

Wexford County Council

Holmestown Waste Management Facility
W0191-02

Annual Environmental Report 2017

Quality Control Sheet

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EXECUTIVE SUMMARY

This *Annual Environmental Report* has been prepared for Holmestown Waste Management Facility, Waste Licence W0191-02, for the reporting period from **1 January 2017 to 31 December 2017 inclusive**. The report includes the information specified in Schedule H of the Waste Licence, Content of the Annual Environmental Report, in accordance with Waste Licensing - *Draft Guidance on Environmental Management Systems (EMS) and Reporting to the Agency, 1999*. The main topics discussed within this report are as follows:

- General Site Information
- Management and Staffing
- Reported Incidents and Complaints
- Development Works
- Waste Acceptance and Handling
- Emissions Management
- Environmental Nuisances
- Resource and Energy Consumption
- Environmental Monitoring and Emissions

The waste management facility commenced accepting waste on site on 29 April 2008 in the northern end of the landfill, namely Cells 3 + 4 in Phase 1, being used first. The waste management facility temporarily ceased accepting waste on 21st May 2012. No waste has been accepted for landfilling at the facility since then. Therefore, the total quantity of waste accepted for landfill at the facility for the reporting period 1st January to 31st December 2017 was 0 tonnes.

An environmental management system was prepared for Holmestown Waste Management Facility in October 2008 consisting of the following elements:

- Schedule of Environmental Objectives and Targets
- Environmental Management Plan
- Corrective Action Procedures
- Awareness and Training Programme

A number of objectives and targets were developed for the facility which are reviewed and updated where appropriate on an annual basis.

The majority of engineering works associated with the general development of the site including the preparation of Phase 1, Cells 1-4, were completed from 2006-2008. The installation of the twin gas lines from phase 1 to the enclosed gas flare and other minor operational works were completed in 2009.

The enclosed flare was commissioned in August 2009 and put into permanent operation in September 2009. Horizontal and vertical gas management infrastructure has been installed in cells 1, 2, 3, and 4. The volumes of landfill gas extracted varied from 50m³/hr to 60m³/hr during the reporting period. Gas extraction rates were optimised in 2016 to minimise odours. The gas quality remained varied during the reporting period with concentrations from 35% CH₄ up to 55% CH₄. The 500m³ flare stack was replaced with a 150m³ flare stack in August 2016.

The construction of the Phase 2 landfill cells commenced in June 2010 and was completed in December 2010.

The Phase 2 landfill footprint encompasses approximately 17,500 m². Lining of the cells involved the placing of approximately 16,600 m³ of engineered clay and the laying and welding of approximately 17,500 m² of HDPE liner. A 500 mm stone drainage blanket was laid on the cell floors with a protective geotextile placed on the cell side slopes.

Wexford County Council carried out a comprehensive environmental monitoring programme during 2017 in compliance with the waste licence conditions. The monitoring programme incorporated Landfill Gas, Leachate Level & Quality, Surface Water Quality, Groundwater Level & Quality, Noise, Dust, Odour and Meteorological. Results to date suggest that there is no notable pollution from operational activities.

There were a number of recurring category 3 incidents in 2017. These were related to:

- peripheral gas wells;
- groundwater monitoring;
- noise.

The elevated gas and groundwater results were detected pre-landfilling and are not related to site operations. Reports to date have summarised that the elevated results recorded are due to naturally occurring elements in the site soils.

The elevated noise readings were also not attributed to site operations. Noise reports commented that all the elevated readings were caused by either the N25 or local noises in close proximity to the sampling device (e.g. birdsong, dog barking etc.).

Reports have been submitted to the EPA that review peripheral gas, groundwater and surface water pond results and provide proposals for control and trigger levels where applicable.

No complaints were received by WCC or the EPA during this reporting period.

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1 INTRODUCTION

1.1 General Information

The Annual Environmental Report (AER) for Holmestown Waste Management Facility includes as a minimum the information specified in Schedule H of the Waste Licence W0191-2, *Content of Annual Environmental Report*.

The AER has been prepared in accordance with the Environmental Protection Agency (EPA) publication *Waste Licensing – Draft Guidance on Environmental Management Systems (EMS) and Reporting to the Agency, 1999* and further guidance provided on the EPA website. This document is the sixth AER prepared for the site.

The reporting period for this AER is **1 January 2017 to 31 December 2017 inclusive**.

1.2 Site information

Table 1 Site information on Holmestown Waste Management Facility







HOLMESTOWN WASTE MANAGEMENT FACILITY	
Waste licence register no:	W0191-02 (revised date 24/03/2010)
Name and address of operator:	Wexford County Council County Hall Carricklawn, Wexford.
Name and address of facility:	Holmestown Waste Management Facility Bartown Wexford
Site Description:	<p>Holmestown Waste Management Facility is located within the town lands of Holmestown Great, Glenduff, Bolgerstown, Muchwood and Ballyeaton, approximately 8 kilometres west from Wexford Town (National Grid Reference 2973, 1230). The site which lies to the north of the N25, Wexford to New Ross road comprises an area of approximately 63 hectares of which 15 hectares will be used for landfilling and is situated within a mixed forested plantation of mainly coniferous trees known as Holmestown Wood.</p> <p>The property is bounded by agricultural lands to the North, South, East and West. The land use in the surrounding area is good quality grazing and is intensely farmed to the west, north and east by dairy and livestock farmers. There are a number of dwellings surrounding the site including farmhouses, residences and a nursing home. The site is within the catchment of the Slaney River, and a number of small streams drain the site to the Slaney, less than 2km away. A site location map is provided as Appendix G.</p>

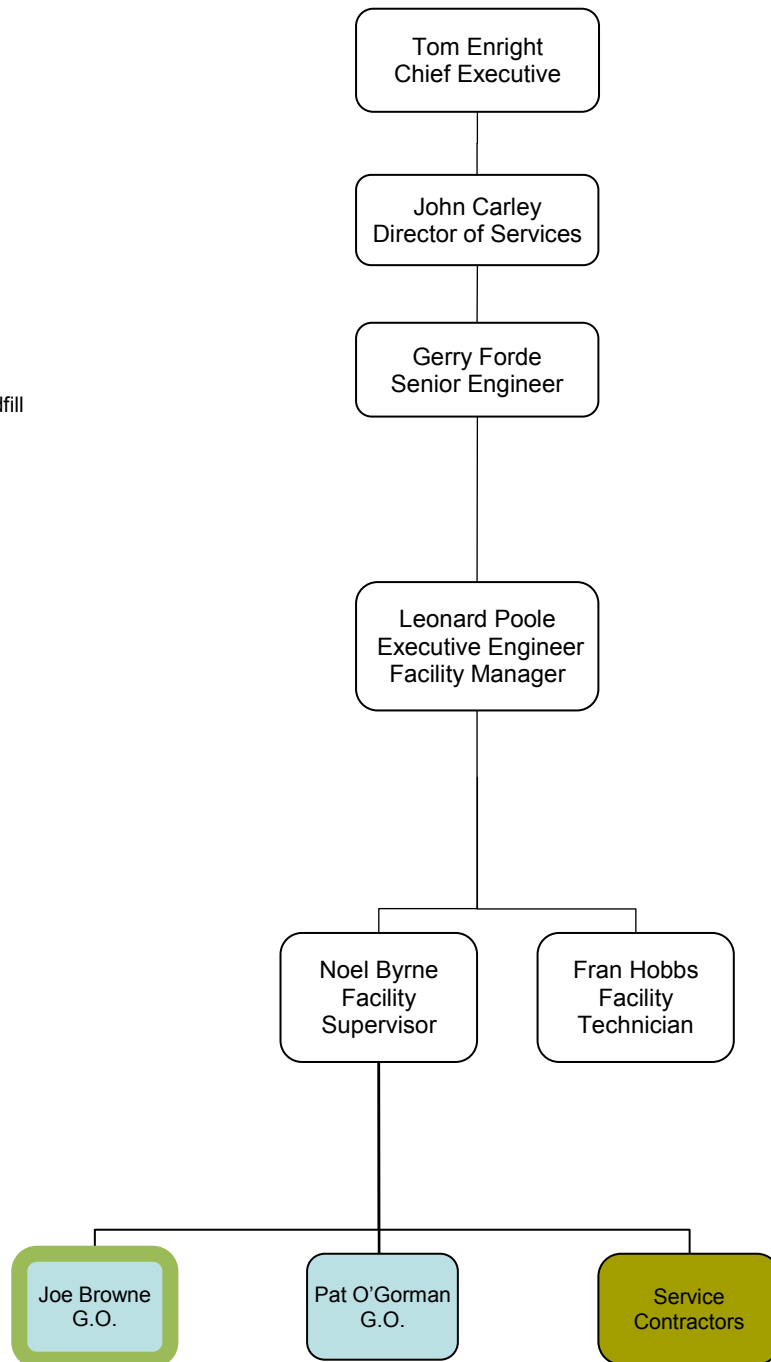
2 MANAGEMENT & STAFFING STRUCTURE

2.1 Management and staffing structure for Holmestown Waste Management Facility

Management Structure for Holmestown Waste Management Facility on 31st December 2017

Key

-  Management
-  Weighbridge
-  Civic Amenity
-  Civic Amenity/Landfill
-  Landfill
-  Rapid Response



The Holmestown waste management facility was operated by Wexford County Council during 2017 with consultancy support provided by sub consultants including RPS and Fehily Timoney & Company and service contractors including Response Engineering Ltd, Irish Biotech Services and Automatic Flare Systems Ltd.. Details of the management structure during the reporting period for the facility are provided above.

2.2 Financial provisions

In accordance with Condition 12.1 Wexford County Council paid a sum of €12,882 to the Environmental Protection Agency for the management and monitoring of the waste licence.

2.2.1 Provision for the Closure, Restoration and Aftercare

Wexford County Council (WCC), as a Local Authority, has made the necessary provisions, for the development, management, restoration and aftercare of Holmestown Waste Management Facility. WCC has assigned a full time permanent engineer for the management of the facility. Wexford County Council is committed to the ongoing provision of funding for all site development works, environmental monitoring costs and restoration and aftercare works at Holmestown Landfill for the duration of the Waste Licence, and has made financial provision as presented in the Environmental Liabilities Risk Assessment (see 2.3 below and Appendix H).

2.2.2 Community Support and Development

An environmental monitoring committee (EMC) was established in July 2005 and includes two members of the Barntown Environmental Alliance, two elected members of Wexford County Council and two Wexford County Council officials. The Committee meets periodically – less frequently than when the landfill was fully operational. A community support and development fund has been set up by Wexford County Council.

2.3 Review of Environmental Liabilities

Condition 12.2.2 states the licensee shall arrange for the completion of a Environmental Liabilities Risk Assessment (ELRA) to address the liabilities from past and present activities. WCC engaged the services of Fehily Timoney and Company, consulting engineers, to undertake this assessment. The ELRA was completed in July 2013 and issued to the EPA via the Eden system.

In September 2015, the EPA responded to seek submission of an updated ELRA and CRAMP to take account of their newly published guidelines "*Guidance on Assessing and Costing Environmental Liabilities 2014*". WCC submitted the revised ELRA in December 2014 and the revised CRAMP in January 2015. WCC submitted a further revision of the ELRA in March 2015 to correct some earlier minor discrepancies.

The ELRA approach is a standard risk assessment that involves the assessment of the likelihood of occurrence of an event in combination with the consequences of that event. This is followed by the costing of the plausible worst case scenario for the purposes of informing the level of financial provision (cover) necessary. The projected worst-case scenario for Holmestown is landfill fire. Costs associated with such an event are estimated at **€671,440 (excluding VAT)**.

2.4 Environmental Management System

Condition 2.3 requires the licensee to establish and maintain an Environmental Management System (EMS) at the facility. The site environmental management system was prepared in October 2008 and revised in 2010. The EMS consists of the following elements:

- Schedule of Environmental Objectives and Targets
- Environmental Management Plan
- Corrective Action procedures
- Awareness and training Programme

2.4.1 Environmental Objectives & Targets – Progress

The Environmental Objectives and Targets for the period January 2017 to December 2017 and details of progress made regarding each objective are detailed in Table 2 and 3 hereafter. In summary the objectives and targets established include the following;

- Objective No 1: Operate facility in accordance with the conditions of the waste licence and promote continual environmental improvement
- Objective No 2: Improve Environmental Performance of the facility by maintaining a comprehensive monitoring regime
- Objective No 3: Maximise recycling levels within the civic amenity and site office
- Objective No 4: Promote energy efficiency on site and in the site offices
- Objective No 5: Minimisation of Complaints

2.4.2 Environmental Management Plan

An environmental management plan (EMP) was prepared and as part of the EMS in October 2008 and reviewed in January 2010. The EMP comprises information on the following topics:

- Site description
- Site infrastructure
- Types of waste accepted on site
- Civic amenity site
- Leachate Collection and treatment Leachate Management System
- Landfill Gas Abatement Methods
- Surface water Control Measures
- Environmental Monitoring
- Site Security and Site Offices
- Operational Matters
- Noise and dust abatement
- Vermin and litter control
- Fires
- Restoration and Aftercare

2.4.3 Corrective action Procedure

Procedures are in place in accordance with Condition 2.3.2.3 of the licence to monitor, measure, audit and record the environmental performance of the environmental management system. These procedures establish how non-conformance within the system is dealt with and how any corrective and preventive action is carried out. A corrective action procedure was prepared in October 2008 and included in the overall EMS report.

2.4.4 Awareness and Training Programme

In accordance with Condition 2.3.2.4 of the licence, an awareness and training programme has been developed to increase environmental awareness among staff and identify training needs of all personnel working at Holmestown waste management facility. The facility manager has overall responsibility for reviewing training needs on an annual basis to ensure that all staff have the necessary skills and level of awareness to carry out their duties to the highest environmental and safety standards. A training schedule summarizing staff training proposals for 2017 is included in Appendix B.

Table 1 Achievement of Objectives and Targets for 2017

Achievement of Objectives and Targets for 2017			
	Comments	Target	Progress
Objective No 1: Operate facility in accordance with the conditions of the waste licence and promote continual environmental improvement			
1.1 To prevent recurrence of leachate-related incidents that occurred during 2014	<ul style="list-style-type: none"> • Ensure strict controls are in place if pumps are operated in manual mode when necessary • Assess feasibility of temporary capping using proprietary artificial lining materials 	Continuous Continuous	Successful and ongoing Ongoing. Deemed not feasible in 2017 in light of possible plan to decommission site.
Objective No 2: Improve environmental performance of the facility by maintaining a comprehensive monitoring regime			
2.1 Regularly review environmental monitoring data and monitor changes in trends	Conduct monitoring, as a minimum in accordance with the waste licence Maintain trend analysis graphs for 2017, interrogate and interpret this data. Make improvements where the need is identified	December 2017	Ongoing. No required improvements identified.
Objective No 3: Progress implementation of polluter-pays principle at the civic amenity			
3.1 Introduction of charge for recycling customers		June 2017	Complete
Objective No 4: Enhance Protections to Groundwater			
4.1 Implement any Recommendations in GW technical Assessment report	To be agreed with the Agency	Ongoing	Report complete. Implementation of

Achievement of Objectives and Targets for 2017			
	Comments	Target	Progress
			recommendations is outstanding.
Objective No 5: Accelerate waste decomposition and reduce long-term environmental liability			
6.1 Commence leachate recirculation	Subject to SEW approval	Ongoing	This was not approved by the Agency prior to completion of capping.

Table 2 Objectives and Targets for 2017

Objectives and Targets for 2017			
	Comments	Target	Responsibility
Objective No 1: Operate facility in accordance with the conditions of the waste licence and promote continual environmental improvement			
1.1 To prevent recurrence of leachate-related incidents that occurred during 2014	<ul style="list-style-type: none"> • Ensure strict controls are in place if pumps are operated in manual mode • Keep strict watch on leachate levels in cells and leachate treatment plant capacity during periods of heavy rainfall 	Continuous	Facility Manager
Objective No 2: Improve environmental performance of the facility by maintaining a comprehensive monitoring regime			
2.1 Regularly review environmental monitoring data and monitor changes in trends	Conduct monitoring, as a minimum in accordance with the waste licence Maintain trend analysis graphs for 2017, interrogate and interpret this data. Make improvements where the need is identified	December 2017	Facility Technician & Manager

Objectives and Targets for 2017			
	Comments	Target	Responsibility
Objective No 3: Progress implementation of polluter-pays principle at the civic amenity			
3.1 Introduction of charge for recycling		June 2017	Facility Supervisor & Manager
Objective No 4: Enhance Protections to Groundwater			
4.1 Implement any Recommendations in GW technical Assessment report	To be agreed with the Agency	December 2017	Facility Manager & Technician
Objective No 5: Assess Feasibility of Decommissioning of Site			
5.1 Complete feasibility study which will examine excavation of the waste and removal for alternative disposal/recovery	Our consultants are currently working on this study	Ongoing	Facility Manager

2.4.5 Full title of any procedures developed by the licensee in the year which relates to the facility operation

During the reporting period January – December 2017 no new site procedures were developed at the facility. All procedures are kept on file at the site office and all staff are made fully aware of new/revised procedures as they are developed. The procedures developed for the site are as follows:

- HWMF001 Waste Acceptance Procedure rev.2
- HWMF002 Waste Handling Procedure
- HWMF003 Communications Procedure
- HWMF004 Environmental Records Procedure
- HWMF005 Corrective Action Procedure
- HWMF006 Leachate Handling Procedure
- HWMF007 Emergency Response Procedures
- HWMF008 Firewater Risk Retention assessment
- HWMF009 Entering onto private property procedure
- HWMF010 Civic Amenity procedures
- HWMF011 Weighbridge procedures
- HWMF012 Fire Evacuation - Emergency Procedure
- HWMF013 Accident and reporting procedure

2.4.6 Report on communication programme

In accordance with Condition 2.4.1 of the waste licence a communications programme has been developed at the facility. An environmental monitoring committee convenes periodically to discuss a range of matters relating to the management and operation of the waste management facility. In addition Wexford County Council provides the following documentation for public access at the site office and at Wexford County Hall:

Table 3 List of records available for public access in relation to the landfill

List of records available for public access
Waste Licence W00191-2
Waste Licence application
Correspondence with the EPA
Incident / complaints records
Audit records
Waste acceptance records
Rejected waste records
All monitoring records
Leachate removal records
Bird / vermin control reports

3 REPORTED INCIDENTS & COMPLAINTS SUMMARIES

3.1 Incidents

A recurring category 3 incident which was initially reported to the EPA on 11 January 2008 relating to the detection of carbon dioxide and methane gas at a number of gas monitoring boreholes continued to be in exceedence of its trigger level during the period January to December 2017.

Monitoring of gas wells was carried out between September 2007 and March 2008. Naturally occurring methane and carbon dioxide were regularly detected in a number of boreholes located outside the perimeter of the constructed lined cells during routine monitoring on site prior to waste acceptance. As a means of investigating these recurring gas levels the EPA requested that an investigation be carried out on site, this was undertaken between March and April 2008.

The investigation found existing levels of naturally occurring methane and carbon dioxide in the area as a result of the breakdown of organic material in the soil. An assessment was carried out and the risk associated with naturally occurring methane and carbon dioxide on the site was deemed not to be significant due to the underlying geology of the area. The presence of clay which has a low permeability acts as a natural containment material preventing gas from travelling through the ground for any considerable distance. The cells are also fully lined with a double liner system consisting of a geocomposite liner on top of an engineered clay liner. A number of recommendations were made to monitor and manage the landfill in the absence of perimeter gas wells through maintaining a negative pressure within the waste body. Two reports were submitted to the EPA during April and December 2008 entitled:

- Investigation of Naturally Occurring Background Gas Levels at Holmestown Landfill – Risk Assessment and Recommendations. (Revision 1)
- Investigation of Naturally Occurring Background Gas Levels at Holmestown Landfill – Risk Assessment and Recommendations – Trace Gas Analysis. (Revision 2)

A review of the peripheral gas borehole results as recommended in previous reports has been completed. The review incorporates all results to the end of 2009. This report will form the basis for future works/monitoring.

Another recurring category 3 incident was the exceedence of trigger levels for groundwater boreholes. Results were outside Interim Guideline Values in a number of the on-site groundwater boreholes tested. The elevated values date back to pre-landfilling and have been recorded both upstream and downstream of the landfill footprint. Similar to gas readings the elevated results are prevalent downstream in the north east corner where the bulk of the on site excavation works were carried out and appear to be due to a non-landfill source in the soil. The main soil mass is low permeability clay with sand and gravel lenses. Groundwater movement in the soil zone is relatively slow resulting in low flows. This enables emissions to build up locally around a source as appears to be indicated from the results.

Subsequent to ongoing interim trigger level exceedences, a report reviewing all groundwater data to the end of 2009 was completed and submitted to the EPA.

Exceedences of noise trigger levels were also noted during the reporting period. The excessive noise was attributed to traffic on the N25 roadway or local noise sources (dogs barking etc.) during monitoring for all the monitoring locations that tested above the licence limit.

3.2 Complaints

No complaints were received during this reporting period.

4 DEVELOPMENT WORKS UNDERTAKEN DURING THE REPORTING PERIOD & THOSE PROPOSED FOR THE COMING YEAR

4.1 Landfill Engineering Works

Condition 3.1 of the licence states that the licensee shall establish all infrastructure referred to in the licence prior to the commencement of the licensed activities or as required by the waste licence. In accordance with Condition 3.2 proposals for all Specified Engineering Works reports (SEW's) have been submitted to the Agency for approval. A list of these reports to date is as follows. Due to a numbering error SEW No. 7 was omitted i.e. next report after SEW No. 6 is in fact SEW No. 8.

- SEW Report No. 1: Development of the facility including preparatory works and lining – October 2005
- SEW Report No. 2: Installation of the Civic Amenity Facility – October 2005
- SEW Report No. 3: Installation of the Landfill Gas System – October 2005
- SEW Report No. 3A: Installation of the Landfill Gas System (Revised) – September 2007
- SEW Report No. 4: Installation of the Leachate Management System – October 2005
- SEW Report No. 5: Installation of the Groundwater Control Infrastructure – October 2005
- SEW Report No. 6: Installation of the Surface Water Management Infrastructure – October 2005
- SEW Report No. 8: Installation of Clay Liner – February 2007
- SEW Report No. 9: Access to Additional Cells – July 2008
- SEW Report No. 10: Landfill Cell Development Phase 2 – April 2009
- SEW Report No. 11: Downsize Landfill gas flare – December 2015

4.1.1 Completed Engineering Works to end of 2017

The majority of engineering works associated with the general development of the site including the preparation of Phase 1, Cells 1-4, were completed during 2006 and 2007. During the latter part of 2008 engineering works associated with the completion of Contract 3 and snagging works were completed. During 2009 the installation of the twin gas lines from phase 1 to the enclosed gas flare and other minor operational works was completed. Landfill Cell Development Phase 2 commenced in June 2010 and was completed in December 2010. No Engineering works were complete at Holmestown Waste Management facility during 2017.

Table 4 Summary of Engineering

Start Date	Development Works
n/a	n/a

4.1.2 Proposed Engineering Works 2018

A description of engineering works proposed at Holmestown Waste Management Facility for 2018 is as follows:

5 WASTE ACCEPTANCE & HANDLING

5.1 Waste Activities carried out at the Facility

In accordance with Schedule A of the Licence, Holmestown Waste Management facility is licensed to accept 80,000 Tonnes of waste per annum. This includes 55,000 Tonnes of non-hazardous household and commercial waste, 5,000 Tonnes of waste for composting, 8,000 Tonnes of construction and demolition waste for recovery and 12,000 Tonnes of household and commercial waste for recovery.

Both waste recovery and disposal operations took place on site at Holmestown Waste Management facility during 2017.

5.2 Waste Acceptance and Handling Procedures

Holmestown Waste Management facility opened in April of 2008, as a replacement landfill for Killurin which ceased accepting waste on site at the end of June 2008. The facility temporarily stopped accepting waste on 21st May 2012. Waste has been placed in cell's 1, 2, 3 & 4 of Phase 1 which is at the northern end of the landfill footprint.

5.3 Waste Deposition

As the facility temporarily stopped accepting waste on 21st May 2012 no waste was brought to the active tipping face during the reporting period.

All waste consigned off-site during 2017 was disposed of to facilities licensed or permitted to accept or treat that waste. Transport of waste was carried out in accordance with the *Waste Management (Collection Permit) Regulations, SI 820 of 2007*, and Amendment Regulations, *SI 87 of 2008* as appropriate.

5.4 Total quantity of wastes accepted on site

As the facility temporarily stopped accepting waste on 21st May 2012 no waste was accepted for landfill at the facility for the reporting period 1st January to 31st December 2017.

2600 tonnes of leachate was accepted from Killurin Landfill (W0016-02) for pre-treatment at Holmestown leachate treatment plant during 2017.

5.5 Total Quantity of Waste Consigned Off Site

The total quantity of waste consigned off site at Holmestown Waste Management Facility for the reporting period 1st January to 31st December 2017 was 1205 tonnes.

A summary of the total quantity of waste consigned off site for the reporting period is presented below in Appendix E.

The total volume of leachate sent off site for further treatment at Wexford Wastewater Treatment Works was estimated at 16,873 tonnes. This is inclusive of the 2600 tonnes imported from Killurin.

5.6 Remaining capacity of the site

The most recent void calculation indicates a remaining landfill capacity of approximately 1.1million tonnes remaining for waste, net of allowances for cover.

5.7 Area occupied by waste

A topographical survey completed in March 2011 showed the area of waste present within Cells 1, 2, 3 and 4 to be 18,132m². The overall area where waste will be land filled is approximately 15.2 ha (152,000 m²).

6 Emissions Management

6.1 Landfill Gas Management

The maintenance of the landfill gas control system is an ongoing process. Horizontal and vertical infrastructure was placed concurrent with waste. The pipe work systems are connected to a 150m³ enclosed gas flare. The enclosed flare was commissioned and put into permanent operation in August 2016 replacing the 500m³ enclosed flare which operated from September 2009 to August 2016.

More detailed information on the landfill gas extraction system installed to date on site can be found in the following report which can also be viewed on file in the site office:

- *SEW Report No. 3A: Installation of the Landfill Gas System (Revised) which was submitted to the EPA in September 2007*

6.1.1 **Estimated annual and cumulative quantities of landfill gas extracted from the site.**

The volumes of landfill gas extracted varied from 37m³/hr to 76m³/hr during the reporting period. Gas extraction rates have been maximised to minimise odours. The gas quality varied during the reporting period from 32% CH₄ up to 44% CH₄. The total volume of CH₄ flared on site during 2017 was 58,261m³ recorded by SCADA system. The cumulative volume from commencement of flaring to the end of 2017 was 3,426,440m³.

We have installed infrastructure in accordance with best practice to ensure that gas capture is maximised. We are confident from the absence of odour in and around the site and by maintaining a negative pressure in the landfill that gas capture at HWMF is satisfactory.

6.2 Leachate, Groundwater and Surface Water Management

6.2.1 **Leachate**

Leachate is generated by incident rainfall seeping into the landfill and becoming contaminated by contact with the waste product, and by the decomposition of the waste itself. Other potential sources of leachate generation, such as groundwater and surface water ingress are prevented from entering the waste fill areas through a number of site specific engineering works.

Leachate from Cells 1, 2, 3 & 4 is pumped directly to the leachate treatment plant using the in-cell submersible pumps. From the leachate treatment plant final effluent tank the pre-treated leachate is pumped to the Wexford Town Wastewater Treatment Plant for final treatment and disposal. It should be noted that occasionally, during periods of persistent heavy rainfall, it becomes necessary to remove untreated leachate from site by tanker.

The on-site leachate treatment plant was commissioned during 2009 and began to accept leachate directly from Phase 1 for treatment. The treatment plant provides a capacity of approximately 1200 m³, equivalent to a process retention time of 15 days at the maximum flow (average estimate is 50m³ per day, estimated peak flow is 80m³ per day). The plant comprises of the following main elements, together with ancillary pipe work to convey the leachate between tanks:

- ◆ 2 x Sequencing batch reactor (SBR);
- ◆ Treated leachate balance tank (TLBT);
- ◆ Raw leachate feed pump;
- ◆ Venturi aerators;

- ◆ Decant pump;
- ◆ Final discharge pump;
- ◆ Alkali dosing facilities; and
- ◆ Nutrient dosing facilities.

In January 2015, off-site pumping of treated leachate to sewer commenced, supplemented by occasional periods of tankering of untreated leachate off-site to Wexford WWTP during periods of excess rainfall.

Monthly volumes of leachate discharged off site are presented in Table 6 below. In August 2015, importation of leachate from Killurin (W0016-02) for treatment at Holmestown commenced. The table below takes account of imported Killurin leachate during 2017.

Table 6 Leachate volumes removed from site in 2017

	A	B	C
Month	Tankered off site HWMF (m³)	Imported from Killurin (m³)	Pumped off site HWMF (m³)
January	0	245	861
February	0	397	2,055
March	0	358	1,345
April	0	202	997
May	0	186	1,209
June	0	131	2,115
July	0	59	419
August	0	59	579
September	0	231	1,833
October	0	124	1,782
November	0	382	1,614
December	0	126	2,064
Total	0	2600	16,873

Integrity testing of leachate storage tanks in the leachate treatment plant was carried out by Response Engineering in 2017.

6.2.2 Groundwater

Condition 3.10 of the licence states that effective groundwater management infrastructure shall be provided and maintained at the facility during construction, operation, restoration and aftercare of the facility. As a minimum, the infrastructure is required to be capable of the following:

- Protection of groundwater resources from pollution by the waste activities
- Protection of other infrastructure, such as the liner; from any adverse effects caused by groundwater.

At Holmestown Waste Management facility the cell formation levels have been designed so that the formation levels will be a minimum of 2m above the expected winter water-table levels. The nature of the excavation elsewhere on site is shallow so groundwater is not expected to be encountered.

Groundwater resources are protected from waste related pollution by the construction of a quality-assured composite lining system, which comprise the following:

- ◆ 1,000 mm compacted engineered clay with hydraulic conductivity (k) $\leq 1 \times 10^{-9}$ m/sec; overlain by
- ◆ 2 mm fully-welded HDPE liner.

Leachate arising from waste activities is contained within the landfill by the lined system and conveyed to the on-site leachate treatment plant via sealed pipe systems. Treated leachate is currently pumped off site to Wexford Town Wastewater Treatment Plant for final treatment and disposal. There is no discharge to groundwater from any aspect of the landfill development.

Foul water drains to a proprietary wastewater treatment plant on site. Effluent from the wastewater treatment plant discharges to the leachate treatment plant.

6.2.3 Surface Water

In accordance with the licence conditions (condition 3.10); surface water is collected on site via a network of drains, and is fed into the surface water collection pond to the north of the site at SWP1. The water settles in the pond and is then released to a petrol interceptor tank via SWP2. From there the surface water flows in an easterly direction to the stream on the east of the site, and enters the stream at SW4.

The following describes the various aspects of surface water collection systems:

- All clean surface water from paved roads and roofed areas on site drains into the constructed surface water drainage system and drains to the surface water pond via carrier pipes and open channels.
- Dirty surface run-off from the civic amenity area is collected in gullies, and drains and diverted to the leachate treatment plant via a splitter chamber and carrier pipe.
- Surface water run-off from the screening berm at the north end of the site is collected by a number of embankment swales and directed to the surface water pond.
- Surface water in constructed landfill cells in which the filling with waste has not yet commenced is pumped to the surface water pond.

The surface water pond located to the north east of the landfill is lined with a 1 m thick layer of clay, engineered to ensure a maximum permeability of 1×10^{-9} m/sec. The pond is designed to attenuate peak flows up to a 1 in 100 year return period, and to fully contain peak flows up to a 1 in 5 year return period. The pond is designed to cater for the worst case scenarios during the lifetime of the entire landfill. The allowable discharge from the pond has been reduced below baseline flow levels in order to enable water settlement and achieve suspended solids content less than 25 mg/l.

6.2.4 Water Balance Calculations

The objective of water balance calculations is to understand and predict and reconcile the liquid inputs and outputs of the facility. In order to predict the approximate leachate volumes which would be generated on-site, water balance calculations have been calculated for the period 1st January 2017 to 31st December 2017 to estimate the approximate volume of leachate that was generated during the reported period. This volume can then be compared to the volume of leachate leaving site, by tanker over the weighbridge or by rising main to sewer.

The water balance addressed the volume of leachate generated at the site including the estimated annual infiltration of rainfall. The water balance methodology is described below and the calculation is shown in Appendix F.

The water balance calculations are based on the methodology specified in the EPA's Landfill Site Design Manual. The calculation used is as follows: -

$$L_o = [ER(A) + LW + IRCA + ER(I)] - [aw]$$

L_o = leachate produced (m³)

ER = effective rainfall (m) (Use actual rainfall (R) for active cells)

A = area of cell (m²)

LW = liquid waste (m³)

IRCA = infiltration through restored and capped areas (m)

I = surface area of lagoon (m²)

a = absorptive capacity of new waste (m³/t)

w = weight of waste deposited (t/a)

An absorptive capacity of 0.025 m³ per tonne was assumed.

The meteorological data used was obtained from the nearby Met Eireann meteorological station at Johnstown Castle. The total rainfall from 1st January 2017 to the 31st December 2017 was approximately 963 mm. Meteorological data is presented in Appendix D.

Phase 1 (18,700m²) was the only part of the landfill contributing to leachate generation in 2017. The entire Phase 1 area is covered with a temporary cap. An 89% infiltration rate was used in the 2017 AER (as per 2014 and 2015 infiltration rate) for temporary restored areas. Given that no fresh waste was emplaced during 2017, the absorptive capacity of waste was ignored.

In addition, the water balance takes account of other 'dirty' areas of the site that drain to the leachate treatment plant, namely the weighbridges, wheelwash, waste inspection/quarantine bays and the leachate treatment plant pavement. We have also made an allowance to take account of wastewater generated on site by facility staff.

The estimated volume of leachate generated at Holmestown for the period 1st January 2017 to the 31st December 2017 is 17,287m³ (a calculation summary is included in Appendix F). In addition, an estimated 120m³ of wastewater was generated from staff accommodation. As referenced in our 2016 AER, on the morning of 1st January 2017, there was an estimated 1,000m³ of leachate in the system (between the landfill cells, raw water tanks, SBRs and final effluent tank). This volume is added to the above figures to give the total of Holmestown generated leachate that was conveyed from site for further treatment during 2017 – a total amount of 18,408m³.

A monthly breakdown of leachate volumes removed is presented in Table 6 above.

7 ENVIRONMENTAL NUISANCES

7.1 Review of environmental nuisance control at the facility for the reporting period

Condition 8.15 of the Waste Licence states that the licensee will inspect the facility and its immediate surrounds for nuisances caused by litter, vermin, birds, flies, mud, dust and odours. Nuisances at Holmestown Waste Management facility are logged in a weekly tick-box report and action is taken immediately to address any identified issues. Table 8 below summarises the measures implemented on site to combat environmental nuisances during 2016.

Condition 7.3 of the Waste Licence states that litter fencing shall be installed and maintained around the perimeter of the active tipping area prior to the disposal of waste in any cells and that all litter control infrastructure shall be inspected on a daily basis. A litter fence was maintained around Cells 1, 2, 3 & 4 during the filling period. The litter control infrastructure was inspected on a daily basis and any defects remedied immediately. Any loose litter or other litter identified on site is removed and disposed of in an appropriate manner and all vehicles delivering waste to or removing waste from Holmestown Waste Management facility are appropriately covered.

Table 7 Environmental Nuisance Control 2017

Nuisance	Mitigation Measures in Place
Vermin	<i>Comserv</i> . Permanent bait points set up on site (internal and external). Inspections carried out on a monthly basis. If infection found then weekly inspections until rodent free. Monthly reports produced and kept at site office.
Litter	Daily litter picking and litter inspections are carried out as CA site. Inspection log kept at site office.
Flies	<i>Comserv</i> employed to control flies. If flies present then treated through spraying. Reports kept in site office.
Odour	Fixed monitoring points established on site and monitored as required. Odour inspections adhere to recommendations from the Office of Environmental Enforcement's method of assessment of odours.

Condition 11.5 of the licence states that prior to the commencement of waste disposal, the licensee shall submit to the Agency for its agreement a proposal for the control and eradication of vermin and fly infestations at the facility.

A number of proposals were produced by Wexford County Council during 2008 and submitted to the Agency for approval. These proposals have since been approved and implemented on site in order to address the issue of nuisance monitoring as follows:

- Control and eradication of vermin and fly infestation proposal.
- Odour monitoring proposal

Copies of both proposals and associated correspondence with the Agency are kept on file at the site office.

8 RESOURCE & ENERGY CONSUMPTION

8.1 Electricity and Energy Usage

Electricity usage for the reporting period was estimated at 190,000 kWh. The administration building at Holmestown has been designed with energy efficiency in mind. The following is a list of energy saving mechanisms that have been implemented:

- Control of internal lighting based on occupancy and the level of available natural light.
- Hot water heated by a combination of wood chip boiler and highly efficient vacuum tube solar panels
- Under floor heating system and wood chip boiler providing all heat for administration building
- Mechanical heat recovery unit which uses exhaust warm air to heat cold air coming into the building
- Rainwater harvester in operation to collect water from building roof for reuse in toilets
- Building management system monitors the temperature in each room and controls
- Integral mini wind turbine and solar panel power each light column in operation in the car park area.
- A wind turbine was constructed on site in October 2009. This is located south east of the Administration Building and provides power to the building.

8.2 Water

No water was used on the landfill site. As there was no water meter installed in the site office to date to monitor water intake, no domestic water usage data is available. A rainwater harvester is in operation to supply water for sanitary use.

8.3 Diesel

Total diesel fuel consumption is estimated to be 500 litres from 1st January to 31st December 2017. This is related entirely to civic amenity site operations.

9 EMISSIONS & ENVIRONMENTAL MONITORING SUMMARY

9.1 Emissions and environmental monitoring

A summary of licence requirements for environmental monitoring, as carried out at Holmestown Landfill during this reporting period (January 2017 – December 2017), is presented in Table 9 below. A plan showing the location of all monitoring points is included in Appendix G.

All industries have to annually report environmental emissions and waste transfer data through a web-based form as part of their AER. The E-PRTR Regulation (EC) No 166/2006 concerning the establishment of a European Pollutant Release and Transfer Register came into force in February 2006 and was brought into Irish law through SI No 123 of 2007. The PRTR 2017 document is included in Appendix A.

Table 8 A summary of emissions & environmental monitoring as specified in W0191-2

Emissions Monitoring	Frequency
Landfill Gas Flare	Continuously/Annually
Leachate Leachate Treatment Plant	Continuously/Quarterly/Annually
Surface Water Pond	Continuously/Quarterly/Annually
Environmental Monitoring	Frequency
Landfill Gas Site Office Gas migration monitoring Boreholes Gas field Balancing	Continuously Monthly Monthly/as required
Leachate Leachate levels Visual, odour and temperature Leachate analysis	Continuous Quarterly Annual
Surface water	Quarterly / Annual
Groundwater Levels	Monthly / Quarterly
Groundwater	Quarterly / Annual
Noise	Quarterly
Dust	Tri-Annually and Annually
Odour	Daily/Weekly/As required

9.2 Monitoring

Wexford County Council carries out a comprehensive monitoring programme, in compliance with the waste licence conditions. The monitoring programme includes Landfill Gas, Leachate Level & Quality, Surface Water Quality, Groundwater Level & Quality, Noise, Dust, Odour, Meteorological and Topographical surveys.

Results are interpreted using either pre-defined emission limits or in the case of more variable systems such as water bodies by comparison with pre-operational (baseline) trends. Licence Monitoring at HWMF follows the principles set out in the following:

- 1999/31/EC. *Council Directive on the Landfill of Waste*. Official Journal of European Communities.
- Campbell, R. et al. (2003), *Landfill Manuals: Landfill Monitoring, 2nd Edition*. EPA.

There are emission limits in the license for gas, noise and dust parameters. Trigger Levels (based on monitoring data) have also been set for emissions from the storm water attenuation pond and selected groundwater parameters. Control Rule principles as referred to in the Landfill Directive have been established for groundwater monitoring and will be revised as more data is collected. In accordance with the Licence/best practice we measure a number of additional parameters to supplement emission limit/trigger level data. All the data measured is reviewed and utilised for interpretation where applicable.

Monitoring during this reporting period was carried out according to Schedule D of Waste Licence W191-02. Monitoring for 2017 is summarised in this section.

9.3 Emissions Monitoring:

9.3.1 Landfill Gas Flare

One enclosed type flare (in accordance with Section 3.14.1 of the licence) is in operation at HWMF. The flare was commissioned originally in 2009 (at 500m³/hr capacity) and downsized in August / July 2016. The flare is located at the eastern side of the facility adjacent to the Leachate Treatment Plant. The flare is connected to the active cells via a 355mm OD PE pipe that runs both over and underground. The flare's current maximum operating capacity is 150m³/hr and it is set to burn at >1000 degrees C. The retention time for the flare is 0.5 sec.

The main components of the flare include:

- Control valves;
- Knock out Pot with filter;
- Flame arresters;
- Gas booster (variable speed motor)
- Sampling equipment for both influent bulk gases and emissions;
- Temperature control by thermocouple and louvers;
- Human Machine Interface;
- Call out System.
- Connection to SCADA

Emission limit values for landfill gas plant are set out in Schedule C.6 of our License and are summarized in the Table 10 below.

Table 9 Flare Emission Limits

Parameter	Flare Enclosed Emission Limit Value ^{Note 1}	Utilisation Plant Emission Limit Value ^{Note 1}
Nitrogen oxides (NO _x)	150mg/m ³	500mg/m ³
CO	50mg/m ³	50mg/m ³
Particulates	n/a	130mg/m ³
Total Organic carbon (TOC)	10mg/m ³	10mg/m ³

Note1: Dry gas referenced to 5% oxygen by volume for utilisation plants and 3% oxygen by volume for flares.

The operation of the flare unit is continuously monitored and recorded by the SCADA system. A call out system is linked to the SCADA which notifies WCC staff via text message if the preset control limits are breached. The SCADA is linked to the Administration Building and the internet. Flare performance is monitored by staff on an ongoing basis.

Flare emission results

A flare emission test was carried out in accordance with specified requirements on the flare unit in November 2017 by Glenside Environmental Services. The report concluded that NO_x in the landfill flare exhaust stack was within the emission limit values specified in Schedule C6 of Waste Licence W0191-02; however a TOC level exceedence (11.70mg/m³) and a CO level exceedence 52.10mg/m³ were recorded. The full report will be submitted to the EPA as part of the Annual Results Report under separate cover.

9.3.2 Leachate Treatment Plant

Emission limit values for leachate discharged to sewer are set out in Schedule C.7 of our License and are summarized in the Table 11 below.

Table 10 Emission Limits for Leachate Being Discharged to Sewer

Emission Point Reference: LTP3

Volume to be emitted: Maximum in one day 80m³

Parameter	Emission Limit Value
	Daily Mean Concentration (mg/l)
BOD	200
COD	750
Ammoniacal Nitrogen (NH ₄ +N)	10
Nitrate Nitrogen	1500
Alkalinity	1000
Dissolved Methane	0.2

Monitoring frequency and analysis techniques for emissions to sewer are set out in Table D.8.1 of the licence.

Leachate treatment plant results

The onsite Leachate Treatment Plant was commissioned in 2009. All pre treated leachate (in accordance with section 5.12.4 of the Licence) was pumped off-site for final treatment at Wexford Wastewater Treatment Plant. It is noted that the Leachate Treatment Plant was fully compliant with the emission limits throughout 2017.

It should be noted that, occasionally, during periods of persistent heavy rainfall, it is necessary to tanker untreated leachate off site to Wexford WWTP for treatment. As this leachate is not being discharged to sewer, this leachate has not been assessed for compliance with the licence limits, although by its nature, this tends to be relatively weak leachate due to dilution.

9.3.3 Surface Water Pond

Two sampling points SWP1 and SWP2 are located on the inlet and outlet of the attenuation pond respectfully. Schedule C4 of the Licence sets discharge limits for the level of suspended solids from the outlet (SWP2) of the attenuation pond. The discharge limit is detailed in Table 12 below.

Table 11 Surface Water Discharge Limit.

Measured at the outlet of the surface water pond (SWP2).

Level (Suspended Solids mg/l)
25

In accordance with sections 3.22.1(c) and 6.5.3 of the Licence monitoring of surface water entering and discharging from the attenuation pond is ongoing. Proposals have been submitted to the Agency detailing criteria/trigger levels that determine when the outlet from the pond shall be closed. The pond outlet will close automatically if the trigger levels at the inlet (SWP1) are breached. The parameters monitored include conductivity, pH and TOC. Trigger levels have been set and are summarised in Table 13 below.

Table 12 Trigger Levels for the Attenuation Pond.

Monitoring Point	pH		Electrical Conductivity	TOC
	Upper	Lower		
	pH		uS/cm	mg/l
SWP1	9.5	6.5	875	25

The trigger level review recommends that TOC trigger levels are set at 25mg/l. For full details of attenuation pond trigger levels see report as follows:

- Fehily Timoney and Company (September 2010). Trigger Levels for Surface Water Retention Pond.

In addition Section 3.22.1 of the Licence requires levels in the surface water retention pond, flows to perimeter streams and quality of the surface water at the inlet to the surface water lagoons and being discharged to the perimeter streams to be recorded on telemetry. Similar to the pond inlet (and in addition to quarterly environmental monitoring) pH, electrical conductivity and TOC are being recorded continuously at the outlet (SWP2). A SCADA monitoring / control system is operational and can be accessed in the Administration Building on site. Discharges from the pond to the surface water stream were manually controlled, grab samples, SCADA data and visual inspection are used to ascertain optimum release conditions.

In 2017 flows to the pond were limited to:

- main access road drainage from the entrance gate to the head of the western track;
- Water pumped from waste free cells in Phase 2
- Clean run-off from the civic amenity and maintenance areas

All dirty run-off (including dirty run off from the civic amenity site and waste acceptance/quarantine areas) is directed to the LTP for pre-treatment in accordance with the Licence and then pumped off-site for final treatment at Wexford Waste Water Treatment Plant.

Surface water pond emission results

Surface water results for the watercourses in and around the site were generally satisfactory. An exceedence of ammonia was recorded at SWP2 in Q2 0.64mg/l (similar results have been recorded at this location in the past). No other exceedences were recorded at the inlet or outlet of the pond.

9.4 Environmental Monitoring

9.4.1 Landfill Gas

Gas sampling was carried out on site prior to construction. Initially groundwater wells were sampled until gas wells were installed around the proposed landfill footprint. Pre-construction results showed elevated levels of carbon dioxide at a number of locations. One elevated methane reading was recorded. The majority of the pre-construction gas wells were in filled during the construction phase. Peripheral landfill monitoring boreholes GS11-GS17 (as detailed in Schedule D, Table D1.1, of our Licence) were installed in conjunction with Phase 1 of the landfill cells. Prior to landfilling high naturally occurring Methane and Carbon Dioxide levels were measured in these boreholes and an investigation was carried out at the request of the Agency. The high readings are all concentrated in the north east corner of the facility where the bulk of the excavation work was carried out. As part of the investigation nine additional boreholes (GW2-GW10) were installed. Subsequent reports noted the elevated levels of carbon dioxide and methane pre-construction and summarized that *'It is likely therefore that when fill material was placed on top of this virgin ground, it acted like a semi-impermeable blanket, inhibiting venting of gases and causing a build up of gas in the ground.'*

The reports recommended that for a two year period monitoring is carried out at all boreholes at intervals not exceeding one month. Additionally, vertical and horizontal gas extraction pipes are monitored (at weekly intervals approx.) to assess pressures within the waste body to ensure that negative pressures are maintained. For full details of the investigation into the naturally occurring gases see reports as follows:

- Fehily Timoney and Company (April 2008). Investigation of Naturally Occurring Background Gas Levels at Holmestown Landfill. Risk Assessment and Recommendations, Rev 1;
- Fehily Timoney and Company (December 2008). Investigation of Naturally Occurring Background Gas Levels at Holmestown Landfill. Trace Gas Analysis, Rev 2;

In accordance with Section 3.24.1 (b) of the Licence, landfill gas is monitored continuously in all site buildings. WCC have also installed Gas monitoring equipment in two local dwellings at the owner's request.

To allow for settlement gas sampling points within the waste will be installed when the landfill cap is completed. As noted above monitoring of the in-cell gas infrastructure is ongoing.

Landfill gas concentration limits measured in any service duct or manhole on, at or immediately adjacent to the facility and/or at any other point located outside the body of the waste are set out in Schedule C.2 of our License and are summarized in the Table 14 below.

Table 13 Landfill Gas Concentration Limits

Methane	Carbon Dioxide
20% LEL (1% v/v)	1.5% v/v

A summary of gas monitoring points is included in Table 15 below.

Table 14 Gas Environmental Monitoring Points

List of landfill gas monitoring points for 2017	
Points	Description
(GS6 to GS10 baseline pre land filling monitoring)GS11, GS12, GS13, GS14, GS15, GS16, GS17	Perimeter gas migration monitoring wells
GB1, GB2, GB3, GB4	Gas monitoring points in buildings
GW2 East west, GW3 East west, GW4 North south, GW5, GW6, GW7, GW8, GW9 East west, GW10	Gas investigation wells (Installed March/April 2008)
Waste cells	All vertical extraction wells in Phase 1.

Landfill gas results

Methane and Carbon Dioxide levels remain elevated in a number of the perimeter monitoring wells. Elevated readings were initially recorded before landfilling operations commenced with Borehole GS13 consistently recording the highest readings with methane levels as high as 56.3% (Dec.2017). The elevated readings are concentrated along the north east periphery of the phase 1 landfill footprint where the bulk of the excavation work was carried out.

Methane and carbon dioxide results for the peripheral gas boreholes have tended to fluctuate dramatically. The results on average, however, indicate that the level and location of gas release has not varied significantly since the pre-landfilling stage (Q1, 2008) and contamination from the landfill cell is not suspected.

Three boreholes GS17, GW5 and GW10 have not exceeded trigger levels to date. GW5 and GW10 are located in virgin ground and GS17 is the most southerly borehole on the eastern perimeter of Phase 1.

Elevated results were also recorded pre and post landfilling operations for groundwater in the north east corner.

Plots detailing trends for Methane and Carbon Dioxide (Licenced emission limit parameters) for the peripheral boreholes GS11-GS17 are included in Appendix C. Gas has not been detected in any of the site buildings.

A report to review the peripheral gas borehole results were submitted to the EPA in 2010. The review incorporates all results to the end of 2009.

9.4.2 Flare.

See section 9.3.1 for general information on the flare. Landfill gas utilisation plant/enclosed flare parameters and monitoring frequency are set out in Table D.7.1 of our License. The enclosed flare parameters, monitoring frequency and analysis method are summarized in Table 16 below.

Table 15 Flare Parameters and Monitoring Frequency

Parameter	Flare (enclosed)	Analysis
	Monitoring Frequency	Method / Technique
Inlet		
Methane (CH ₄)%v/v	Continuous	Infrared analyser
Carbon dioxide (CO ₂)%v/v	Continuous	Infrared analyser
Oxygen (O ₂)%v/v	Continuous	Electrochemical
Total Sulphur	Annually	Ion chromatography
Process Parameters		
Combustion Temperature	Continuous	Temperature Probe / Data logger

The results of parameters which are monitored continuously are transferred and stored on the SCADA system.

In addition, regular monitoring of inlet gas is carried out as part of the gas field balancing procedure. The equipment used for the detection and quantification of landfill gas is a GA5000 – ATEX Certified Gas Analyser.

The operation of the flare unit is continuously monitored and recorded by the SCADA system. A call out system is linked to the SCADA which notifies WCC staff via text message if preset control limits are breached.

Flare results

The reporting element of the SCADA system was commissioned in 2010. Daily on site inspections were also carried out. During 2015, it became apparent that due to decreasing yields of landfill gas from the waste mass, our current 500m³hr flare cannot continue to operate satisfactorily as it is oversized. An SEW was submitted to the EPA to seek approval to downsize our current flare, and approval was granted. A new 150m³ enclosed flare stack was installed in August 2016.

9.4.3 Leachate

See section 6.2.1 for general information on the Leachate Treatment Plant. Seven leachate sampling locations have been established and maintained as detailed in Schedule D, Table D1.1, of the license. Three points LTP-1, LTP-2 and LTP-3 are located within the leachate treatment compound. The remainder of the monitoring points (L1, L2, L3 & L4) are located in the corresponding waste cells. In accordance with our licence, leachate levels are continuously monitored and are recorded on the SCADA system. Leachate levels for the landfill cells are maintained at 1.0m over the top of the liner at the base of the landfill in accordance with section 5.12.2 of our licence.

Leachate parameters and monitoring frequency are set out in Tables D.5.1 of the License. Continuous and quarterly monitored leachate parameters, monitoring frequency and analysis method are summarized in Table 17 below.

Table 16 Leachate Parameters and Monitoring Frequency

Parameter	Flare (enclosed)	Analysis
	Monitoring Frequency	Method / Technique
On-site Leachate		
Visual	Quarterly	Visual
Odour	Quarterly	Olfactory
Leachate Level	Continuous	Pressure transducer
Temperature.	Quarterly	Thermometer

Visual, odour and temperature inspections are carried out by site staff. Visual and odour assessment are based on visual and olfactory scales respectively. In cell leachate level is controlled and monitored by a combination of pumps, pressure probes and the SCADA system.

Leachate results

No significant visual, odour or temperature change was noted in 2017. Leachate levels in the landfill cells is maintained at <1.0m above the liner at the base of the landfill.

Annual leachate quality was sampled in Sep. 2017 in accordance with Table D5.1 of the Licence. The annual leachate quality report is submitted under separate cover in accordance with schedule F of the licence.

9.4.4 Surface Water

Eleven surface water sampling locations have been established and maintained as detailed in Schedule 4, Table D1.1, of the license. Two points SW4 and SW5 are located downstream of Phase 1 of the landfill. Nine are located on watercourses upstream: SW1; SW2, SW2A; SW3; SW3A; SW6; SW7; SW8; SW9 of current operations. There are two principal surface water streams one flowing from SW9 to SW5 and another from SW2 to SW5. Each is made up from a number of smaller streams and drainage ditches. These combine to the north east of the site and flow east, north east towards the river Slaney. Monitoring point SW5 is located downstream of the main junction of these streams. The northern edge of the landfill is 1.8km approx. from the River Slaney. The first surface water samples were collected in 2002. Pre-construction and pre-landfilling results are utilised as baseline data for comparison as required.

The objective of environmental monitoring is to screen for environmental pollution due to facility operations. Surface water bodies within and downstream of the facility are at risk. The relevant monitoring points are SW4 & SW5 (both downstream of the main operational areas), SWP1 & SWP2 (the attenuation pond monitoring points) and to a lesser extent SW1, SW2, SW2A, SW3, SW3A, and SW6 which are also on the Holmestown site but are upstream of all major activities. The other monitoring locations (SW7, SW8 & SW9) are upstream and offsite and their results are only interpreted if an influence in onsite streams is suspected. Surface water monitoring locations are summarized in Table 18 below.

Table 17 Surface Water monitoring locations

Surface water monitoring locations	
Surface water monitoring point	SW1, SW2, SW2a, SW3, SW4, SW5, SW6, SW7, SW8, SW9

The parameters tested in this report (in accordance with Table D.5.1 of the license) are as follows: Ammoniacal Nitrogen; Electrical Conductivity; Chloride; Dissolved Oxygen; Temperature; Ph; BOD; COD; Total Suspended Solids (TSS); Visual Inspection/Odour (weekly).

Surface water results

A visual inspection of each of the surface water monitoring locations was carried out on a weekly basis during 2017 as per licence requirements. The visual inspection and surface water quality results for 2017 did not indicate pollution from facility activities.

An Elevated ammonia level was recorded in Quarter 2 at SW8 & SWP2. Similar results have been recorded at these locations in the past. The elevated readings do not appear to be linked to HWMF activities.

9.4.5 Surface water Biological Survey

A biological survey of the surface water streams surrounding Holmestown Waste Management Facility was carried out in Aug. 2017. A total of 4 locations were selected for monitoring as follows:

- KS01 Upstream SE of facility within the site boundary – Un-named stream
- KS02 Downstream NE of the facility within the site boundary – Un-named stream
- KS03 Downstream of the facility within the site boundary – Polehore stream
- KS04 Upstream of the facility within the site boundary – Polehore stream

The overall quality of the un-named stream upstream of the facility was determined to be unpolluted and rated as Q3-4 at KS01, the overall quality of the un-named stream downstream of the facility was determined to be unpolluted and rated as Q3-4 at KS02 using the EPA Q-value rating system. The overall quality of the Polehore stream upstream and downstream of the facility was determined to be unpolluted and rated as Q4 using the EPA Q-value rating system. There were no signs of animal access to the streams at any of the monitoring locations. There was no noticeable difference in water quality between upstream and downstream locations. It is therefore concluded that the Holmestown Waste Management Facility is currently not causing any deterioration in the biological quality of surface waters. All surface water biological monitoring locations are shown in Appendix G. A copy of the biological monitoring report is kept on file at the site office and can be viewed upon request.

9.4.6 Surface water pond quality: SWP1 – SWP2

For general details on the pond see section 9.3.3 above. SWP1 and SWP2 are also monitored as part of the quarterly monitoring suite (see section 9.3.3 above). Surface water results for the watercourses in and around the site were generally satisfactory.

9.4.7 Groundwater

Groundwater monitoring was carried out at a total of 7 on-site and 11 off-site private well locations on a quarterly basis as detailed in Schedule D of the waste licence. Appendix G shows the location of all groundwater monitoring locations on site. Groundwater monitoring locations are summarized in Table 19 below.

Table 18 Groundwater Monitoring Locations

Groundwater Monitoring Locations	
Existing Groundwater Monitoring Wells	BH1, BH2, BH3, BH6, BH7, BH8, BH9.
Private well monitoring points	PW1, PW2, PW2A, PW2B, PW5, PW7, PW8, PW9, PW10, PW11, PW11A.

In accordance with section 6.4.2 of the Licence a report was previously submitted to the Agency detailing proposals for trigger levels for Groundwater results. Three parameters were selected based on suitability: Ammoniacal Nitrogen; Conductivity and Chloride. The trigger levels are summarised in Table 20 below.

Table 19 Trigger Levels for Groundwater.

Trigger level			
Units	Ammoniacal nitrogen mg/l	Electrical Conductivity µS/cm	Chloride Mg/l
BH 1	0.2	1,890	126
BH 2 ^{Note 1}	66.0	2,633	163
BH 3	0.2	613	59
BH 6	0.1	917	211
BH 7 ^{Note 2}	Note 2	Note 2	Note 2
BH 8	1.6	835	59
BH 9 ^{Note 1}	1.3	1,629	46

Note 1 = Down gradient groundwater borehole
 Note 2 = BH7 has been dry during post waste monitoring

The trigger level report (in accordance with the Landfill Directive) proposes Control Rule principles for groundwater management at HWMF. The Control Rule principal involves the establishment of Control Levels and Trigger Levels. A Control Level is set as an indicator of possible environmental pollution. A Trigger Level is defined as the level at which significant adverse environmental effects have occurred. Control Levels are used to instigate review/remediation works prior to significant environmental pollution taking place. For full details on the Control Levels and the Trigger Levels for groundwater see report as follows:

- Fehily Timoney and Company (September 2010). Groundwater Monitoring Trigger Levels.

Groundwater results

Elevated levels were recorded in a number of the on-site groundwater boreholes tested. The elevated levels date back to pre-landfilling and have been recorded both upstream and downstream of the landfill footprint. Similar to gas readings the elevated results are prevalent downstream in the north east corner where the bulk of the onsite excavation works were carried out and appear to be due to a non-landfill source in the soil. Elevated ammonia and chloride levels were recorded in 2017, based on borehole locations and trends the elevated ammonia and chloride do not appear to be related to HWMF activities. The main soil mass is low permeability clay with sand and gravel lenses. Groundwater movement in the soil zone is relatively slow resulting in low flows. This enables emissions to build up locally around a source as appears to be indicated from the results.

Monitoring of groundwater levels was carried out at each of the on-site locations on a quarterly basis with the use of a dip meter. Groundwater levels remained relatively consistent throughout the monitoring period, with only minor variations in groundwater levels recorded in accordance with prevailing weather conditions.

Monitoring results were not available for BH7 and BH8 during 2017 as the wells were found to be dry at time of sampling.

Historical trend graphs of groundwater trigger levels (ammoniacal nitrogen, conductivity and chloride) are included in Appendix C

A total of eleven private wells are monitored around the facility. A review of private well results is considered outside the scope of standard reporting. The results will be utilised for more rigorous reviews if required. See quarterly reports for results.

9.4.8 Noise

Ten potentially noise sensitive locations are sampled at HWMF on a quarterly basis in accordance with Table D.1.1 of the Licence and amendments thereof. Emission limit values for noise are set out in Schedule C.1 of our License and are summarized in the Table 21 below.

Table 20 Noise Emission Limits

Day Db(A) $L_{Aeq}(30^1$ minutes)	Night Db(A) $L_{Aeq}(30^1$ minutes)
55	45

1. Duration amended to 30mins in accordance with Table D.4.1 of the licence and current standard practice.

Noise monitoring frequency and technique are summarized Table 22 below.

Table 21 Noise Monitoring: Frequency and Technique

Parameter	Monitoring Frequency	Analysis Method/Technique
L(A)E _Q [30 minutes]	Quarterly	Standard ^{Note1}
L(A) ₁₀ [30 minutes]	Quarterly	Standard ^{Note1}
L(A) ₉₀ [30 minutes]	Quarterly	Standard ^{Note1}
Frequency Analysis (U3 Octave band analysis)	Quarterly	Standard ^{Note1}

Note 1: "International Standards Organisation. ISO 1996. Acoustics- description and Measurement of Environmental noise. Parts 1, 2 and 3."

Leq(t): is the continuous equivalent sound level over a specified time (t), where t represents a 30-minute period during this survey. This measure is used to give an indication of the average noise level over the specified time period.

L10 and L90: are both statistical noise levels. L10 Indicates that for 10% of the monitoring period, the sound levels were greater than the quoted value. L90 Indicates that for 90% of the monitoring period, the sound levels were greater than the quoted value. L10 is used to express event noise. L90 is used to express background noise, usually filtering out loud, intermittent interferences such as traffic noise.

Noise results

A number of elevated noise monitoring results were noted for both day and night monitoring in 2017. The elevated noise levels have been attributed to external factors (e.g. N25, vehicles passing, dogs barking, birdsong etc.) for the majority of the results recorded. No significant tonal noises were recorded. Historical trend graphs of noise results are included in Appendix C.

9.4.9 Dust

Jim McGarry carried out dust monitoring at ten representative locations using Bergerhoff dust gauges on three separate occasions during 2017. Sampling results are provided in Appendix C. The location of all dust monitoring locations can be found in Appendix G.

- The dust deposition limit of 350 mg/m²/day was exceeded at D1 in period 2 during 2017; this was due to contamination of the dust jar.

9.4.10 PM₁₀ Monitoring

PM₁₀ monitoring was not carried out in 2017

9.4.11 Odour

Odour monitoring was carried out at Holmestown waste facility during 2017 as per EPA Guidance. Five odour monitoring points previously agreed with the Agency were monitored and labelled OD1, OD2, OD3, OD4 and OD5. OD1 is located to the northeast of the landfill on a bordering farm property. OD2 is located on the landfill between the active tipping area and Holmestown Little Farm on the western boundary of the site. OD3 is located between the landfill and Bolgerstown Farm on the eastern boundary of the site OD4 is upwind of the landfill and OD5 is downwind of the landfill. Odour monitoring is based on a combination of odour persistence which is rated on a scale of 0 to 2 (0 = none, 1 = intermittent, 2 = persistent), and odour intensity which is rated on a scale of 0 to 4 (0 = none, 1 = faint, 2 = moderate, 3 = strong, 4 = very strong).

No odour persistence or intensity was recorded above 0 at anytime during 2017. No odour complaints were received during 2017. On a daily basis site personnel carry out a brief walkover of the site, to assess potential odour issues. If any odours are identified during the walkover measures are implemented to reduce or remove the source of the odour as soon as possible. Quarterly odour monitoring is carried out at the five agreed points copies of all odour logs are kept on file at the site office and can be viewed upon request. Odour monitoring results for the reporting period are included in Appendix C.

9.4.12 Bio aerosols

Bio aerosols monitoring was not carried out on site at Holmestown during 2017. As per licence conditions bio aerosols monitoring is only required to be carried out upon commencement of composting operations on site. To date no composting of materials has taken place at Holmestown Waste Management facility.

9.4.1 Meteorological monitoring

All monitoring information was obtained from the weather station located at Johnstown Castle in Wexford; this station is within 10km of Holmestown Landfill site. A copy of the reports are available for review at the facility office. Meteorological graphs showing trends over time are available for review in Appendix D.

9.4.2 Topographical Survey

The latest topographical survey of the landfill cells was carried out in September 2016 and is included in Appendix G.

By comparison to the last survey carried out in March 2014, settlement appears to be in the region of 240mm (max level 25.9 in 2014, 25.659 in 2016).

APPENDICES

A. PRTR 2017

REFERENCE YEAR	2017
-----------------------	------

1. FACILITY IDENTIFICATION

Parent Company Name	Wexford County Council
Facility Name	Holmestown Waste Management Facility
PRTR Identification Number	W0191
Licence Number	W0191-02
Classes of Activity	
No.	class_name
-	Refer to PRTR class activities below
Address 1	Barntown
Address 2	Wexford
Address 3	
Address 4	
	Wexford
Country	Ireland
Coordinates of Location	-6.57278 52.35079
River Basin District	IESE
NACE Code	3821
Main Economic Activity	Treatment and disposal of non-hazardous waste
AER Returns Contact Name	Fran Hobbs
AER Returns Contact Email Address	fran.hobbs@wexfordcoco.ie
AER Returns Contact Position	Facility Technician
AER Returns Contact Telephone Number	053 9120922
AER Returns Contact Mobile Phone Number	087 9141105
AER Returns Contact Fax Number	
Production Volume	0.0
Production Volume Units	
Number of Installations	0
Number of Operating Hours in Year	0
Number of Employees	3
User Feedback/Comments	
Web Address	

2. PRTR CLASS ACTIVITIES

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

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

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

4. WASTE IMPORTED/ACCEPTED ONTO SITE

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

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

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

4.1 RELEASES TO AIR

[Link to previous years emissions data](#)

| PRTR# : W0191 | Facility Name : Holmestown Waste Management Facility | Filename : Holmestown_PRTR_W0191_2017.xlsx | Return Year : 2017 |

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SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS

RELEASES TO AIR					ADD EMISSION POINT			
POLLUTANT		METHOD			QUANTITY			
No. Annex II	Name	M/C/E	Method Used		Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
			Method Code	Designation or Description				
01	Methane (CH4)	C		Langem	333274.54	333274.54	0.0	0.0
08	Nitrogen oxides (NOx/NO2)	M		EN 14792.2005	10.3	10.3	0.0	0.0
11	Sulphur oxides (SOx/SO2)	M		EN 14792.2005	10.9	10.9	0.0	0.0

ADD NEW ROW | DELETE ROW * | Click on the Pollutant Name (Column B) then click the delete button

SECTION B : REMAINING PRTR POLLUTANTS

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

ADD NEW ROW | DELETE ROW * | Click on the Pollutant Name (Column B) then click the delete button

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

RELEASES TO AIR					Please enter all quantities in this section in KGs			
POLLUTANT		METHOD			ADD EMISSION POINT	QUANTITY		
Pollutant No.	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
351	Total Organic Carbon (as C)	M		EN 1484.1997	1.8	1.8	0.0	0.0

ADD NEW ROW | DELETE ROW * | Clicking on the Pollutant Name (Column B) then click the delete button

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

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

	Holmestown Waste Management Facility				
	T (Total) kg/Year	M/C/E	Method Used		Facility Total Capacity m3 per hour
			Method Code	Designation or Description	
Total estimated methane generation (as per site model)	373324.54	C	EST	Landgem flare SCADA record	N/A
Methane flared	40050.0	M	OTH		150.0
Methane utilised in engine/s	0.0				0.0
Net methane emission (as reported in Section A above)	333274.54	C	EST		N/A

(Total Flaring Capacity)
 (Total Utilising Capacity)

4.2 RELEASES TO WATERS

[Link to previous years emissions data](#)

| PRTR# : W0191 | Facility Name : Holmestown Waste Management Facility | Filename : Holmestown_PRTR_W0191_2017.xlsx | Return Year : 2017 |

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Data on ambient monitoring of storm/surface water or groundwater, conducted as part of your licence requirements, should NOT be submitted under AER / PRTR Reporting as this only concerns Releases from your facility

SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS

RELEASES TO WATERS					Please enter all quantities in this section in KGs			
POLLUTANT					ADD EMISSION POINT			
No. Annex II	Name	M/C/E	Method Used		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 * Double-clicking on the Pollutant Name (Column B) then click the delete button						

SECTION B : REMAINING PRTR POLLUTANTS

RELEASES TO WATERS					Please enter all quantities in this section in KGs			
POLLUTANT					ADD EMISSION POINT			
No. Annex II	Name	M/C/E	Method Used		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 * Double-clicking on the Pollutant Name (Column B) then click the delete button						

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

RELEASES TO WATERS					Please enter all quantities in this section in KGs			
POLLUTANT					ADD EMISSION POINT			
Pollutant No.	Name	M/C/E	Method Used		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 * Double-clicking on the Pollutant Name (Column B) then click the delete button						

4.3 RELEASES TO WASTEWATER OR SEWER

[Link to previous years emissions data](#)

| PRTR#: W0191 | Facility Name : Holmestown Waste Management
 Facility | Filename : Holmestown_PRTR_W0191_2017.xlsx | Return
 Year : 2017 |

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SECTION A : PRTR POLLUTANTS

OFFSITE TRANSFER OF POLLUTANTS DESTINED FOR WASTE-WATER TREATMENT OR SEWER					Please enter all quantities in this section in KGs			
POLLUTANT		METHOD			ADD EMISSION POINT	QUANTITY		
No. Annex II	Name	M/C/E	Method Used		Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
			Method Code	Designation or Description				
06	Ammonia (NH3)	M				32.04	32.04	0.0
01	Methane (CH4)	M				0.4113	0.4113	0.0
<input type="button" value="ADD NEW ROW"/>		<input type="button" value="DELETE ROW *"/>			* Select a row by double-clicking on the (Ann B) then click the delete button			

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

OFFSITE TRANSFER OF POLLUTANTS DESTINED FOR WASTE-WATER TREATMENT OR SEWER					Please enter all quantities in this section in KGs			
POLLUTANT		METHOD			ADD EMISSION POINT	QUANTITY		
Pollutant No.	Name	M/C/E	Method Used		Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
			Method Code	Designation or Description				
303	BOD	M				127.48	127.48	0.0
306	COD	M				2036.96	2036.96	0.0
372	Nitrite (as N)	M				938.18	938.18	0.0
<input type="button" value="ADD NEW ROW"/>		<input type="button" value="DELETE ROW *"/>			* Select a row by double-clicking on the (Ann B) then click the delete button			

4.4 RELEASES TO LAND

[Link to previous years emissions data](#)

| PRTR#: W0191 | Facility Name : Holmestown Waste Management Facility | Filename : Holmestown_PRTR_W0191_2017.xlsx | Return Year : 2017 |

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SECTION A : PRTR POLLUTANTS

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

ADD NEW ROW

DELETE ROW *

double-clicking on the Pollutant Name (Column B) then click the delete button

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

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

ADD NEW ROW

DELETE ROW *

double-clicking on the Pollutant Name (Column B) then click the delete button

5. ONSITE TREATMENT & OFFSITE TRANSFERS

EPBTSB / WMSB Facility Name: Malware/Waste Management Facility/Process: Malware_PBTB_WMSB_2017/Annual Release Year: 2017

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Please enter all quantities on this sheet in Tonnes

Transfer Destination	European Waste Code	Hazardous	Quantity (Tonnes per Year)	Description of Waste	Treatment & Operation	Method Used		Location of Treatment	Headline: Name and Licence/Permit No of Head Treatment Facility Sub-Headline: Name and Licence/Permit No of Responder/Dispenser	Headline: Address of Head Treatment Facility Sub-Headline: Address of Responder/Dispenser	Name and Licence / Permit No. and Address of Final Responder / Dispenser (HAZARDOUS WASTE ONLY)	Headline: Address of Final Destination, Final Responder / Dispenser (HAZARDOUS WASTE ONLY)
						MFC/E	Method Used					
Within the Country	13 02 08	Yes	1.176	other engine, gear and lubricating oil	R9	M	Weighted	Offsite in Ireland	Enva Environmental, 084F1, Clonman, Paartlasaire, Co. Laoise, Ireland	Clanman, Paartlasaire, Co. Laoise, Ireland	Enva Environmental, 084F1, Clonman, Paartlasaire, Co. Laoise, Ireland	Clanman, Paartlasaire, Co. Laoise, Ireland
Within the Country	13 02 08	Yes	0.0	other engine, gear and lubricating oil	R9	M	Weighted	Offsite in Ireland	Greenstar, WCP/HKK/054 (A)108	Park, Garoy, Co. Westford, Ireland	Greenstar, WCP/HKK/054 (A)108	Park, Garoy, Co. Westford, Ireland
Within the Country	15 01 02	No	42.24	plastic packaging	R2	M	Weighted	Offsite in Ireland	Greenstar, WCP/HKK/054 (A)108	Park, Garoy, Co. Westford, Ireland	Greenstar, WCP/HKK/054 (A)108	Park, Garoy, Co. Westford, Ireland
Within the Country	15 01 04	No	10.21	metallic packaging	R4	M	Weighted	Offsite in Ireland	Rhak Glazra Co. Ltd., WP2472006	Unit 4 Okerztaun Industrial Park, Caragh Road, Nazr, Co. Kildare, Ireland	Rhak Glazra Co. Ltd., WP2472006	Unit 4 Okerztaun Industrial Park, Caragh Road, Nazr, Co. Kildare, Ireland
Within the Country	15 01 05	No	0.0	comparite packaging	R3	M	Weighted	Offsite in Ireland	AES/GOFF Ltd., W00229	Kilrane, Razlora, Co. Westford, Ireland	AES/GOFF Ltd., W00229	Kilrane, Razlora, Co. Westford, Ireland
Within the Country	15 01 05	No	5.48	comparite packaging	R3	M	Weighted	Offsite in Ireland	Greenstar, WCP/HKK/054 (A)108	Park, Garoy, Co. Westford, Ireland	Greenstar, WCP/HKK/054 (A)108	Park, Garoy, Co. Westford, Ireland
Within the Country	15 01 07	No	53.86	glass packaging	R3	M	Weighted	Offsite in Ireland	Rhak Glazra Co. Ltd., WP2472006	Unit 4 Okerztaun Industrial Park, Caragh Road, Nazr, Co. Kildare, Ireland	Rhak Glazra Co. Ltd., WP2472006	Unit 4 Okerztaun Industrial Park, Caragh Road, Nazr, Co. Kildare, Ireland
Within the Country	16 01 07	Yes	1.28	oil filters	R9	M	Weighted	Offsite in Ireland	Enva Environmental, 084F1, Clonman, Paartlasaire, Co. Laoise, Ireland	Clanman, Paartlasaire, Co. Laoise, Ireland	Enva Environmental, 084F1, Clonman, Paartlasaire, Co. Laoise, Ireland	Clanman, Paartlasaire, Co. Laoise, Ireland
Within the Country	16 06 01	Yes	0.0	lead battery	R4	M	Weighted	Offsite in Ireland	Enva Environmental, 084F1, Clonman, Paartlasaire, Co. Laoise, Ireland	Clanman, Paartlasaire, Co. Laoise, Ireland	Enva Environmental, 084F1, Clonman, Paartlasaire, Co. Laoise, Ireland	Clanman, Paartlasaire, Co. Laoise, Ireland
Within the Country	16 06 01	Yes	4248.0	lead battery	R4	M	Weighted	Offsite in Ireland	KMK, WCP-OW-08-0607-01	Bettytaun Cranz, Bettytaun, Co. Meath, Ireland	KMK, WCP-OW-08-0607-01, Bettytaun Cranz, Bettytaun, Co. Meath, Ireland	Bettytaun Cranz, Bettytaun, Co. Meath, Ireland
Within the Country	16 06 04	No	0.0	alkaline battery (except 16 06 03)	R4	M	Weighted	Offsite in Ireland	The Recycling Village, WFP-LH-10-0010	agheda, Co. Louth, Ireland	The Recycling Village, WFP-LH-10-0010	agheda, Co. Louth, Ireland
Within the Country	19 07 03	No	16.873	landfill leachate other than those mentioned in 19 07 02	D9	M	Weighted	Offsite in Ireland	Wofard Waste Water Treatment Plant, AES/GOFF Ltd., W00229	Trinity Street, Westford, Ireland	Wofard Waste Water Treatment Plant, AES/GOFF Ltd., W00229	Trinity Street, Westford, Ireland
Within the Country	20 01 01	No	0.0	paper and cardboard	R3	M	Weighted	Offsite in Ireland	Greenstar, WCP/HKK/054 (A)108	Park, Garoy, Co. Westford, Ireland	Greenstar, WCP/HKK/054 (A)108	Park, Garoy, Co. Westford, Ireland
Within the Country	20 01 01	No	79.29	paper and cardboard	R3	M	Weighted	Offsite in Ireland	Greenstar, WCP/HKK/054 (A)108	Park, Garoy, Co. Westford, Ireland	Greenstar, WCP/HKK/054 (A)108	Park, Garoy, Co. Westford, Ireland
Within the Country	20 01 01	No	30.68	paper and cardboard	R3	M	Weighted	Offsite in Ireland	Recycling 2000, WFP/06/06	Drineagh Business Park, Razlora Road, Westford, Co. Westford, Ireland	Recycling 2000, WFP/06/06	Drineagh Business Park, Razlora Road, Westford, Co. Westford, Ireland
Within the Country	20 01 01	No	40.74	paper and cardboard	R3	M	Weighted	Offsite in Ireland	Greenstar, WCP/HKK/054 (A)108	Park, Garoy, Co. Westford, Ireland	Greenstar, WCP/HKK/054 (A)108	Park, Garoy, Co. Westford, Ireland
Within the Country	20 01 11	No	30.4	textiles	R3	M	Weighted	Offsite in Ireland	Textiler Recycling Limited, WCP-DC-08-1225-01	Complex, Belgard Road, Tallagh, Dublin 24, Ireland	Textiler Recycling Limited, WCP-DC-08-1225-01	Complex, Belgard Road, Tallagh, Dublin 24, Ireland
Within the Country	20 01 21	Yes	0.791	fluorescent tubes and other mercury-containing waste	R5	M	Weighted	Offsite in Ireland	KMK, WCP-OW-08-0607-01	Bettytaun Cranz, Bettytaun, Co. Meath, Ireland	KMK, WCP-OW-08-0607-01, Bettytaun Cranz, Bettytaun, Co. Meath, Ireland	Bettytaun Cranz, Bettytaun, Co. Meath, Ireland
Within the Country	20 01 25	No	0.0	edible oil and fat	R9	M	Weighted	Offsite in Ireland	Puro Oil, WCP-KK-10-557-01	Ballyvaughan, Barnstoun, Co. Westford, Ireland	Puro Oil, WCP-KK-10-557-01	Ballyvaughan, Barnstoun, Co. Westford, Ireland
Within the Country	20 01 25	Yes	173.593	discards of electrical and electronic equipment other than those mentioned in 20 01 21 and 20 01 23 containing hazardous components	R5	M	Weighted	Offsite in Ireland	The Recycling Village, WFP-LH-10-0010	Unit 4 Tenure Business Park, Manasterbaice, Drineagh, Co. Louth, Ireland	The Recycling Village, WFP-LH-10-0010	Unit 4 Tenure Business Park, Manasterbaice, Drineagh, Co. Louth, Ireland
Within the Country	20 01 40	No	0.0	metal	R4	M	Weighted	Offsite in Ireland	Wofard County Council, Landfill, Co. Westford, Ireland	Wofard County Council, Landfill, Co. Westford, Ireland	Wofard County Council, Landfill, Co. Westford, Ireland	Wofard County Council, Landfill, Co. Westford, Ireland
Within the Country	20 01 40	No	152.57	metal	R4	M	Weighted	Offsite in Ireland	Greenstar, WCP/HKK/054 (A)108	Park, Garoy, Co. Westford, Ireland	Greenstar, WCP/HKK/054 (A)108	Park, Garoy, Co. Westford, Ireland
Within the Country	20 03 01	No	0.0	mixed municipal waste	R3	M	Weighted	Offsite in Ireland	AES/GOFF Ltd., W00229	Kilrane, Razlora, Co. Westford, Ireland	AES/GOFF Ltd., W00229	Kilrane, Razlora, Co. Westford, Ireland
Within the Country	20 03 01	No	0.0	mixed municipal waste	R3	M	Weighted	Offsite in Ireland	Wofard County Council (kerbside recycling section),	Machinery Yard, Enniscorthy, Co. Westford, Ireland	Wofard County Council (kerbside recycling section),	Machinery Yard, Enniscorthy, Co. Westford, Ireland
Within the Country	20 03 01	No	1204.56	mixed municipal waste	R3	M	Weighted	Offsite in Ireland	Greenstar, WCP/HKK/054 (A)108	Park, Garoy, Co. Westford, Ireland	Greenstar, WCP/HKK/054 (A)108	Park, Garoy, Co. Westford, Ireland

B. Staff Training

DESCRIPTION	Stewart Jones	Rhona Wily	Rhona Neal	Rhona Peter	Geoffrey Wily	Timothy Wily	Franking Row	Patrick Wyles	Robson Jones	Felix Barnard	Melvin Jones	Stewart Pat	Ryan Pitt	Walter Wiper	Comments
ADR Training															Refresher required every 2 years
Alcohol Offence															Refresher required every 2 years
Age Friendly Training															
Alcohol Awareness															
AT&T Safety Awareness															Refresher required every 2 years
Box LR															Refresher required every 2 years
Corporate Induction Course															
CapSolve in Local Government Model															
Customer Relationship Awareness															
Customer Safety Training															
Customer Service Awareness															
Computers & Basic Skills and															
Computers (Introductory Level)															
Counter Balance Pallet LR Training															Refresher required every 2 years
CRIS Training - HR Executive															Refresher required every 2 years
CRIS Training - Support (continued)															Refresher required every 2 years
CRIS Training - HR/HRSD Support (AT ROADWORKS)															Refresher required every 2 years
CRIS Skills at Roadworks Info update															
Customer Service: Managing Difficult and Aggressive Behaviour															
Quality Awareness Training															
Driver CPC (Module 1)															Module to be completed every 2 years
Driver CPC (Module 2)															Module to be completed every 2 years
Driver CPC (Module 3)															Module to be completed every 2 years
Driver CPC (Module 4)															Module to be completed every 2 years
Driver CPC (Module 5)															Module to be completed every 2 years
ESOL - Computer Course															
Energy Mapping															
Fire Alarm Management Certificate															
Fire Alarm Operations Training Course															
Fire Safe Pass															Refresher required every 2 years
Fire Pass Advice Gallery & Briefing															Refresher required every 2 years
Fire Signaller Certificate															Refresher required every 2 years
Fire Warden															Refresher required every 2 years
First Aid Basic															
First Aid Certificate First Responder															Refresher required every 2 years
First Aid Healthcare ASD															Refresher required every 2 years
First Aid Occupational															Refresher required every 2 years
Flu Training															
High Coast Guard National Publication															
Health Awareness															Refresher required every 2 years
Health and Safety Management															
Health Inspector (Introduction & safe use)															Refresher required every 2 years, Health Inspector Training not required
Life Jacket (Store & Use)															
LITTER WASTE TRAINING															
LITTER MANAGEMENT & ENFORCEMENT															
Lifting Slings (Introduction & safe use)															Refresher required every 2 years
Managing Incidents in the Workplace															
Person Handling															
Powering Workforce Equipment															
RAMS 1989 Manual Refresher Training															
RAMS & PPE Training															
Small Boat Training (Safe use and operation)															
Surface Traffic (Safe Use Refresher)															Refresher required every 2 years
Safety in Excavations															
Safety in Excavations															
Safety Representative Training															
Signaling Lighting & Identifying of Roadworks															Refresher required every 2 years
Statutory Inspections Lifting Equipment															
Supervising Safety															
Takeaway Material Handling															Refresher required every 2 years
TVS Introduction Assessment															
Workplace Operations Training															

 Training completed (date)
 No record of training
 Training proposed this year
 Training required

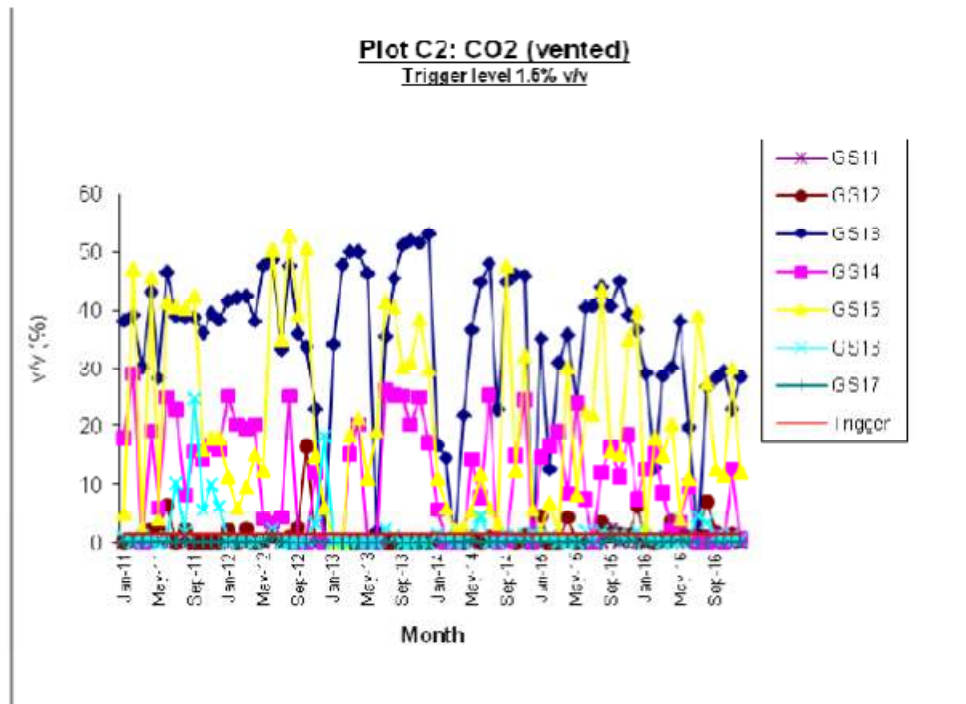
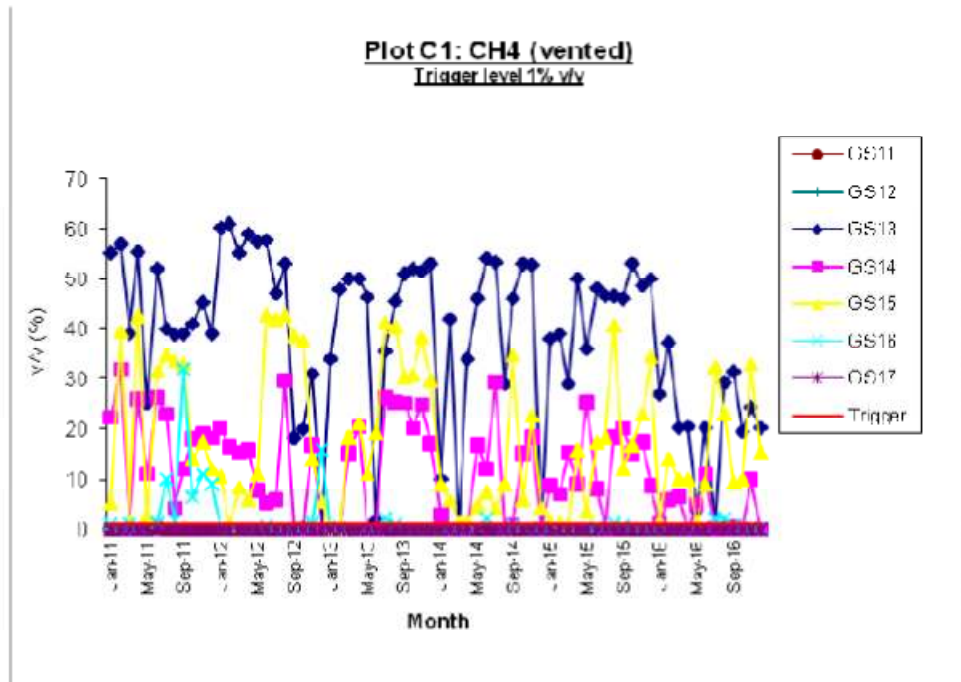
Training Record 2018
 WAP (Worx 2)
 Indoor Staff

DESCRIPTION	Hobbs Fran	Weyer Sean	Comments
Cryptosporidium Risk Assessment			
Abrasive Wheels			Refresher required every 1 years.
Asbestos Awareness			
ATEX: Safety Awareness	25/04/2018 25/04/2018	25/04/2018 25/04/2018	Refresher required every 1 years.
Certificate in Local Government Studies			
CSCS Tickets (HEALTH AND SAFETY AT ROADWORKS)	06/12/2017 06/12/2017		Refresher required every 5 years.
Customer Care Inc Managing difficult and Aggressive Behaviour	06/04/2018		
Data Protection Awareness Training		03/09/2018	
Disability Awareness			
EPA: Biodegradable Municipal Waste			
EPA: Odour Assessment			
FAS: Waste Management	16/06/2018 16/06/2018	16/11/2017 16/11/2017	
FAS: Safe Pass	16/06/2018 16/06/2018	17/06/2018 17/06/2018	Refresher required every 4 years.
Filters Ensl, Op & Maint.			
Fire Extinguisher	12/06/2017 12/06/2017	12/06/2017 12/06/2017	Refresher recommended every 3 years.
Fire Safety Manager	16/06/2018		
Fire Warden	06/12/2017		
First Aid Basic			
First Aid: Cardiac First Responder			
First Aid: Healthcare AED	12/06/2017		
First Aid: Occupational	16/06/2018 16/06/2018	16/06/2018 16/06/2018	Refresher required every 1 years.
GPS Training			
Health & Safety Management System Awareness		06/12/2017	
IMAP Training		06/12/2017	
ISO Construction Contracts Bill		03/09/2018	
Landfill Gas Management			
Lift/Jack: Care and Use	12/06/2017 12/06/2017	12/06/2017 12/06/2017	Refresher recommended every 3 years.
Manual Handling	22/04/2018 22/04/2018	16/07/2017 16/07/2017	
Procurement Training	07/10/2018		
PSOS & PSOS			
Safety in Excavations			
Safety Inspections (Lifting Equipment)			
Supervising Safety		06/12/2017	
Water: Validation and Interpretation			

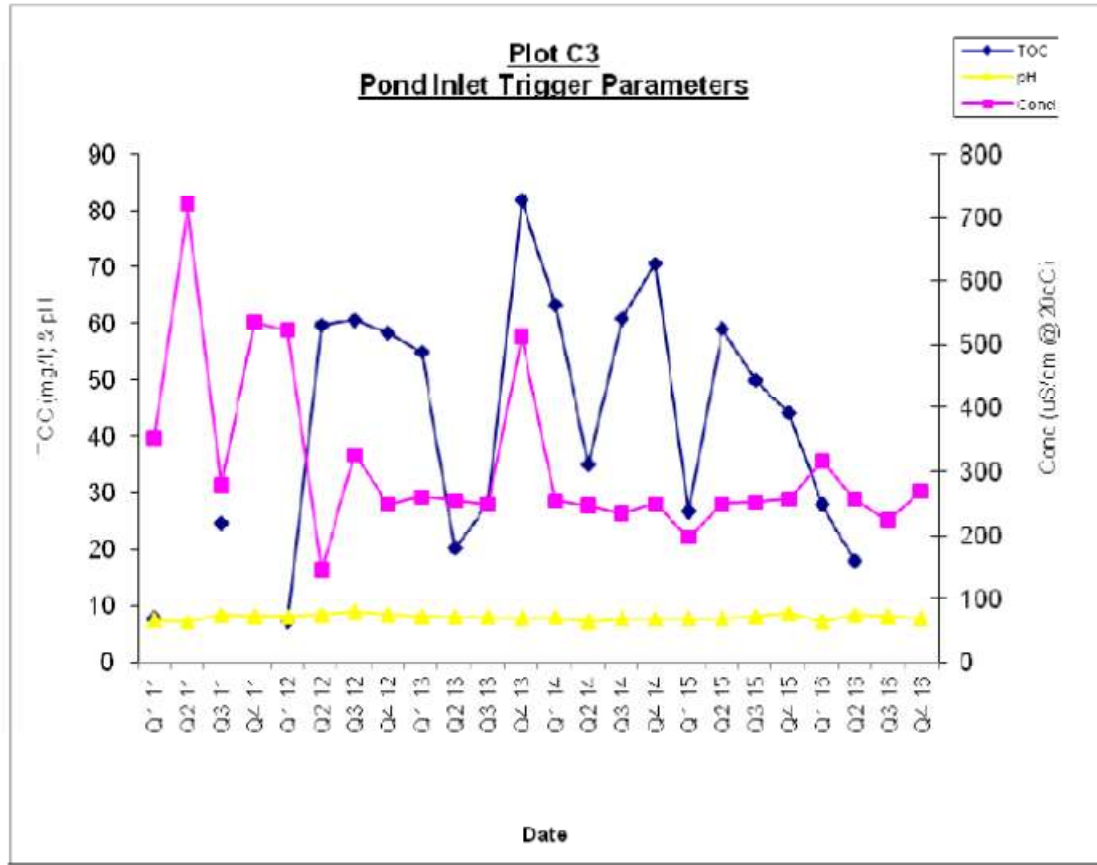


C. Monitoring Results and Graphs

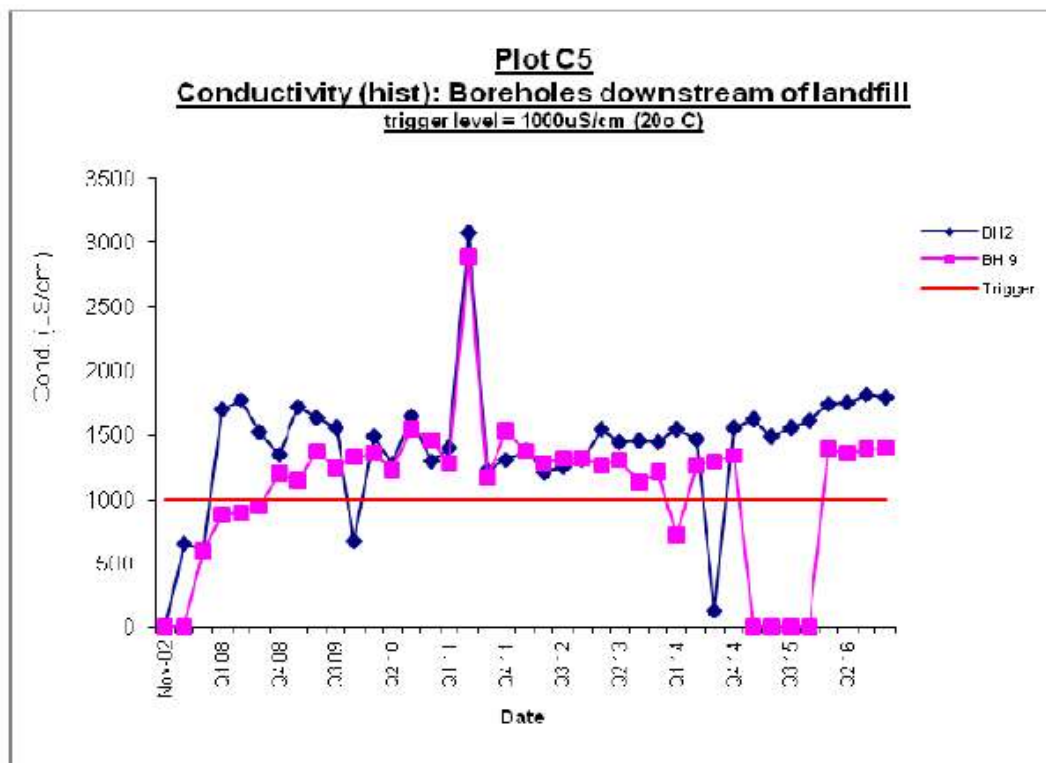
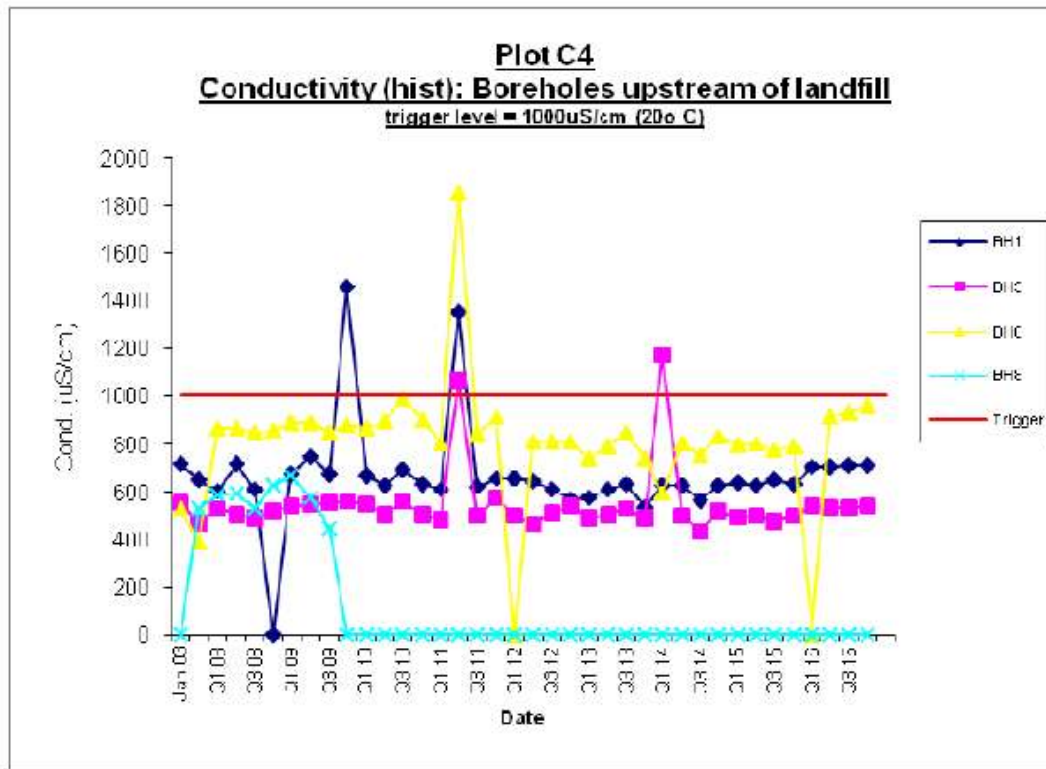
Gas Monitoring Results 2016



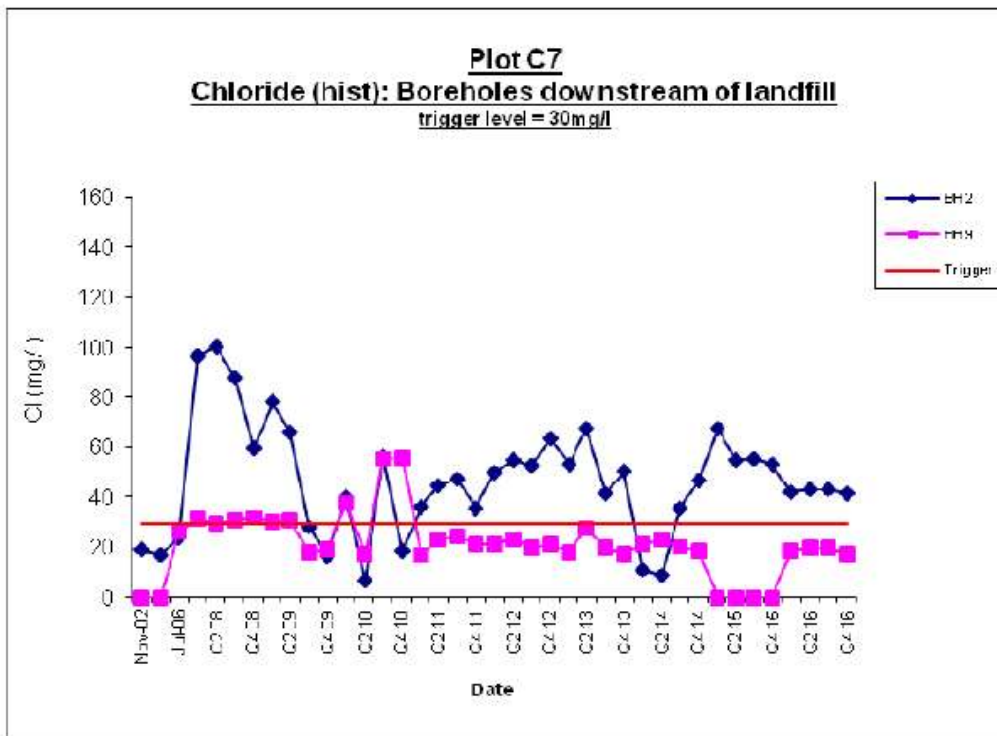
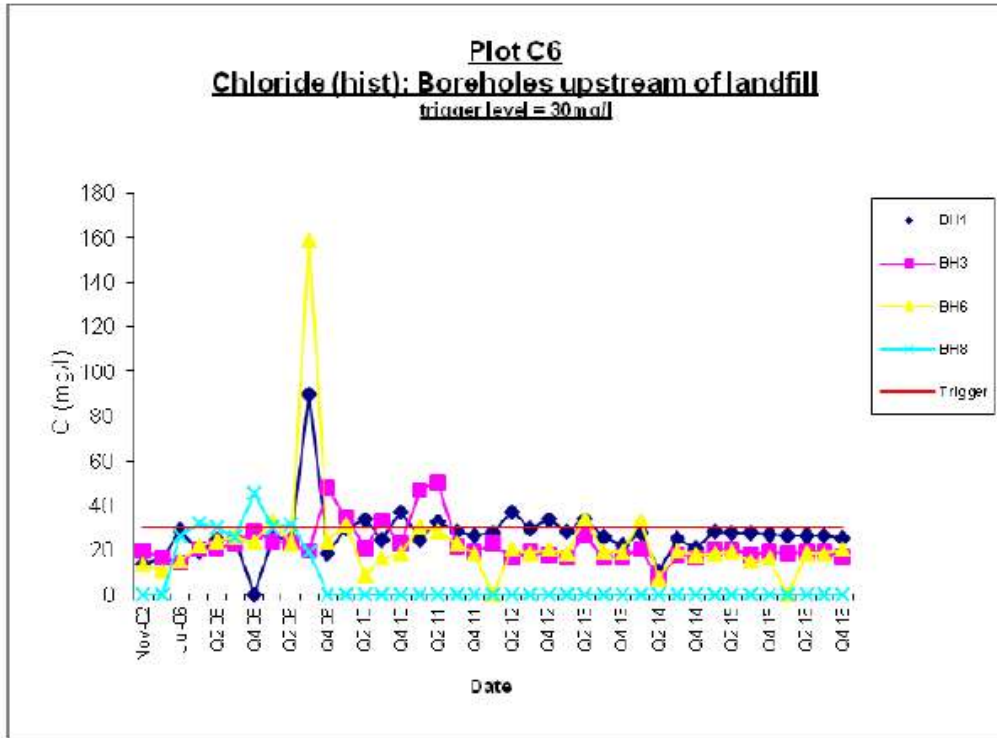
Surface Water Monitoring Results 2016



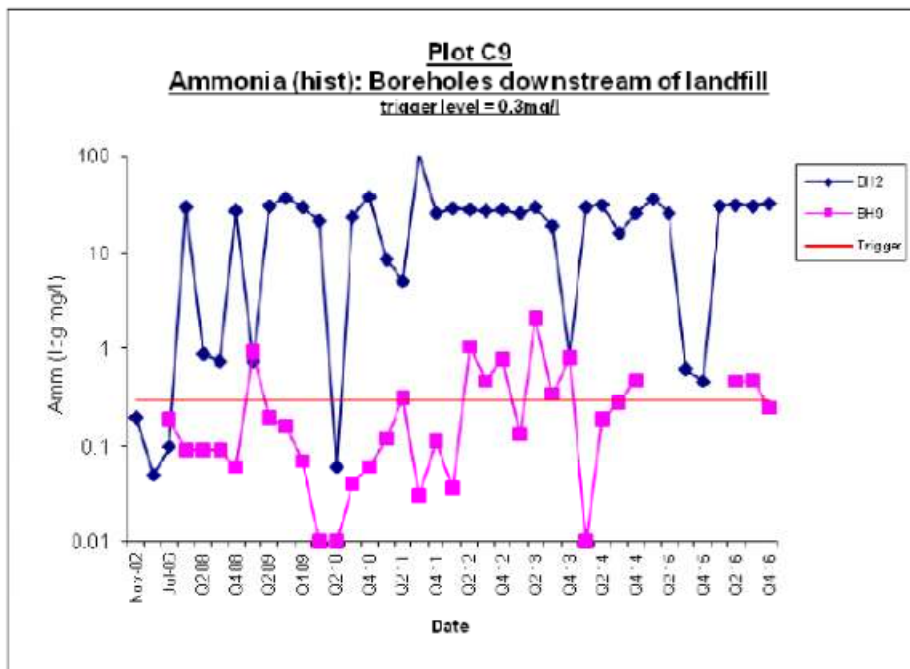
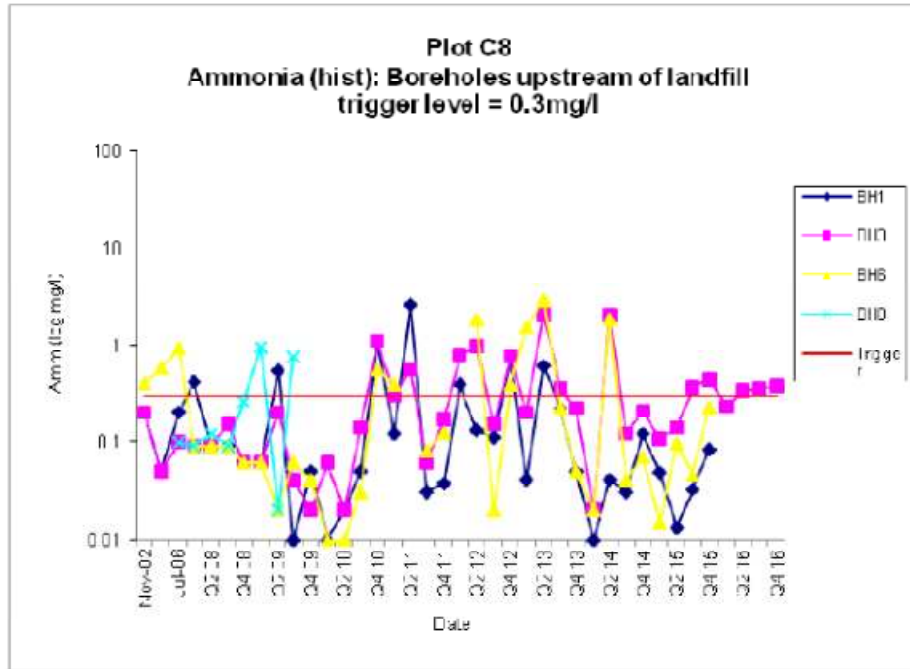
Ground Water Monitoring Results 2016



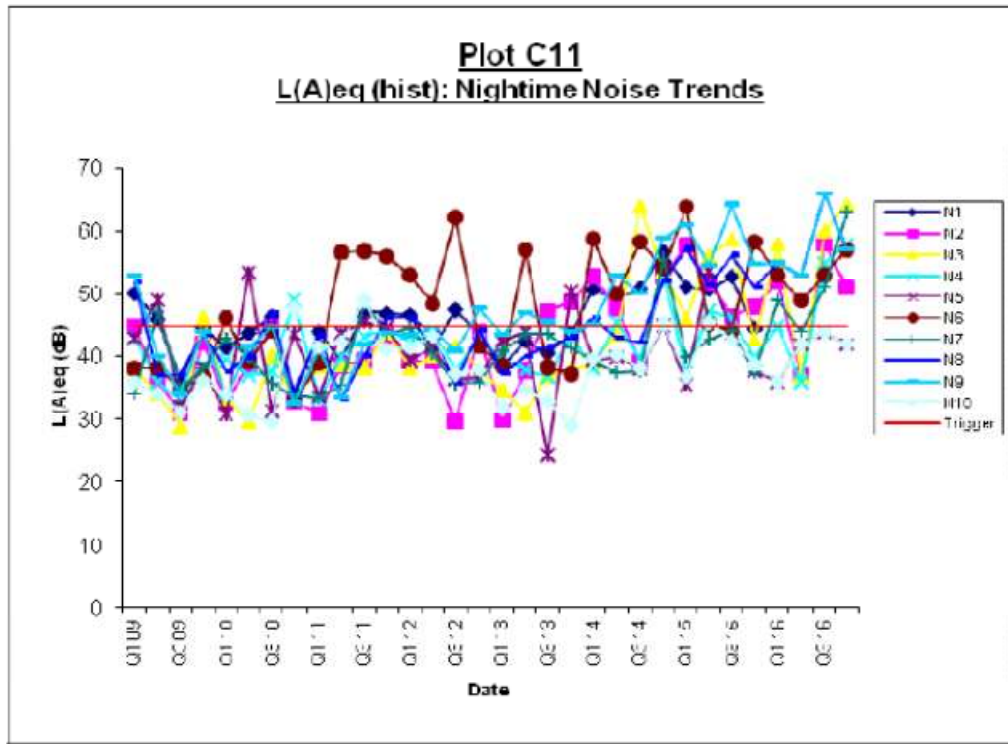
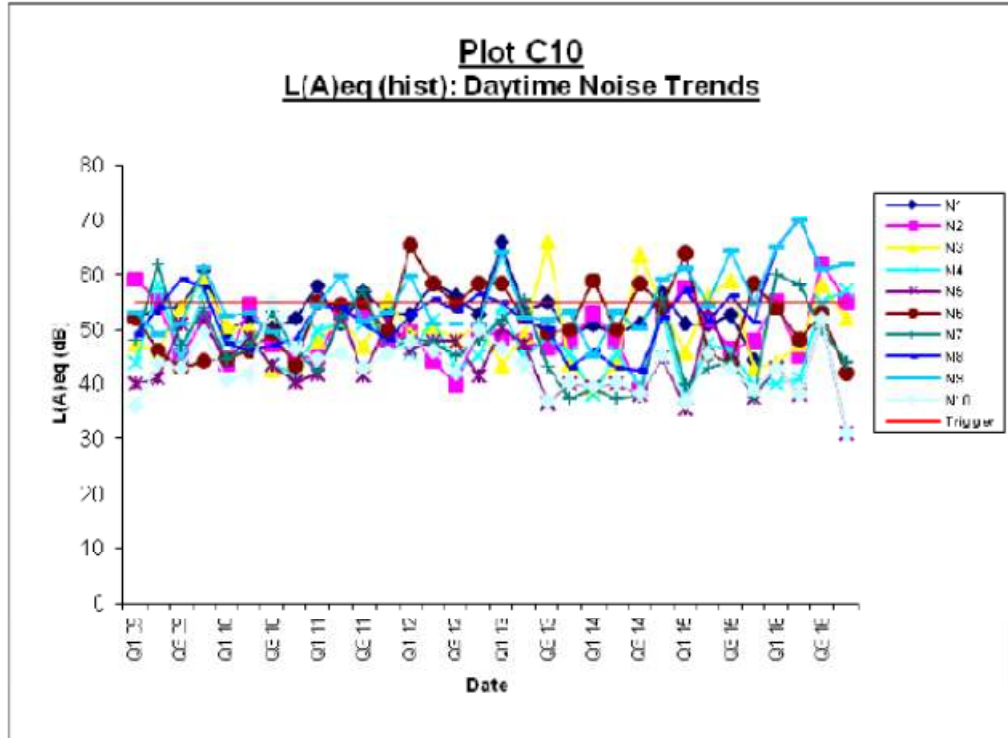
Ground Water Monitoring Results 2016



Ground Water Monitoring Results 2016



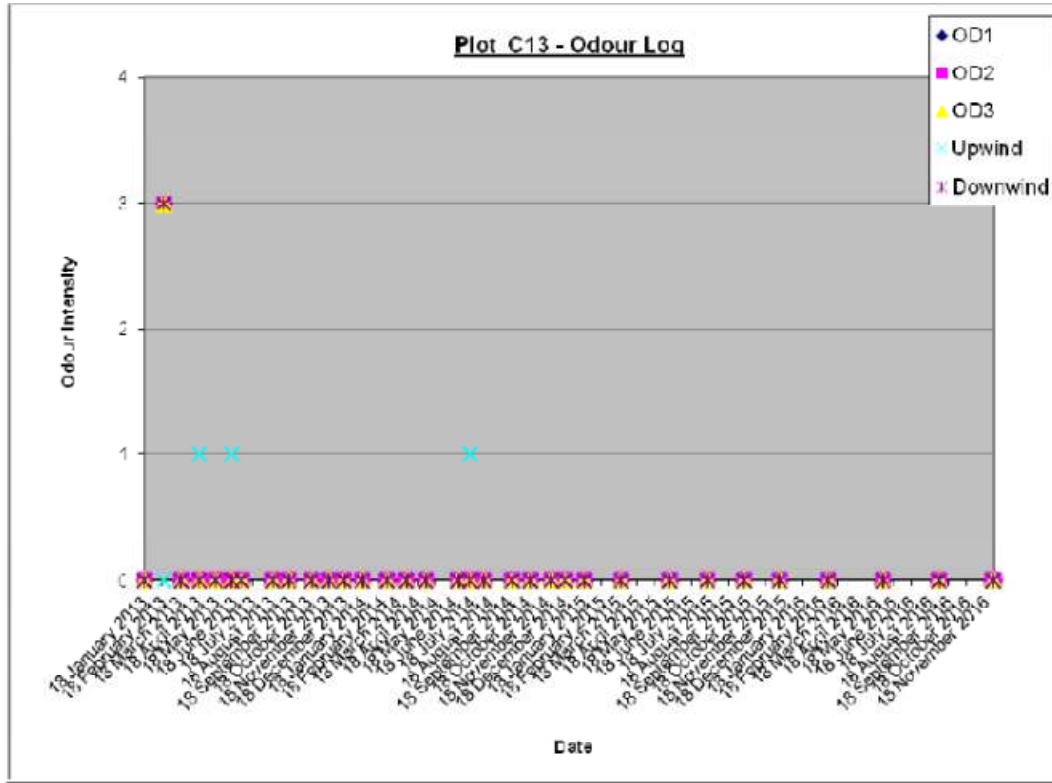
Noise Monitoring Results 2016



Dust Monitoring Results 2016

Dust Monitoring Locations and Frequency			
Dust analysis	D1 - D10	D1 - D10	D1 - D10
Dust Monitoring Results (mg/m ² /day)			
Date Range	Mar-Apr 16	May-Jun 16	Sep - Oct 16
D1	70	203	188
D2	55	91	162
D3	7	94	123
D4	40	79	78
D5	113	107	99
D6	30	85	83
D7	94	jar broken	69
D8	41	13	253
D9	87	67	99
D10	55	59	101

Odour Monitoring Results 2013 - 2016

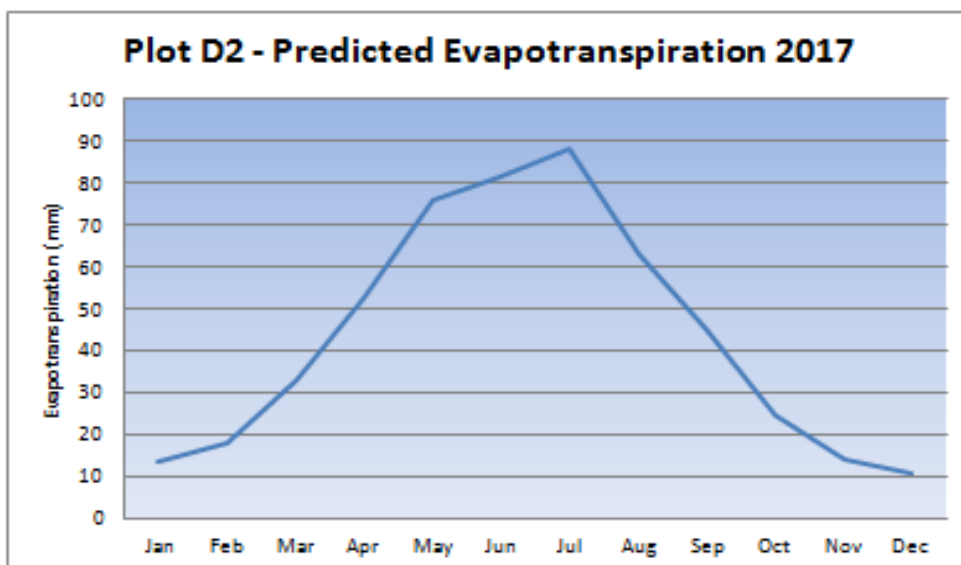
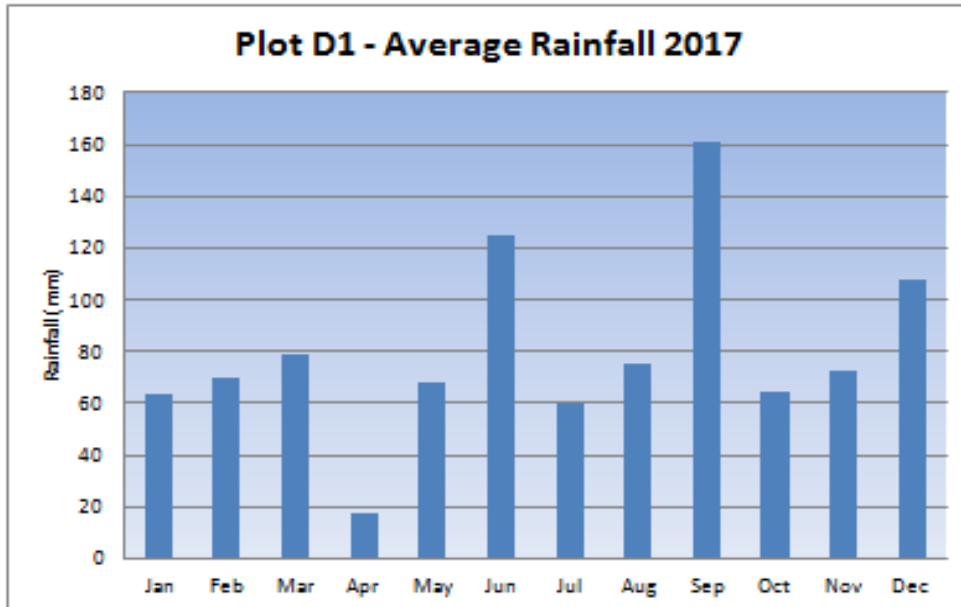


Legend

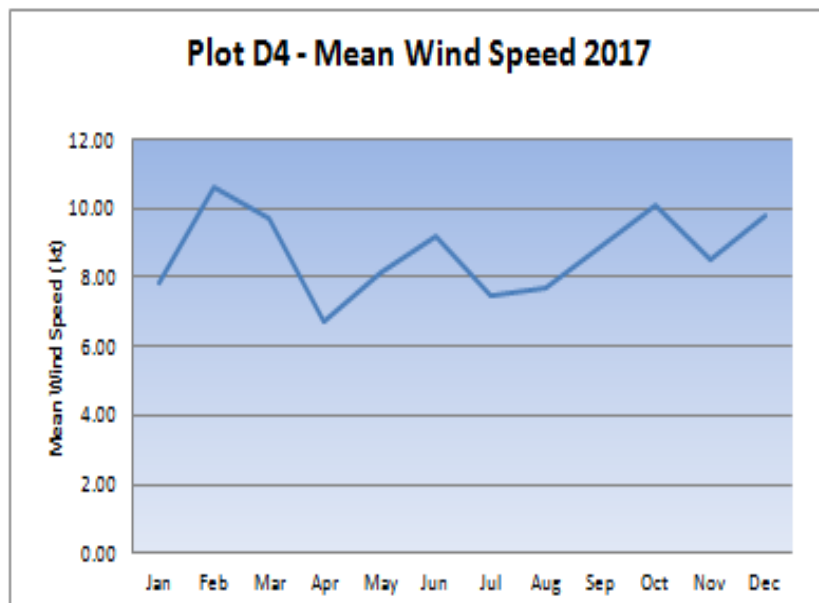
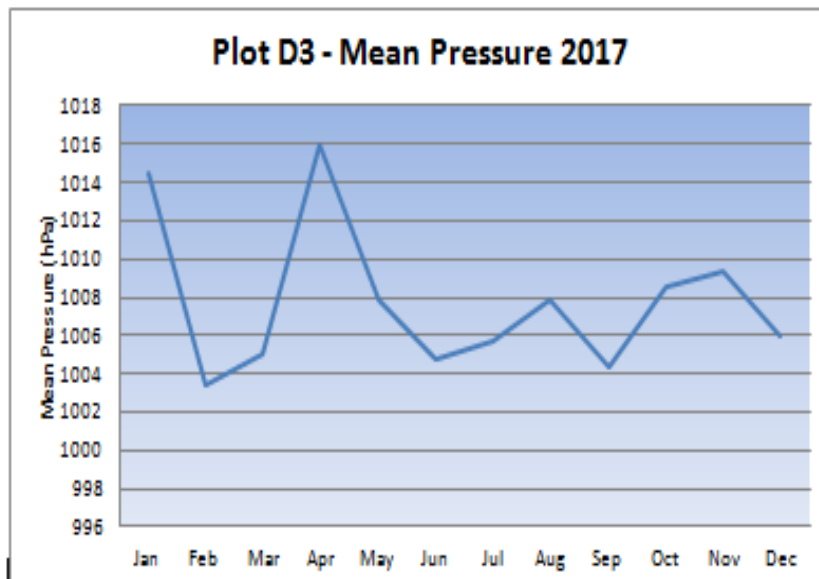
0	No detectable odour
1	Faint odour
2	Moderate odour
3	Strong odour
4	Very strong odour

D. Meteorological Data Graphs

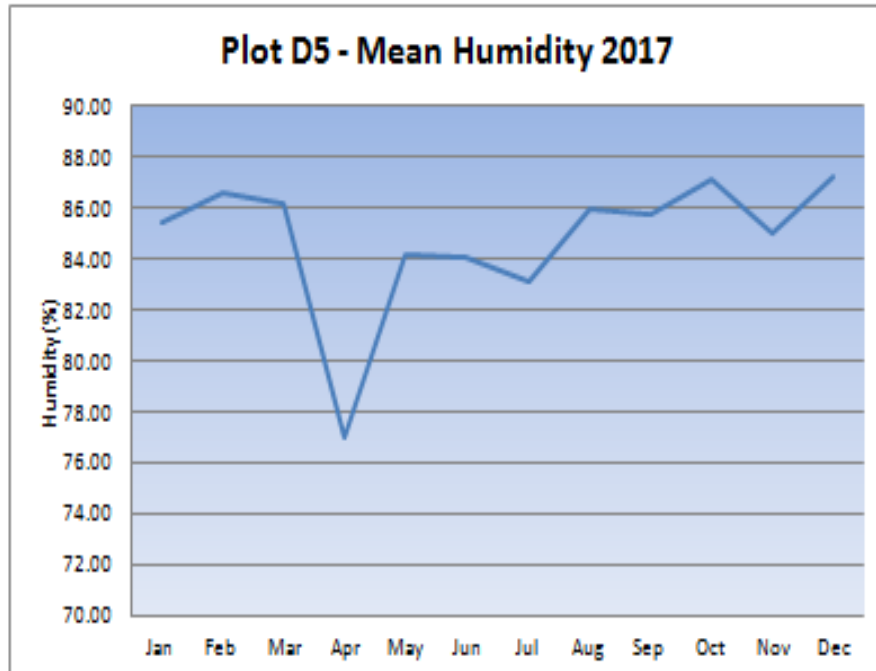
Appendix D - Meteorological Graphs



Appendix D - Meteorological Graphs



Appendix D- Meteorological Graphs



E. Summary of waste accepted and consigned off-site

Waste consigned off site from Holmestown Civic amenity from 1st January 2017 to 31st December 2017 (tonnes)

Recyclables	Company	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	TOTALS
Cardboard	Greenstar	11.4	7.82	3.6	3.02	3.02	5.54	2.94	4.64	7.54	7.58	12.74	8.44	78.28
W.E.E.E. & Mobiles	WEEE Ire	20.612	13.993	20.592	12.82	7.92	7.3	18.646	19.52	9.16	9.16	19.475	14.395	173.593
Plastic	Greenstar	5.88	2.2	2.2	1.9	2.08	5.42	1.48	1.52	3.84	6.04	5.96	3.92	42.24
Newspaper	Recycle 2000	1.98	9.4	2.2	1.96	0.92	1.8	5.3	3.8	0.82	1.19	0.96	0.35	30.88
Scrap metal	Greenstar	12.15	4.5	15.04	13.02	13.46	10.4	15.4	21.44	12.02	13.1	11.38	10.88	152.57
Oil Filters	Greenstar	0	0	0	0.12	0	0	0	0	0.36	0	0.8	0	1.28
Textile	Textile Recycling Ltd	1.4	8	8	6.4	0.4	1.8	0.88	1.28	1.32	0.34	0.4	0.18	30.4
Glass	Rehab Glassco	5.8	5.58	3.2	7.1	2.8	2.88	4.08	3.48	5.83	3.6	5.56	3.97	53.86
Tetra Pak	Greenstar	0	0	0	0	0	0	0	0	0	0	0	5.48	5.48
Engine Oil	Greenstar	0	0	0	0	0	1.178	0	0	0	0	0	0	1.178
Magazines	Greenstar	0	0	0	5.76	5.9	5.98	0	5.96	5.94	6.04	0.64	4.52	40.74
Aluminium drink cans	Rehab Glassco	1.8	1.8	1	2.8	0.06	1.8	0.14	0.12	0.18	0.14	0.24	0.13	10.21
Books	Greenstar	0	0	0	0	10	0	0	0	0	0	0	0	10
Cooking Oil	Greenstar	0	0	0	0	0	0	0	0	0	0	0	0	0
Lead acid batteries	KMK	0	0	0	0	0	0	0	0	0	0	0	0	0
Farm fence batteries	Recycling Village	0	0	0	0	0	0	0	0	0	0	0	0	0
Printer Cartridges	Greenstar	0	0	0	0	0	0	0	0	0	0	0	0	0
Compost material	AES	1.6	0.86	2.06	1.62	0.6	0	1	2.44	1.7	1.66	0	0	13.34
Tubes & Bulbs	KMK	0	0	0	0	0	0	0	0	0	0	0	0	0
Recycling Total		62.422	53.953	57.892	56.52	47.16	44.078	49.868	64.2	48.71	48.85	58.135	52.065	643.849
Holmestown Waste Management Facility 2017														
BLACKBAG	Greenstar	20.4	24.88	22.58	23.22	35.9	25.86	21.1	21.5	23.9	20.94	17.22	37.68	294.98
TIMBER	Greenstar	15.8	10.42	13.16	12.7	18.38	11.1	14.84	12.74	23.58	5.86	11.88	3.12	153.58
BULKY	Greenstar	56.04	51.02	62.24	68.76	95.38	43.86	67.3	50.84	85.38	31.02	56.94	73.88	742.86
CA WASTE TOTAL		92.24	86.12	97.98	104.68	149.66	80.82	103.24	85.08	132.86	57.82	86.04	114.68	1191.22

F. Water Balance Calculation Spreadsheet

HVMF 2017 AER
Water Balance

TABLE 1
Leachate Generation

Actual rainfall 2017	962.90	mm/yr	actual data from met. eireann (1st Jan to 31st Dec)
Infiltration Factor	90%		
Infiltration to landfill	864.6842	mm/yr (temporary restored areas)	
Dirty paved areas	962.9	mm/yr (assumes all rainfall becomes leachate)	
Density	0.90	t/m ³	
Waste Input 2017	0.00		
Liquid waste input	0	m ³ /yr	
Absorptive Capacity	0.025	m ³ per m ³	
Site life	20	years	

Year	Months	Phase	Active Area	Temp Cap	Full Cap	Waste Input 2015	Active Infiltration (m ²)	Temp Infiltr. m ³	Restored Area Infiltration (m ²)	Total Water (m ²)	Cumulative Water (m ²)	Absorptive Capacity (m ²)	Cumulative abs. capacity (m ²)	Cumulative leachate generation (m ²)	leachate produced (Lo) (m ²)
2017 (1st Jan to 31st Dec)	12	Dirty paved areas	740	0		0	713	0	0	713	713	0	0	713	713
2017 (1st Jan to 31st Dec)	12	1 (Cell 1,2,3,4, 10)	0	18700		0	0	16,170	0	16,170	16,170	0	0	16,170	16,170

Dirty paved areas draining to LTP	Area (m ²)
Weighbridges	100
Waste Inspection/Quarantine	250
Wheel wash	90
LTP Yard	300
Total	740

Wastewater from Admin Building	
Ave Nr of Staff	8
Per capita daily flow rate (from EPA manu)	60 l
Total Daily flow rate	480 l
Nr working days	250 d
total Annual Flow	120000 l
	120 m³

$$L_o = [ER(A) + LW + IRCA + ER (I)] - [aw]$$

Actual Leachate for 2017 as per effluent tank flow meter is 16873 m³

As per the Water Balance Calculation (the theoretical Value) is 16170 m³

By comparing Actual with Rainfall the Infiltration factor can be calculated.
e.g.

$$(16873 - 713) * 100 / (16700 * 9629) = 90\%$$

Total 2017	16,882
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Measured Quantity	NA
Less Admin Bldg WW	120

Nett VIB Quantity	NA
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Variance	NA
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LTP Total 2017	m ³
HVMF Generated leachate	16,882
HVMF Wastewater	120
HVMF carryover from 2016	1000
Imported from Killurin	0
	18,002

G. Drawings





**Wexford
County
Council**



**Holmestown Waste
Management Facility**
Wexford County Council,
Wexford
Tel: 053-9120522

PROJECT TITLE:
Holmestown Waste Management
Facility

DRAWING TITLE:
Appendix G1
Site Location Plan

DRAWN:

CHECKED:

DATE:

SCALE:

DRAWING No:

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