB CONTRACTOR STAFF CARRYING OUT WORK

Steve Hindle

REPORT WRITER

Steve Hindle

SIGNATURE

DATE

04-05-2017

**GAS FIELD BALANCING SHEET**



Site:		Tramore				Total Flare Hrs				45988		
Date:		09/05/2018				Flare Automatic Operating Hrs Settings				Flare running		
Name:		Steve Hindle				Flare Temperature °C				1009		
Equipment Used :		GA2000				Blower motor setting				13.5%		
Serial No :		GA12884				Flow Arrival m <sup>3</sup> hr				35m <sup>3</sup> hr		
Last Calibration Date :		05/12/2017				Flow after balance m <sup>3</sup> hr				40m <sup>3</sup> hr		
Calibration Due Date :		05/12/2018				Flow Leaving m <sup>3</sup> hr				40m <sup>3</sup> hr		
1	2	3	4	5	6	9	10	12	13	14	15	16
ID	Date/Time	CH4 %	CO2 %	O2 %	BALANCE %	RESIDUAL NITROGEN %	CO ppm	H2S ppm	SUCTION PRESSURE mb	COMMENTS	START VALVE POSITION %	FINISH VALVE POSITION %
TM_FLARE	09/05/2018 13:35	53.7	21.5	1.6	23.2	17.15	2	5	-13.93		100	100
TMGE2-02	09/05/2018 13:40	0.1	0	20.1	79.8	3.82	0	0	-0.17	Extraction line flooded	0	0
TMGE2-03	09/05/2018 13:41	49.5	21.3	0.4	28.8	27.29	3	1	0.28		0	5
TMGE2-04	09/05/2018 13:42	64.5	26	0.1	9.4	9.02	1	2	0		2	5
TMGE2-05	09/05/2018 13:43	0.1	0	19	80.9	9.08	0	0	-0.15	Extraction line flooded	0	0
TMGE2-06	09/05/2018 13:44	15	8.9	9.5	66.6	30.69	1	0	0.15		0	0
TMGE2-07	09/05/2018 13:47	14.5	12.1	3	70.4	59.06	1	0	0.78		0	0
TMGE2-08	09/05/2018 13:48	7.4	5.4	14.4	72.8	18.37	0	0	-0.05		0	0
TMGE1-01	09/05/2018 13:54	38.1	18.9	0.1	42.9	42.52	1	0	0.45		0	0
TMGE1-02	09/05/2018 13:56	28.2	9.9	10.8	51.1	10.28	2	0	0.43		0	0
TMGE1-03	09/05/2018 14:01	47.1	22.6	0.1	30.2	29.82	2	1	0.11		0	5
TMGE1-04	09/05/2018 14:03	1.5	1.6	18.9	78	6.56	0	0	-0.26		0	0
TMGE1-05	09/05/2018 14:06	32.1	16.5	6.1	45.3	22.24	2	0	0.1		0	0
TMGE1-06	09/05/2018 14:07	43.9	20.4	1.5	34.2	28.53	1	0	-9.36		10	10
TMGE1-07	09/05/2018 14:08	59.5	23.1	0.1	17.3	16.92	1	2	-0.39		0	5
TMGE1-08	09/05/2018 14:10	49.9	21.5	1	27.6	23.82	1	2	-7.86		5	10
TMGE1-09	09/05/2018 14:11	5.5	6.1	14.5	73.9	19.09	1	0	0.29		0	0
TMGE4-01	09/05/2018 14:16	47	20.4	5.2	27.4	7.74	1	5	-7.75		0	0
TMGE4-02	09/05/2018 14:17	61.3	26.1	0.9	11.7	8.3	2	10	-7.8		40	40
TMGE4-03	09/05/2018 14:20	51.4	19.3	4.8	24.5	6.36	7	0	0.27		0	2
TMGE4-04	09/05/2018 14:21	61.3	26.5	0.2	12	11.24	3	21	-7.42		60	60
TMGE4-05	09/05/2018 14:23	56	22.8	3	18.2	6.86	4	2	-7.51		5	10
TMGE4-06	09/05/2018 14:24	58	24.4	1.6	16	9.95	4	14	-7.55		10	10
TMGE4-07	09/05/2018 14:25	65.6	26.9	1	6.5	2.72	3	1	-7.48		20	30
TMGE4-08	09/05/2018 14:26	0.3	1.7	17.3	80.7	15.31	2	0	0.89		0	0
TMGE4-09	09/05/2018 14:28	42.4	18	5.8	33.8	11.88	3	3	0.37		0	0
TMGE4-10	09/05/2018 14:30	53.3	23.2	2.8	20.7	10.12	3	13	-7.61		10	10
TMGE3-01	09/05/2018 14:39	57.4	22.5	0.1	20	19.62	2	6	-7.88		0	10
TMGE3-02	09/05/2018 14:39	57.5	23	0.1	19.4	19.02	2	9	-3.26		20	20
TMGE3-03	09/05/2018 14:40	57.6	22.5	0.1	19.8	19.42	2	11	-7.78		10	20
TMGE3-04	09/05/2018 14:42	59.6	21.7	2.1	16.6	8.66	3	0	3.82		0	5
TMGE3-05	09/05/2018 14:43	50.6	17.9	2.2	29.3	20.98	3	18	-7.66		10	10
TMGE3-06	09/05/2018 14:45	29.1	20.1	1	49.8	46.02	3	0	0.35		0	0
TMGE3-07	09/05/2018 14:47	70.3	23	0.4	6.3	4.79	4	1	0.23		0	10
TMGE3-08	09/05/2018 14:48	55	18.8	0	26.2	26.2	3	57	-6.21		0	20
TMGE3-09	09/05/2018 14:50	7.5	6.9	12.7	72.9	24.89	7	1	0.15		0	0
TMGE3-10	09/05/2018 14:51	61.7	23.9	0.1	14.3	13.92	3	5	-6.04		5	20
TM_FLARE	09/05/2018 14:55	55.4	22.3	1.1	21.2	17.04	3	4	-7.15		100	100



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SITE: Tramore, Co Waterford

DATE: 09-05-2018

### HEALTH AND SAFETY NOTICE

WEAR A HEAD HAT AND REFLECTIVE VEST OR JACKET ON OPERATIVE SITES

WEAR A PROTECTIVE FACE MASK WHEN WORKING IN AN AREA WHERE THERE IS ANY POSSIBILITY OF BREATHING IN CERAMIC INSULATING DUST

### TO BE COMPLETED FOR ALL HIRE INSTALLATION, SERVICE AND REPAIR VISITS

1. RECORD ALL INSTRUMENT READINGS AND VALVE SETTINGS ON ARRIVAL
2. RECORD ALL CHANGES AND REPAIRS MADE
3. RECORD ALL PARTS, MATERIALS & COMPONENTS FITTED OR USED
4. CHECK THAT PRESSURE AND VACUUM GAUGES ARE ZEROED
5. RECORD ALL INSTRUMENT READINGS AND VALVE SETTINGS ON DEPARTURE
6. LEAVE SITE CLEAN AND TIDY
7. NOTE FUTURE REMEDIAL ACTION NEEDED AND SEE THAT IT IS CARRIED OUT

### FLARE AUTO TIMER SETTINGS

DAY	START	STOP
SUNDAY		
MONDAY		
TUESDAY		
WEDNESDAY		
THURSDAY		
FRIDAY		
SATURDAY		

ENGINEERS NAME

Steve Hindle

UF10-250

ARRIVAL: **Flare running**

HOURS RUN	BOOSTER		CH4	53.7	%	CO2	21.5	%
45988 hrs clock	FLARE		O2	1.6	%	PRESSURE	2.4	mbar

INLET VALVE SETTING % OPEN

NO 1	100%	NO 2	N/A	NO 3	N/A	NO 4	N/A	NO 5	N/A	NO 6	N/A
------	------	------	-----	------	-----	------	-----	------	-----	------	-----

MAIN CONTROL VALVE SETTING % OPEN

100%

INLET VACUUM GAUGE READINGS STARING SIDE NEAREST KNOCKOUT POT

NO 1	-7.0	NO 2	N/A	NO 3	N/A	NO 4	N/A	NO 5	N/A	NO 6	N/A
------	------	------	-----	------	-----	------	-----	------	-----	------	-----

INLET TEMP	12.0	°C	INLET VACUUM PRIOR TO KO POT FILTER	-7.0	MBAR
VACUUM AFTER KO POT FILTER	-7.0	MBAR	VACUUM AFTER INLET FLAME ARRESTER	N/A	MBAR
OUTLET PRESSURE AFTER GAS BOOSTER	2.4	MBAR	OUTLET GAS TEMP	16	°C
PRESSURE AFTER SLAM SHUT	Gauge stuck	MBAR	PRESSURE AFTER OUTLET FLAME ARRESTER	0 gauge sticking	
TOTAL FLOW	N/A	m <sup>3</sup>	BLOWER SPEED	13.5	%
DAMPER POSTION	N/A	%			
FLOW RATE	40	m <sup>3</sup> /hr	MEASURING INSTRUMENT	OPFM	
FLAME TEMP	1010	°C	MOTOR TEMP (drive bearing)	24	°C
FLAME QUALITY	OK		AMBIENT TEMP	N/A	°C

MANOMETER LIQUID LEVEL WITH RIG SHUT DOWN

AMBIENT PRESSURE

N/A

MBAR

TYPE OF LIQUID: PERFLOW

RED SG - 0.8

EMISSIONS ANALYSER CO CELL

N/A

EMISSIONS ANALYSER NOX CELL

N/A

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CHECK FOR LEAKS WITH GAS DETECTOR		None	
CONDENSATE DRAIN SYSTEM CHECK		Yes	
DRAINS CORRECTLY	Yes	KNOCKOUT POT FILTER CLEAN	N/A
COMMENTS			
BOOSTER MODEL AND SERIAL NO		Transatr Vac TAV4471	
MOTOR & FAN SEAL GREASED	N/A	BOOSTER CORRECT ROTATION	Yes
NOTE: USE SHELL ALVANIA 3, GREASE EVERY SERVICE <b><u>IMPORTANT DO NOT OVERGREASE</u></b>			
BOOSTER OIL CHANGED (EVERY 5000 HOURS, USE 20W50 ENGINE OIL IN DONKIN V50)			N/A
BOOSTER FLEXIBLE CONNECTORS	OK	MOUNTINGS	OK
BEARING NOISE			OK
BOLTS TIGHT	Yes	SLAMSHUT SPRING	OK
FLAME ARRESTER INLET	N/A	OUTLET	OK
PILOT LIGHT FUNCTION	Cleaned & set	UV SENSOR FUNCTION	Cleaned
DAMPER OPERATION	OK	CONDITION OF BURNER CUPS	N/A
LOUVERS CONDITION	OK	INTERIOR LIGHT	OK
EXTERIOR LIGHT			N/A
ALL INDICATOR BULBS FUNCTION	Yes	ELECTRICAL CONNECTIONS CHECKED FOR TIGHTNESS	Yes
HINGES & VALVES LUBRICATED	Yes		
PRESSURE SWITCH FUNCTION			
SUCTION	N/A	SETTING	N/A
BOOSTER	Yes	SETTING	1.0 mbar
BURNER	N/A	SETTING	N/A
OTHER (specify)		N/A	SETTING
COMMENTS			

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CHECK SIGNAL, CONTROL AND TELEMETRY FUNCTION	N/A
SIGNAL, CONTROL & TELEMETRY REPORT FILLED OUT AS APPROPRIATE	N/A
REPORT ALL & ANY CHANGES MADE TO TELEMETRY SYSTEM	None
REPORT ALL & ANY CHANGES MADE TO CONTROL PROGRAMME	None
CH4 ANALYSER OPERATION	Fault
O2 ANALYSER OPERATION	Fault
CO2 ANALYSER OPERATION	Fault
CO EMISSION ANALYSER	Fault
REPORT ALL & ANY REPAIRS	None
REPORT ALL & ANY PARTS REPLACED OR NEW PARTS FITTED INCLUDING PART NOS & SUFFICIENT DETAIL FOR THEM TO BE INVOICED	
COMMENTS	NEW PARTS FITTED
The slam shut valve remained closed when the flare was running due to the power supplying the compressor was tripped. Reset contact breaker.	
Damper louvers stiff in operation. Lubricated Damper louvers spindles	
Drained Flare's compressor	

<b>GAS ANALYSER CALIBRATION REPORT:</b>					
GAS USED: 1954 Compressed Gas.		Methane (CH4) 50 % concentration		Carbon Dioxide: Remaining Balance	
Before Calibration:	CH4	N/A %	CO2	N/A %	
After Calibration:	CH4	N/A %	CO2	N/A %	
Comments:	None				
GAS USED: 1954 Compressed Gas.		Oxygen (O <sub>2</sub> ) 20.9% Concentration		Nitrogen: Remaining Balance	
Before Calibration:	O <sub>2</sub>	N/A %			
After Calibration:	O <sub>2</sub>	N/A %			
Comments:	None				

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**REPORT ANY FURTHER REPAIRS OR ACTION NEEDED:**

Requires replacement of 3 x 1/4' BSP valves and suction gauge. Old ones seized, blocked and not working.

Requires replacement of 3 x 1/4' BSP valves and pressure gauge. Old ones seized, blocked or sticking, not working.

Gas Data analyser not working investigated and found the Lambda DPP50-15 240 VAC > 15VDC transformer has failed and requires a new one.

Ignitor and carriage badly corroded. Requires new carriage and new ignitor.

**DEPARTURE REPORT:**

FLARE HOURS RUN: 45989

RUN RIG FOR 30 MINUTES BEFORE TAKING READINGS

CH4	55.6	%	CO2	23.0	%	O2	1.1	%	CO	N/A
-----	------	---	-----	------	---	----	-----	---	----	-----

**INLET VALVE SETTING % OPEN**

NO 1	100%	NO 2	N/A	NO 3	N/A	NO 4	N/A	NO 5	N/A	NO 6	N/A
------	------	------	-----	------	-----	------	-----	------	-----	------	-----

**MAIN CONTROL VALVE SETTING % OPEN**

100%

**INLET VACUUM GAUGE READINGS STARTING SIDE NEAREST KNOCKOUT POT**

(mbar)

NO 1	- 7.0	NO 2	N/A	NO 3	N/A	NO 4	N/A	NO 5	N/A	NO 6	N/A
------	-------	------	-----	------	-----	------	-----	------	-----	------	-----

INLET TEMP	12.0	°C	INLET VACUUM PRIOR TO KO POT FILTER	-7.0	MBAR
VACUUM AFTER KO POT FILTER	-7.0	MBAR	VACUUM AFTER INLET FLAME ARRESTER	N/A	MBAR
OUTLET PRESSURE AFTER GAS BOOSTER	2.3	MBAR	OUTLET GAS TEMP	16	°C
PRESSURE AFTER SLAM SHUT	Gauge Stuck		PRESSURE AFTER OUTLET FLAME ARRESTER	Gauge Sticking	
OTHER			BLOWER SPEED %	13.5	%
DAMPER POSITION	N/A	%	MANOMETER READING	40	m <sup>3</sup> hr
FLOW RATE	44	m <sup>3</sup> hr	FLAME QUALITY	OK	
FLAME TEMP	1002	°C	HAS RIG & COMPOUND BEEN LEFT CLEAN	Yes	

**NAMES OF ALL AFS & SUB CONTRACTOR STAFF CARRYING OUT WORK**

Steve Hindle

REPORT WRITER

Steve Hindle

SIGNATURE

DATE

09-05-2018



**Appendix I**

**Leachate Removal Records**

**Leachate Removal Record - Tramore Landfill**

**Compliance with Conditions 8.2, 11.9 and 11.10 of Licence W0075-02**

Date of Removal	Time of Removal	Amount Removed			Name and Address of Approved Carrier	Carrier Permit Number	Vehicle Reg	Final Destination of Leachate	Spillages during Removal/ Transportation
		Tonnes	Cubic Meters	Gallons					
23/01/2017	10:00:00	38.44	36.291204	8064.712	Power Waste Disposal, Curraghduff, Carrick on Suir, Co. Waterford	WCP-KK-10-127-02	N/A	Tramore Waste Water Treatment Plant, Crobally Upper, Tramore, Co. Waterford	No
07/07/2017	10:00:00	38.44	36.291204	8064.712	Power Waste Disposal, Curraghduff, Carrick on Suir, Co. Waterford	WCP-KK-10-127-02	N/A	Tramore Waste Water Treatment Plant, Crobally Upper, Tramore, Co. Waterford	No