2011

CORK
COUNTY
COUNCIL

[ANNUAL ENVIRONMENTAL REPORT]

WASTE LICENSE REG W0068-03

Environmental Protection Agency, PO Box 3000, Johnstown Castle Estate, Co. Wexford. Telephone: 053-60600 Fax 053-60699

Contents

1. Introduction

Scope and Purpose of the Report

Cork County Council holds a Waste Licence (Register No.W0068-03) to operate Youghal Landfill Site. The aim of this Annual Environmental Report (AER) is to provide a review of activities at Youghal Landfill Site within the past 12 months. The required scope of the report is outlined in Schedule F (Content of the Annual Environmental Report) of the Waste Licence.

Background to the Report

The landfill facility has been in operation since 1972. The Environmental Protection Agency (EPA) granted Cork County Council with a review of the waste management licence on January 18th 2005 (Waste Licence No. W0068-02). This review proposed to increase the waste intake tonnage from 37,000 to 170,000 tonnes per annum and to increase the final profile level from 11m to 15m OD. The facility has been operating under the reviewed licence since that date. A further review was granted in March 2010, Waste Licence W0068-03, to comply with changes in legislation regarding the treatment of waste prior to disposal.

In accordance with the requirements of Condition 11.4.1 and Schedule E of the Waste Licence, the Annual Environmental Report (AER) for the facility is to be submitted to the EPA by March 31st of each year.

This is the eleventh AER to be submitted to the EPA and covers the reporting period December 31st 2010 to December 31st 2011.

Site Location

The facility is located at:

Youghal Mudlands,

Youghal,

Co. Cork

Tel: (024) 93834/91084 Fax: (024) 93834

The location of the site is shown on Figure 1.1.

The National Grid Reference for the site is 2100E, 0800N.

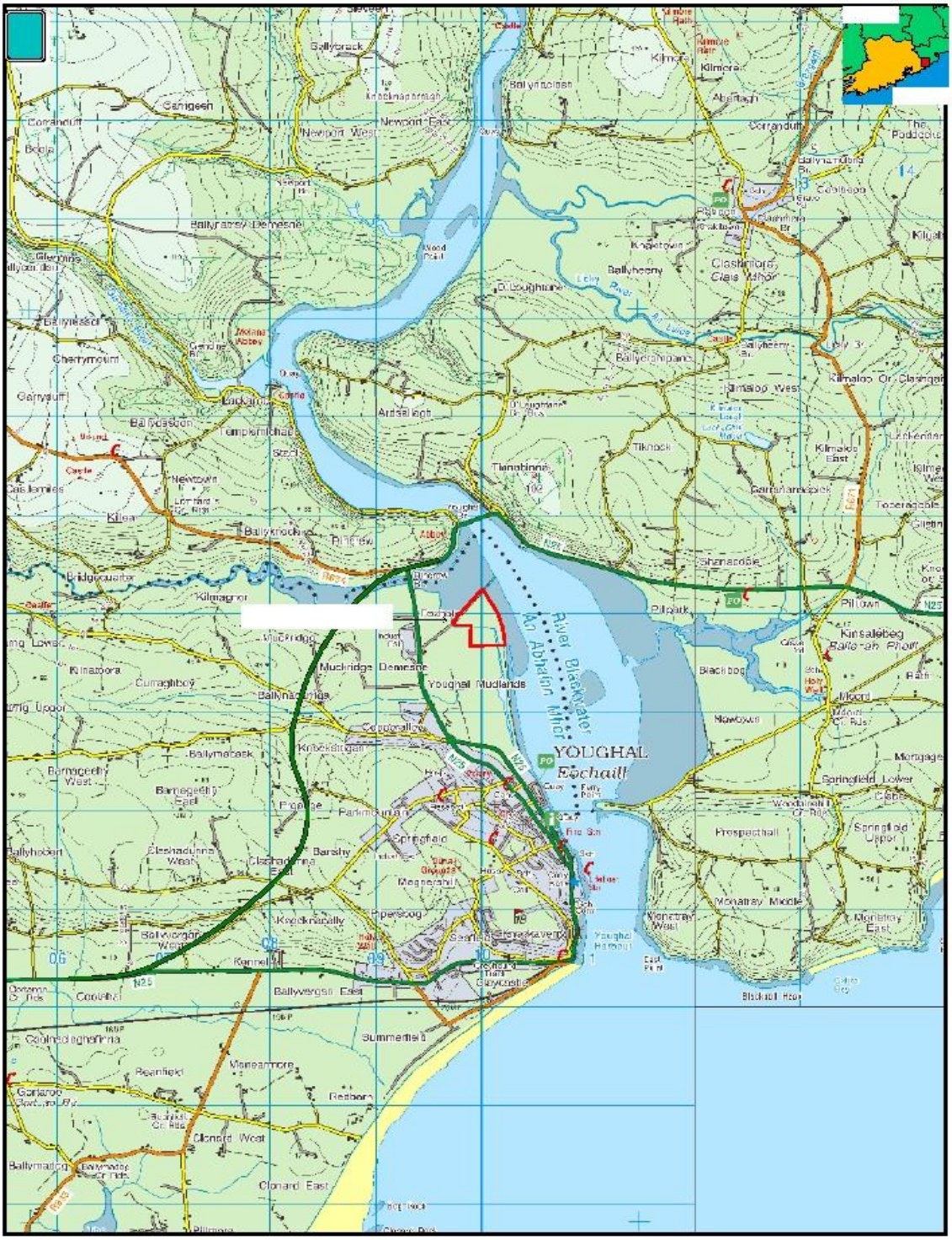


Figure 1 – Site Location Map

Environmental Policy

Cork County Council is committed to conducting all activities such that they have a minimal effect on the environment.

The main objectives of the Council are:

- A commitment to comply with the Waste Licence and all relevant environmental legislation and approved code of practice.
- To reduce negative environmental impacts by continually developing and modifying all procedures.
- To provide adequate training and awareness to all employees with regard to minimising environmental risks.
- To ensure that management and all personnel working on the site are familiar with the conditions of the waste licence, the content of the Environmental Management Plan and the Emergency Response Procedures.

2. Site Description and Activities

Description of the Site

Youghal Landfill Site occupies an area of approximately 15 hectares and is located in the townland of Youghal Mudlands, 1.8km north of Youghal town.

The site lies adjacent to the River Blackwater estuary. Surface water on the site drains southwards along man-made drainage channels. An east-west drainage ditch separates the active landfill area and the proposed extension to the south.

There are no major water abstractions within the immediate catchment of the landfill. The groundwater quality is indicative of the overburden geology, being high in chloride, sodium, magnesium, sulphate and electrical conductivity.

Unconsolidated deposits at the site vary from peats and clays to gravels. The type and thickness of unconsolidated material varies laterally beneath the site. Grey silty clays and silty sands representing typical tidal mudflat deposits are widespread across the site, occurring in the upper 5 m.

Peat deposits are encountered in the upper metre of the uncultivated portions of the mudflats. Beneath these deposits there is evidence of a former river channel. Sands, silts and gravels represent these associated, unconsolidated materials. A significant thickness of stiff clay is encountered particularly under the western area of the site. This is 'brick' clay formerly extracted from clay pits to the west of the site. It is likely to be glacial in origin.

Bedrock is anticipated to be between 35 and 40 m below ground surface. This Waulsortian limestone is classified as a locally important aquifer. It is likely to be confined by the overlying clay layer that acts as a barrier between the overburden groundwater and the bedrock groundwater. As a result the bedrock has a low to moderate vulnerability. Peat, which covers the Youghal mudflats, confines the overburden groundwater but is only one metre thick therefore the overburden groundwater has an extreme vulnerability rating. Saline intrusion to the overburden groundwater indicates hydraulic continuity with the Blackwater Estuary.

The meteorological station at Rossmore Landfill indicates prevailing winds from the southwest, as per other years. Our rainfall data is taken from Rossmore Landfill weather station as Roches Point is no longer a manned station. The annual rainfall at the site during 2011 is outlined in Table 2.1.

Table 1 - Rainfall at Rossmore Landfill 2011

Month	Rainfall/mm
January	75.4
February	114.4
March	22.6
April	16.4
May	81.6
June	114.6
July	39.6
August	66.0
September	50.6
October	80.4
November	156.4
December	78.6
Total	**896.6**

Waste Activities carried out at the Facility

Waste activities at Youghal landfill facility are restricted to those outlined in Schedule A of the Waste Licence as outlined below: -

Third Schedule

Class 1	Deposit on, in or under land (including landfill).
Class 5	Specially engineered landfill, including placement into lined discrete cells, which are capped and isolated from one another and the environment.
Class 6	Biological treatment not referred to elsewhere in this Schedule that results in final compounds or mixtures which are disposed of by means of any activity referred to in paragraphs 1 to 10 of this Schedule.

Class 7	Physico-chemical treatment not referred to elsewhere in this Schedule (including evaporation, drying and calcination) which results in final compounds or mixtures which are disposed of by means of any activity referred to in paragraphs 1 to 10 of this Schedule (including evaporation, drying and calcination).
Class 12	Repackaging prior to submission to any activity referred to in a preceding paragraph of this Schedule.
Class 13	Storage prior to submission to any activity referred to in a preceding paragraph of this Schedule, other than temporary storage, pending collection, on the premises where the waste concerned is produced.

Fourth Schedule

Class 2	Recycling or reclamation of organic substances that are not used as solvents (including composting and other biological transformation processes).
Class 3	Recycling or reclamation of metals and metal compounds.
Class 4	Recycling or reclamation of other inorganic materials.
Class 9	Use of ant waste principally as a fuel or other means to generate energy.
Class 10	Use of waste obtained from any activity referred to in a preceding paragraph of the Schedule.
Class 11	Use of waste obtained from any activity referred to in a preceding paragraph of this Schedule.
Class 13	Storage of waste intended for submission to any activity referred to in a preceding paragraph of this Schedule, other than temporary storage, pending collection, on the premises where such waste is produced.

The main activity at the site is the landfilling of non-hazardous domestic and commercial waste.

The facility accepts domestic, commercial and industrial non-hazardous waste only.

Waste Quantity and Composition

The quantity and composition of waste received and disposed of during the reporting period is outlined in Table 2.2 and Table 2.3, respectively.

Table 2 - Quantities of Waste Received and Disposed of during the Reporting Period:

	Quantity of Waste tonnes			Inert Cover Material Tonnes[1]
	Domestic Waste	Commercial Waste	Industrial Waste	
January	1539.828	10.27	33.46	0
February	3287.93	22.93	37.82	0
March	2858.35	15.29	20.44	53.79
April	2862.01	17.03	0	3093.11
May	2974.83	31.71	23.04	51.21
June	3134.67	40.55	0	297.67
July	3145.03	37.53	25.86	135.81
August	1704.51	32.55	26.1	0
September	730.73	32.95	20.56	19.13
October	862.21	4.55	21.12	165.29
November	920.02	12.61	0	244.27
December	861.95	0	0	0
Total	**24882.07**	**257.97**	**208.4**	**4060.28**

Note 1: Table 2.2 includes inert cover material for which there is no limit at the facility

Youghal CA Site 2011	January	February	March	April	May	June	July	August	September	October	November	December
Aerosol Containers	0	0	0	0	0	0	0	0	0	0	0	0
Beverage Cans	0.34	0.36	0.22	0.26	0.46	0.3	0.34	0.22	0.3	0.36	0.28	0.16
Cardboard	8.6	5.56	5.1	9.1	8.44	6.12	7.8	6.18	7.42	4.82	3.08	7.9
DIY Waste	0	0	0	0	0	0	0	0	0	0	0	0
Fluorescent Tubes	0	0	0	0	0.54	0	0	0	0	0	0	0
Food Tins	0.44	0.78	0.6	0.48	0.72	0.44	0.52	0.5	0.52	0.74	0.6	0.32
Glass Bottles	7.64	2.38	6.74	5.46	4.54	3.32	5.38	7.26	2.28	4.42	4.36	2.4
Green Waste	7.32	0	7.4	8.24	6.62	7.04	9.1	0	0	9.82	0	0
Hard Plastics	0	0	0	0	0	0	0	0	0	0	0	0
Household Batteries	0	0	0	0	0	0	0.415	0	0	0.54	0	0.197
Lead Acid Batteries	0	0	0	0	0	0	0	0	0.3	1.1	0	0.8
Light Plastic Pckg.	0	0	0	0	0	0	0	0	0	0	0	0
Paint	0	0	0	1.34	0	0	0	0	2.1	0	0	0
Paper	9.8	8.22	11.94	10.34	11.84	11.34	12.58	12.32	8.68	8.34	11.78	10.04
Plastic Bottles	2.06	1.76	1.72	1.94	1.84	2.2	1.74	2.16	1.76	1.64	1.8	1.56
Plate Glass	0	0	0	0	9.32	0	0	0	0	0	0	0
Plaster Board	0	0	8.16	0	0	0	0	0	0	0	0	0
Polystyrene	0	0	0	0	0	0	0	0	0	0	0	0
Scrap Metal	6.44	5.86	10.46	4.52	4.26	5.82	4.34	3.7	3.7	3.1	0	4.14
Textiles	0.78	0.6	0.42	0.78	0.48	0.8	0.8	0.92	0.44	0.82	0.54	0.44
Timber	6.82	6.16	4.4	10.5	9.18	9.28	6.18	12.72	3.94	3.14	7.4	3.48
Waste Cooking Oil	0	0	0	0	0	0	0	0	0.74	0	0	0
Waste Engine Oil	0	0	0	0	0	0	0	0	0	0	0	0
Waste Engine Oil Contain & Filters	0	0	0	0	0	0	0	0	0	0	0	0
WEEE	23.9	11.06	15.16	9.02	17.28	13.6	19.4	18.26	13.7	18.72	8.32	10.38
Totals	74.14	42.74	72.32	61.98	75.52	60.26	68.595	64.24	45.88	57.56	38.16	41.817
Cumulative Totals	**74.14**	**116.88**	**189.2**	**251.18**	**326.7**	**386.96**	**455.555**	**519.795**	**565.675**	**623.235**	**661.395**	**703.212**
Bulky Waste	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Domestic Waste	33.22	27.38	35.04	27.62	42.14	31.62	16.98	34.54	15.34	25.14	28.82	27.68
Domestic Waste - Month Totals	**33.22**	**27.38**	**35.04**	**27.62**	**42.14**	**31.62**	**16.98**	**34.54**	**15.34**	**25.14**	**28.82**	**27.68**
Cumulative Dom. Totals	**33.22**	**60.6**	**95.64**	**123.26**	**165.4**	**197.02**	**214**	**248.54**	**263.88**	**289.02**	**317.84**	**345.52**
Total Materials - Mth.	107.36	70.12	107.36	89.6	117.66	91.88	85.575	98.78	61.22	82.7	66.98	69.497
Cumulative Total Materials	**107.36**	**177.48**	**284.84**	**374.44**	**492.1**	**583.98**	**669.555**	**768.335**	**829.555**	**912.255**	**979.235**	**1048.732**
Recycling Rate - Mth	**69.06%**	**60.95%**	**67.36%**	**69.17%**	**64.18%**	**65.59%**	**80.16%**	**65.03%**	**74.94%**	**69.60%**	**56.97%**	**60.17%**
Recycling Rate - Yr.	**69.06%**	**65.86%**	**66.42%**	**67.08%**	**66.39%**	**66.26%**	**68.04%**	**67.65%**	**68.19%**	**68.32%**	**67.54%**	**67.05%**
No. of Users	1289	1157	1330	1483	1358	1476	1636	1592	1195	1172	1162	1228
Cumulative No. Of Users - 2011	**1289**	**2446**	**3776**	**5259**	**6617**	**8093**	**9729**	**11321**	**12516**	**13688**	**14850**	**16078**

Table 3 - Quantities of waste received and disposed of during the lifetime of the Site

Year	Quantity of Waste / tonnes
1988 - 1998	174,635
1999	28,000
2000	28,000
2001	14,808[1]
2002	47,505.12
2003	29,646.02
2004	5,376.67
2005	3,092.89
2006	12,280.59
2007	128,996.08
2008	104,453.27
2009	56,686.76
2010	44,783.98
2011	25,348.44
Total	**702,612.82**

Note 1: This is an estimated total figure for MSW accepted to the facility for 2001. This quantity includes the 2,000 tonnes deposited by the general public.

Remaining Capacity

On the 31st December 2011 the remaining capacity at Youghal Landfill is estimated to be approx 1,500 m^3. This is the estimated remaining capacity of the existing Cell 9.

Final capacity will be reached in 2012, depending on waste intake rates, at which stage the landfill facility will cease to accept waste. The civic amenity facility will continue to operate with the associated waste materials being transferred offsite for disposal or recovery as appropriate.

Methods of waste deposition

In 2011, all waste accepted on site was deposited in the constructed Cell 9 within the existing active area. The refuse vehicles entered the working cell and deposited the waste at the working face. The working face was approximately 15 m wide on average.

Once the waste was deposited a steel-wheeled waste compactor (sheep footed compactor weighing 58 tonnes) and a bulldozer were used to place and compact the waste. To prevent the formation of voids, all hollow objects and large articles deposited on the site were crushed, broken up, flattened or otherwise treated.
At the end of each working day, the working face was covered with compost material/clay material in order to minimise any nuisance.

3. Summary of Monitoring and Emissions

Landfill Gas

Gas results within the landfilled area shows varying levels of methane and carbon dioxide at boreholes G1, G2, and G3.

G1 is situated in waste, near the caretaker shut and carbon dioxide was detected here ranging from 2.0% to 5.8%. G2 is again situated in waste near the CA site. Carbon dioxide levels varied between 0.2% and 1.4%. G3 is situated near the entrance to the landfill road and the waste at this location is the oldest on site. The concentration of carbon dioxide ranged from 0.9% to 12%.

G1 exceeded methane limits during 0.0% and July 0.8%. G2 did not exceed methane limit in 2011. G3 exceeded methane levels in March 5.5%, May 8.5%, June 6.7%, July 12.5%, August 15.0% September 11.6%, October 3.7%, November 1.7% and December 1.8%. History has shown that G3 displays high methane levels during time of heavy traffic as it is located at the entrance to the site and beside the road.

Gas well G4 was inaccessible during the reporting period due to site works and newly erected fencing.G5 was destroyed in 2008 due to capping. Gas wells G4 and G5 are in place for 2012 monitoring.

G6 and G7are perimeter wells on the public walkway around the site. The carbon dioxide reading varied from 0% to 5.8% in G6 and 0% to 5.3 % in G7. Monitoring of gas wells G6 and G7 showed raised levels of carbon Dioxide during the reporting period. Methane levels were 0% for G6 and G7.

Long term trends

The monitoring of all wells will continue during 2012.

There is no evidence of a build up of landfill gas in the site buildings.

Surface Water

Condition 8 and schedule E.2 of the licence requires the licensee t conduct surface water monitoring at various locations on and surrounding the site. The frequency of monitoring varies from quarterly to annually depending on location. These results have been compared to the following surface water criteria.

- Water Quality (Dangerous Substances) Regulations, 2001 (S.I No. 12 of 2001)
- Surface Water Regulations S.1. No. 294 of 1989 Surface Water Directive (75/440/EEC)

GA127

GA127 is influenced by saline intrusion during high tide. This location has become ponded and flow is restricted resulting in low dissolved oxygen. Chloride levels varied during the year due to saline intrusion and time of sampling. The level of Ammoniacal Nitrogen increased to 4.4 mg/l. Total suspended solids varied during the year, peaking in Q3 at 135 mg/l.

Annual metal levels increased in sulphates, alkalinity, manganese, lead and total oxygen nitrogen, Annual metal levels decreased in total phosphorus, cadmium, potassium, zinc, magnesium and copper. All metals were blow the A3 MAC limits set under the Surface Water Quality Standards for metal parameters with the exception of manganese.

SW1

Surface Water monitoring SW1 is located inside the sluice gate, west of the site, adjacent to the site entrance. The results for the reporting period indicate that the water quality at this location is good. Surface water at this location is tidally influenced, although the flow rate is poor.

Ammoniacal nitrogen levels increased during the year to 0.96 mg/l in Q3. Chemical Oxygen demand varied during the year reaching a high of 790 mg/l in Q1 exceeding the

Surface Water Regulations. In comparison Biological Oxygen Demand did not exceed the Surface Water regulations. Chlorides exceeded the limits set due to saline intrusion.

Annual metals levels increased in sulphates, potassium, magnesium, Annual metals levels decreased in manganese, copper, alkalinity, Total Oxygen Nitrogen and Total phosphorus .No metal with the exception of Sulphates and iron, exceeded the A3 MAC limits set under the Surface Water Quality Standards for metal parameters.

SW2

Sampling point SW2 is located within the site boundary to the east of the active filling area. SW2 is in the main drainage channel from the site. Flow at SW2 is low with little dilution of any runoff from the landfill.

Ammoniacal nitrogen reached a high of 5.2 mg/l in Q4 exceeding the Surface Water Regulations. Chemical Oxygen Demand ranged from 68 mg/l to 1000 mg/l exceeding the regulations. In comparison Biological Oxygen Demand did not exceed the surface water regulations. Chlorides levels ranged from 9031 mg/l to 22677 mg/l. This site is influenced by saline intrusion. Total suspended solids did not exceed the Surface Water Regulations.

Annual metals levels increased sulphates, alkalinity, potassium, lead, magnesium and copper. Annual metals levels decreased in manganese, total phosphorus, and total oxygen nitrogen. All metals excluding iron and manganese were below the limits under the Surface Water Quality for Metal Parameters.

Annual metal analysis for 2010, showed manganese 3,862ug/l breached the limits of 50ug/l set under the regulations S.I. no. 294/1989. Also iron breached the limit set of 200ug/l with a result of 3006ug/l in 2010. All other results were with the regulation limits.

SW3

Surface water sampling location SW3 is located approximately 1,000m downstream of SW6, inside the sluice gate. This area is influenced by saline intrusion as indicated by the elevated conductivity and chloride.

Ammoniacal Nitrogen ranged from 0.86 mg/l to 2.49 mg/l. Chemical oxygen demand ranged from 270 mg/l to 800 mg/l in Q1. I comparison Biological oxygen demand levels did not exceed the limit set under the regulations. Chlorides levels ranged from 11,089 mg/l to 22,106 mg/l indicate this location is influenced by saline intrusion.

Annual metals levels increased in sulphates, potassium, magnesium and lead. Annual metals levels decreased in manganese, total oxygen nitrogen, zinc, copper and cadmium. All metals were below the limits set under the Surface Water Quality for Metal Parameters.

SW6

SW6 is located, approximately 30 meters southeast of the boundary of the cells 6&7. Water at this location is tidally influenced as indicated by the elevated conductivity and chloride results over the licensed year. Ammoniacal Nitrogen levels ranged from 0.06 mg/l to 2.49 mg/l below the limit set in A3 MAC of the surface water regulations. Chemical oxygen demand ranged from 50 mg/l to 1310 mg/l exceeding the regulations. In comparison biological oxygen demand did not exceed the limit set in the regulations.

Annual metals levels increased in sulphates, copper and total oxygen nitrogen, Annual metals levels decreased in potassium, manganese and total phosphorus. All metals excluding sulphates are below the limits set under the Surface Water Quality for metal parameters A3 MAC.

Long Term Trends

Overall there has been a continued improvement and stabilization in results for surface water since 2008. The maximum readings have, in most cases, reduced in comparison to recent years. This site has shown a steady improvement since the land filling activities have moved into the engineered cells and the unlined cells have been capped off completely. The capping of the unlined cells in the landfill has helped any overburden of the surrounding environment. This improvement should continue in the future

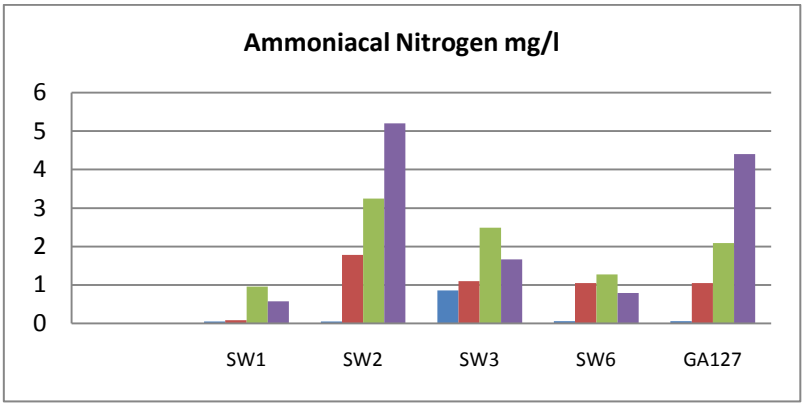


Figure 2 – Ammonical Nitrogen

Surface water regulations limit is 3.1 mg/l.

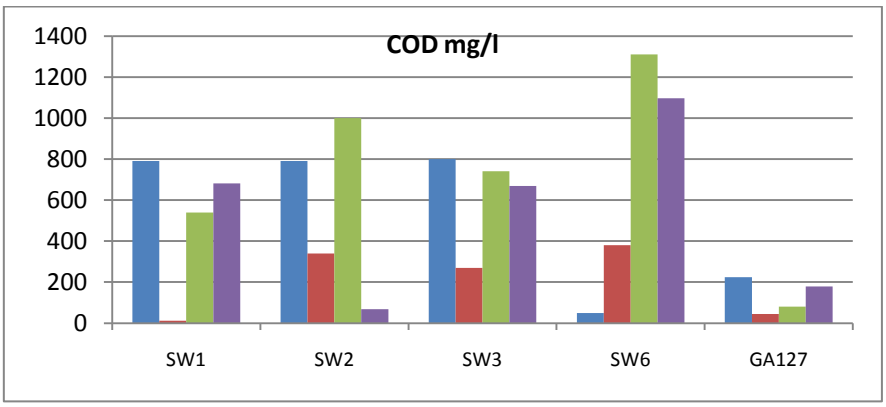


Figure 3 - Shows the trend in COD Concentration

All sites during the year except GA127 breached the limit of 40mg/l set under the surface water regulations.

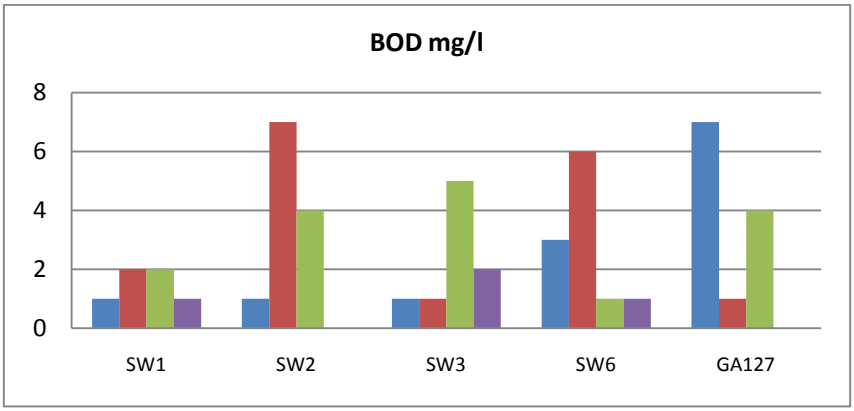


Figure 4 - Biochemical oxygen demand (BOD) surface water regulations 5mg/l.

Groundwater

Condition 8 and Schedule E.2 of the license require the licensee to conduct groundwater monitoring at locations (MW1, MW4 and MW7). MW2 and MW3 were included in the 2006 monitoring schedule to give results down-gradient from the new cells 6, 7, 8 & 9. In 2012 ground water wells MW2, MW2A, MW3, and MW5 were re-established.

Groundwater monitoring results have been compared to the Maximum Admissible Concentrations (MAC values) as set out in the "Drinking Water Regulations" European Community (Quality of Water Intended for Human Consumption) 1988 (Statutory Instrument S.I No. 81 of 1988).

MW1

MW1 is located at the northern perimeter of the site. This monitoring well is influenced by tidal action. Conductivity levels peaked at 26.68 mS/cm in Q4 and chlorides levels peaked at 15,298 mg/l in Q4. Ammoniacal Nitrogen and Total Organic Carbon levels were below the trigger limits set under the EPA for 2012. Dissolved iron levels decreased significantly in 2011 to below the limit of 200ug/l set under the Drinking water directive.

Annual metal results for 2010 were satisfactory with the exception of manganese 6493ug/l and magnesium 743mg/l breaching the limits set under the drinking water directive of 50ug/l and 50mg/l. Sulphate and potassium also exceeded limits set under the Drinking Water Directive. No breaches were recorded for VOS's and pesticides.

MW2

MW2 is located at the south-eastern end of the site in an area that is approximately 50 m from in Cell 6. This monitoring well is influenced by tidal action. Wells were not accessible due to capping works in adjacent cells.

MW3

MW3 is located at the south-western end of the site in an area that is approximately 15m from Cell 8. This monitoring well is influenced by tidal action. Wells were not accessible due to capping works in adjacent cells.

MW4

MW4 is located near the entrance to the facility along the western boundary. MW4 is influenced by tidal action. The results for MW4 showed the following trends. No breaches for Ammoniacal nitrogen and total organic carbon were recorded during 2011. Dissolved iron peaked in Q2 at 8,068ug/l, while Total Organic Nitrogen did not exceeded the limit of detection in 2011.

Annual metal results were satisfactory, with the exception of manganese 1859ug/l breaching the drinking water limit set at 50ug/l. No breaches were recorded for VOC's and pesticides

MW7

MW7 is located south west of Cell 5 on the western boundary of the next phase of development of the landfill. This well became covered over, in September 2006, when the landfill activity moved into the new Cell 6. A new MW7 well was drilled in April 2007. Unfortunately further work in the area destroyed the new drilled well. A new well will be drilled once all capping works have been completed.

Long Term Trends

As already outlined previously, levels of chloride, sodium, electrical conductivity, and Ammoniacal nitrogen are naturally elevated in the groundwater as a result of the geology of the site and tidal influence.

Research has shown that the normal indicative parameters of Leachate contamination include ammonia, chloride, TOC, conductivity, pH, iron and heavy metals such as cadmium, nickel, zinc, copper and lead. This research would indicate that there is no Leachate contamination of groundwater in Youghal Landfill.

Levels of cyanide, phenols, VOC and total chromium are below laboratories detection limits. Manganese levels have decreased in both MW1 and MW4 in 2011. Copper, mercury cadmium and copper are all below the limits set under the drinking water directive.

While the seawater entering the site is probably causing elevated levels of some parameters, land filling activities are also responsible for the elevated levels of parameters such as Ammoniacal nitrogen and potassium.

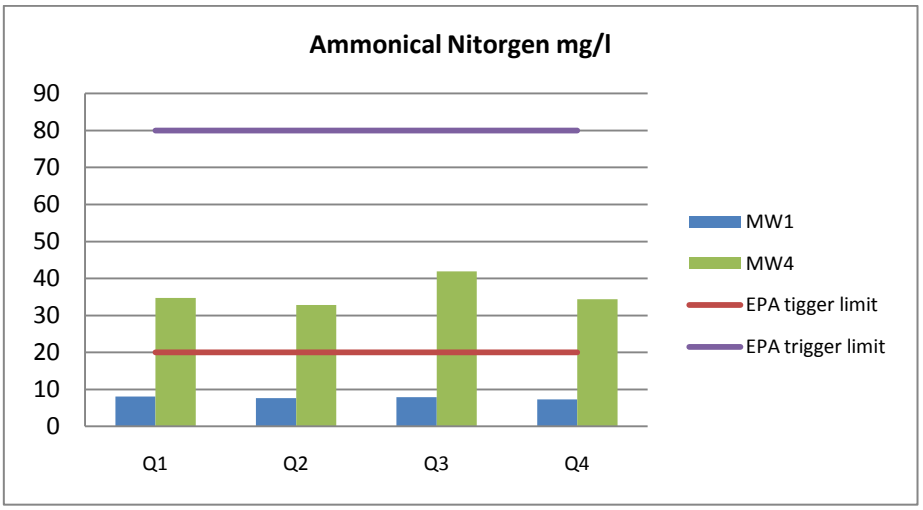


Figure 5 - Ammoniacal Nitrogen

No trigger limits were exceeded for Ammoniacal Nitrogen 2011

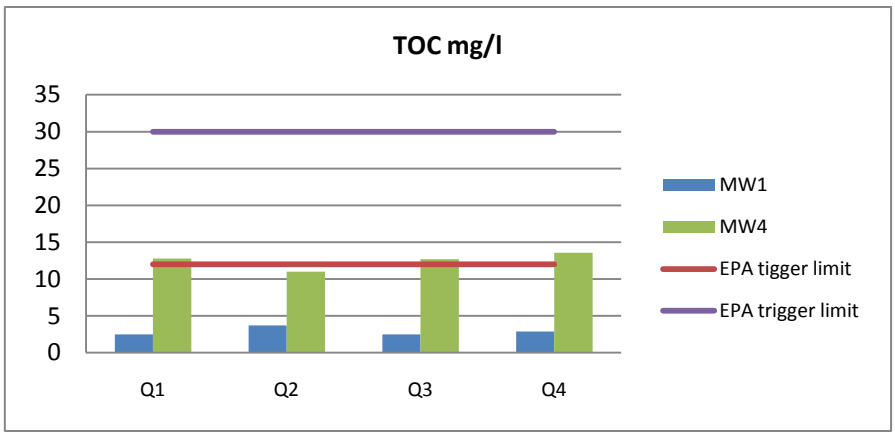


Figure 6 - Total Organic Carbon levels

Leachate

Indicators of Leachate include BOD, COD, conductivity, pH, chloride, sodium, iron, manganese, cadmium and VOCs. Generally Leachate constituents tend to rise during landfill operation, peaking approximately at the time of closure followed by a gradual post closure decrease (Krug and Ham, 1997: Proceedings of the Sixth International Landfill Symposium).

Monitoring of Leachate quality at L1, L2, and L3 & L4 is carried out on a quarterly basis for some parameters and on an annual basis for additional parameters as per the license requirements.

Analyses of parameters, which are above the groundwater criteria used, are typical Leachate characteristics.

Table 3.1 summarises the concentration of analyses in the Leachate in comparison to typical Leachate composition of 30 samples from U.K./Irish landfills accepting mainly domestic waste.

Table 4 - Summary of Leachate concentration range in comparison to typical Leachate concentrations.

Parameter	L1	L2	L3	L4	Typical
	Range (Max)	**Range(Max)**	**Range(Max)**	**Range(Max)**	**Range(Max)**
PH	7	7.2	6.9	6.7	6.4 - 8.0
Electrical conductivity EC(ms/cm)	3.3	5.57	4.57	2.9	503-19,200
Ammoniacal nitrogen NH_4-N	236	884	269	111	<0.2-1,700
Chemical Oxygen Demand mg/l	320	630	450	412	<10-33,700
Biochemical Oxygen Demand mg/l	83	54	51	158	<0.5->4,800
Cadmium Cd µg/l	0.3	0.3	0.1	<0.1	<0.01-0.03
Chromium Cr µg/l	20.3	17.6	12	1.5	40-560
Chloride Cl	429	1086	587	339	64-3,410
Copper Cu µg/l	0.014	0.009	0.013	0.003	20-160
Lead Pb µg/l	32.6	1.7	4.5	2.2	<0.04-0.28
Mercury Hg (µg/l)	0.08	0.05	0.07	0.07	<0.1-1.0
Total oxidised nitrogen (TON)	<0.14	<0.69	<0.69	<0.69	<0.01-6.7

Table 3.1 shows that, with the exception of lead and cadmium, concentration of analytes found in the Leachate are within the typical Leachate concentration range. It can be concluded that the quality of Leachate generated at Youghal landfill site is typical of other landfill sites disposing of similar materials.

In 2011, a total of 13,648m^3 of Leachate was tankered off the site for disposal at Carrigtohill Wastewater Treatment Plant. The total emission of Total N for 2011 was 3.27 tones. The total emission of COD for 2011 was 1.54 tonnes

Figure 7 - Leachate Ammoniacal Nitrogen

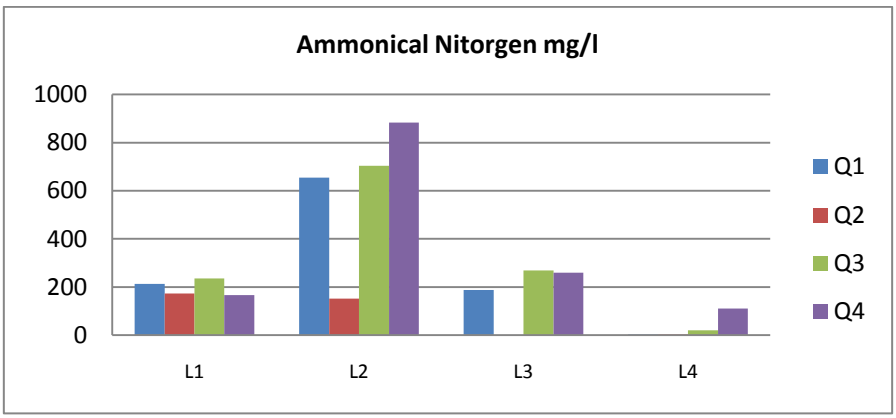


Figure 7 illustrates concentrations of ammoniacal nitrogen concentrations for the reporting period at each of the monitoring points L1, L2, L3 & L4. L2 remained high throughout the year.

Figure 8 - Leachate BOD and COD results

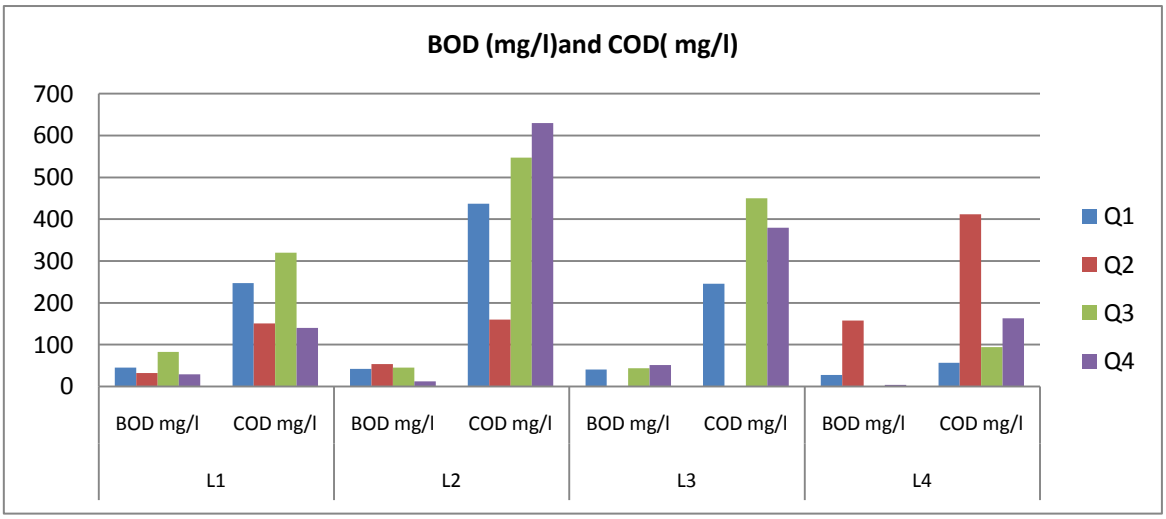


Figure 8 illustrates chemical oxygen demand at monitoring locations L1, L2, L3 & L4. L2 had the highest concentration of COD Q1.

Long Term Trends

From the analysis of leachate quality results it appears that the strength of the leachate is strongest at L2. Waste was placed in the area of L3 & L4 in 2001/2002. Waste was placed in the area of L2 between 2002 and 2006.

However, the ecological assessment of the site and surrounding area concludes that activities at the landfill site are not impacting on the surrounding ecology.

Noise

A daytime noise survey was carried out at the site in accordance with Schedule E of the Waste License on the 19th December 2012. The landfill facility is not operational during night time hours.

Four boundary reference measurements were recorded at the southern, northern, western and eastern boundaries of the site. Monitoring at each location was for 30 minutes duration. During sampling the L_{Aeq}, L_{A10} and L_{A90} were recorded.

L_{Aeq} 30 $_{min}$ levels at the four onsite stations were 53-58 dB. Landfill operations were audible at a low level at 2 sites (N3 and N4). The noise contribution considered attributable to the landfill facility was estimated at <47 db at both stations. No landfill operations were audible at N1 and N2.

Noise emissions from the landfill facility did not give rise to levels above 55 db at any station, thus operations were in compliance with the daytime noise limit specified in the waste license W0068-03.

Dust

In accordance with Schedule E.2 of the Waste License, dust monitoring is carried out at the facility three times during the licensable year. Total dust deposition was monitored over a period of 30 days starting from the 18th April to 16th May, 13th June to 12th July and 15th July to 10 August 2012.

No dust site exceeded the limit of 350 mg/m^2/day set in the license.

4. Site Development Works

The landfill site has been in operation since 1972. The site was licensed by the EPA (68-1) in December 2000 and a review of that licence (W0068-02) was granted in January 2005. A further review was granted in March 2010, W0068-03.

Site Development Works during the Reporting Period

Site development works that have been carried out and that are currently ongoing at the site in accordance with the conditions of the licence during the reporting period are outlined in Table 4.1 below.

Table 5 - Site Development Works during the Reporting Period

Licence Requirement	Status
Condition 3.6 **Site Roads and Hardstanding Area**	**Ongoing**
Condition 3.14.1 **Installation of Horizontal Gas Extraction pipework in Cell 9**	**Ongoing**

Progress towards Site Restoration

Lining Technology installed a restoration cap on Cells 6, 7 & 8. Cells 6, 7 & 8 have been connected to the gas extraction system along with the open Cell 9. Cell 9 will be capped in accordance with Condition 4.3 of the Waste Licence on its completion in the future.

Site Survey

In accordance with Condition 8.9.1 of the Licence, a topographical survey of the site was conducted in January 2012. A void space survey was done on December 31st 2011. The void space available, on this date, was 3,000m^3. This void space is the only remaining capacity left in Cell 9. No other cells have been constructed at Youghal Landfill. This total void space does not allow for settlement. The contour drawing of the survey is included in Appendix 3. Any depressions will be filled and re-graded during the implementation of final capping layer and the landscaping proposal.

Indirect Emissions to Groundwater

Groundwater monitoring data indicates that there are no indirect emissions to the groundwater from the landfill site.

Monthly Water Balance Calculations

The monthly water balance calculations have been calculated as outlined in Appendix 4. The results are summarised in Table 4.2. This shows that there has been a similar leachate production in 2011 (13,648m^3) compared to 2009 (13,165m^3) and 2010 (13,334m^3).

Table 6 - Water Balance Calculations 2011

Month	Predicted Leachate/m^3
January	1170.97
February	1710.43
March	181.64
April	77.30
May	1175.16
June	1725.97
July	448.64
August	998.60
September	805.31
October	1304.66
November	2593.53
December	1275.87
Total	**13,648.06m^3**

5. Waste Received by the Facility

Youghal Landfill Facility provides a final disposal point for municipal solid waste and a civic amenity facility for recycling. A waste transfer form, as per the EPA guidance manual, accompanies each consignment of waste entering the facility.

Every licensed contractor using the landfill facility has been issued with waste transfer forms. The weighbridge operator correlates the contents of the waste transfer form against the waste catalogue list for each load at the weighbridge. The site foreman visually inspects each load as it is deposited at the tip head.

A written record is kept of each waste load arriving at the site. The weighbridge operator maintains a register of the following information: -

- Date and time of delivery of the waste
- Description of the waste (including EWC Code)
- Quantity of waste
- Name of producer/carrier/collector/source of waste
- Vehicle registration number
- Waste collection permit of haulier
- Name of person checking the load
- Details of unacceptable waste loads where relevant
- Driver of load details

The waste categories and quantities accepted into Youghal Landfill site during the reporting period are summarised in Table 2.2-Quantities of Waste Received and Disposed of during the Reporting Period and Table 2.3 -Quantities of was received at the Civic Amenity Facility at the Site. The waste quantities are illustrated in Figure 5.1 and Figure 5.2 respectively.

Figure 9 - Waste Composition 2011: Waste Received and disposed of during the reporting period

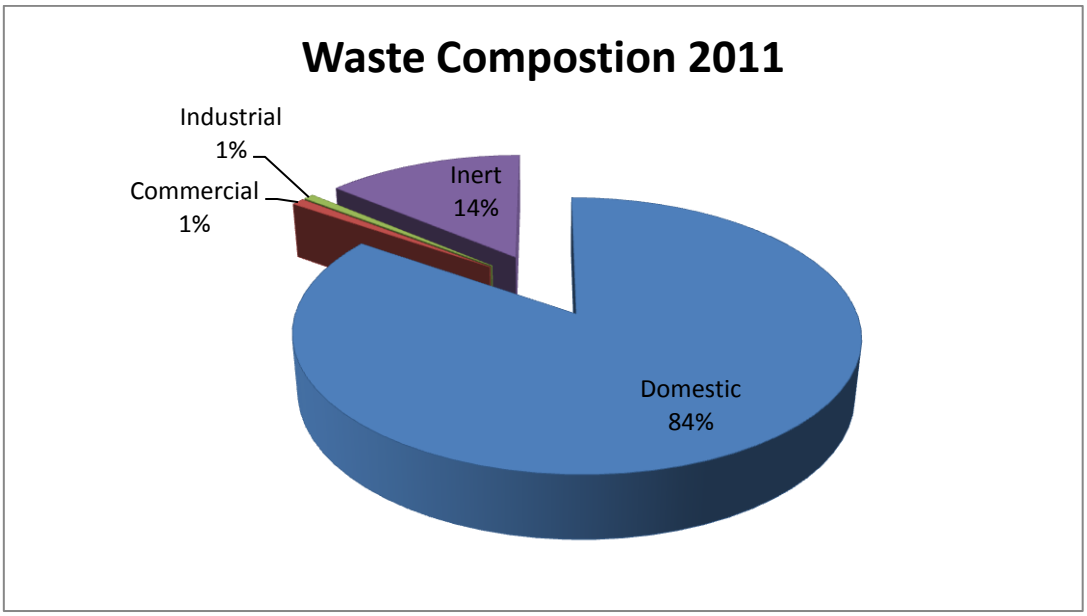
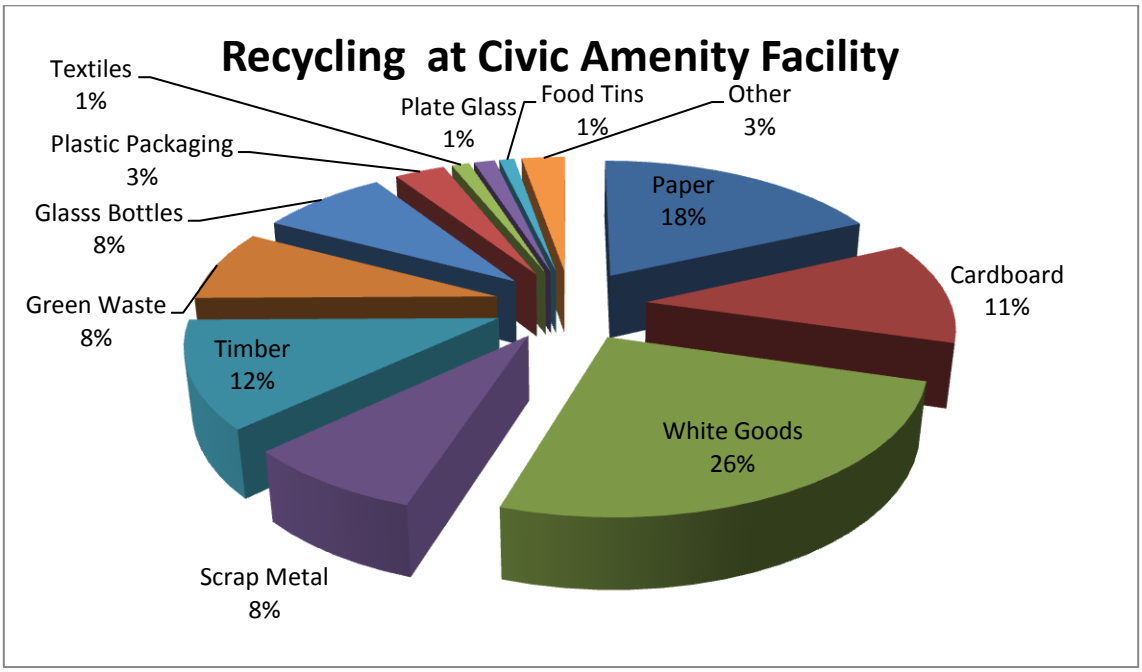


Figure 10 - Waste Composition 2011: Quantities of Waste Recycled at the Civic Amenity Facility



6. Environmental Incidents and Complaints

Incident Summary

Condition 11.2 of the Waste Licence requires that the licensee shall make written records of environmental incidents. **2 incidents** occurred in 2011. One incident in 2011 related to a power outage to the flare units and the other was related to a small fire at the working face. Both incidents were dealt with to the satisfaction of the EPA and caused the minimal amount of disruption. As the earlier stipulation by the Agency to consider odour complaints as incidents (September 2009) was removed in 2010 so no table of incidents will be included in this AER.

Complaints

27 complaints were received by the facility in 2011. This is a significant decrease on the 97 complaints in 2010. All of the complaints were relating to odour. **23** of the 27 complaints were made from one residence. The last recorded complaint was received by the facility on the 24th of June 2011. Only one complaint has been registered in 2012 so far.

Previous work by Cork County Council in reducing emissions from Youghal Landfill were successful in 2008, 2009 and 2010. Work was undertaken in October and November 2010, by Cork County Council, to reduce fugitive emissions from Cell 9. On completion the added infrastructure (additional gas wells and collection mains) augmented the gas yield and reduced the fugitive emissions. During 2011 the number of abstraction wells in Cell 9 was increase to 57no. Also during 2011 works were completed on the abstraction pipework to reduce condensate blockages and a much larger knock-out pot was installed to ensure that extraction pressure was maintained comprehensively on Cell 9 and around the site. This work showed improvements throughout the site and is evidenced in the two Volatile Organic Surveys completed during 2011, May and November, which show an ever reducing surface emissions zone for the site. Work will continue in 2012 to reduce the surface emissions to even lower levels.

7. Environmental Management Programme

Introduction

In accordance with Condition 2 (Management of the Facility) of the Waste Licence (W0068-03), Cork County Council (CCC) is required to establish and maintain a documented Environmental Management System (EMS) for the facility.

Condition 2.3.2.1 requires CCC to prepare a Schedule of Environmental Objectives & Targets, which shall be implemented over a five-year time frame.

A list of Objectives and Targets are given below, in compliance with Condition 2.3 of the Licence. These Objectives and Targets will be managed by Cork County Council at the landfill in Youghal and will continue for a minimum of five years, to be reviewed and submitted annually to the Agency. In consultation with the Agency these objectives and targets have been developed for implementation from 2010. As part of the Environmental Management System (EMS) review for 2010 we have targeted specific improvements deemed necessary for completion in 2011 and 2012. They are as follows:

Objective 1

To monitor and control landfill gas and odour emissions at the facility.

Target 1.1 Reduce the emission of landfill gas from the facility and reduce the number of odour complaints at the facility by 50% in 2012.

Objective 2

To monitor and control leachate levels and emissions from the facility.

Target 2.1 Achieve compliance with Condition 5.12 of the waste licence for the lined cells. Minimum freeboard of 0.50m will be maintained in the leachate lagoon at all times. Leachate levels in the waste shall not exceed a level of 1.0m over the top of the liner at the base of the landfill.

Objective 3

To control environmental nuisances at the facility.

Target 3.1 Achieve compliance with Condition 7 of the waste licence.

Objective 4

To increase site security at the facility.

Target 4.1 Reduce the number of security breaches at the facility by 10% in 2012.

Objective 5

To maximise the efficiency and continuously improve operations at the facility.

Target 5.1 Increase annual recycling rate at the Civic Amenity facility to 65% in 2012.

Objective 6

To monitor, record and control environmental parameters at the facility.

Target 6.1 Achieve compliance with Schedule D of the Waste Licence.

Table 7 - Long Term Environmental Monitoring:

REPORT TITLE	REPORT FREQUENCY	REPORT SUBMISSION DATE
Environmental Management System Updates	Annually	By July 18th 2012 on annual basis
Annual Environment Report (AER)	Annually	By March 31st on annual basis
Bund, tank and container integrity assessment	Every three years	Six months from the date of licence and one month after end of the three year period being reported on.
Record of Incidents	As they occur	Within 5 days of the incident
Topographical survey	Twice yearly	By January 18th annually
Monitoring of landfill gas	Quarterly	Ten days after end of the quarter being reported on.
Monitoring of Surface Water Quality	Quarterly	Ten days after end of the quarter being reported on.
Monitoring of Groundwater Quality	Quarterly	Ten days after end of the quarter being reported on.
Monitoring of Leachate	Quarterly	Ten days after end of the quarter being reported on.
Meteorological Monitoring	Daily	By March 31st on annual basis
Dust Monitoring	Three times per year	Ten days after end of the quarter being reported on.
Noise Monitoring	Annually	By January 18th on annual basis

Definition of responsibilities

Overall responsibility for achievement of Objectives 1 through 6 lies with the Landfill Engineering Manager and Deputy Managers.

8. Facility and Environmental Procedures

General Overview

Operational procedures have been drawn up to control the significant environmental aspects of the landfill. These procedures were addressed in an Environmental Management System review in 2009. This review was completed in February 2009 and details are again included in this year's AER.

Environmental Monitoring Procedure

In early 2001, a site audit was undertaken to assess the level of compliance of the facility and the site operations with the EPA Waste Licence and the conditions therein. This was used in conjunction with knowledge of operations on site to identify the environmental aspects of the activities and services over which CCC, as the operators of Youghal Landfill, have control or could be expected to have an influence. To this end a comprehensive monitoring regime has been put in place and is maintained annually.

Particular areas of examination to consider when identifying environmental aspects are:

- emissions to air
- waste management
- resource usage
- sensitivity of receptors
- any other relevant issues
- release to water
- ecological impact
- land contamination
- noise, dust, odour, visible impact, etc.

Aspects, impacts and the environmental management programme are reviewed as required and annually as part of the environmental management review.

CCC has established and maintained an environmental management programme within which it sets environmental objectives and targets to be achieved each year. Responsibility for achieving objectives and targets is designated and the necessary mechanisms and timeframes for achieving each of the objective and targets are detailed.

Control and Management of Documents:

The environmental management system has been developed to provide a description of the core of the environmental programme for Youghal Landfill and the interactions within the system. The environmental management system refers to the environmental management programme, which includes the procedures used by CCC to meet the sites environmental policy. In turn the procedures identify the records, forms and other support materials, which provide evidence of the operation of the EMS.

All documentation relating to the implementation and control of the licence is held in the environmental management file system in the Youghal Landfill site office. The register of information will be available for viewing at Floor 6 in County Hall. This includes the environmental policy, environmental management procedures, register of legislation and all site correspondence to the Agency.

A document control procedure has been developed to ensure that environmental management system documentation:

- Can be located and is available at key locations
- Is reviewed at least annually, revised as necessary and approved by authorised personnel
- Is current. Obsolete documents are removed from work areas to ensure against unintended use
- Is legible, dated for revision, identified and maintained in an orderly manner.

The document control procedure deals with the creation and modification of various types of documents. It is the facility manager's responsibility to ensure that the information contained in the procedures manual and associated documentation is kept up to date and accurate at all times.

Refuse Drivers Operational Procedures:

The purpose of this procedure is to ensure that all refuse drivers comply with the operational rules on Youghal Landfill and to ensure the safety of members of the public, all refuse drivers and landfill personnel at the Youghal facility. This procedure also minimises the generation of environmental nuisances such as dust and litter generated by movement of vehicles and waste at the facility.

Awareness and Training Procedure

Purpose of Procedure:

- To record training that personnel have obtained prior to this procedure being set up and implemented.
- To ensure that future training needs are identified and appropriate training is provided for facility personnel.
- To ensure that all staff performing tasks at the landfill are aware of the requirements of the Waste Licence.
- To comply with Condition 2.1.2 and Condition 2.4 of Waste Licence 68-3.

Scope of the procedure:

This procedure applies to all training requirements for all landfill operatives in the implementation of the waste licence W0068-03 applicable to Youghal Landfill.

Description of the tasks involved with this procedure:

Training

- The Landfill Manager will assess all personnel for training requirements based on their roles and responsibilities within the licensed facility, especially those associated with activities which have the potential to cause significant environmental aspects.
- The Facility Manager, in conjunction with the Cork County Council Senior Engineer, will arrange that all appropriate training will be provided for site personnel.
- The Landfill Manager will prepare and maintain a current training record for scheduling, tracking of attendance, and recording completion of required training for all personnel.
- At least annually, the environmental training requirements will be reviewed and updated for personnel.
- For new personnel, a training record will be prepared within 30 days after their arrival.
- All training shall be recorded (previous and future training) will be recorded on the attached training record sheet. Training records, including copies of relevant certificates etc., shall be located on site in the Landfill managers Office.

Awareness

- All employees at Youghal Landfill will receive environmental awareness training.
- All new employees will receive environmental awareness training as part of the general induction-training programme.
- Environmental Awareness training will address the following;

    - The environmental aspects and potential impacts of activities related to their work at the facility.
    - Introduction of the facilities environmental objectives and targets and importance of compliance.
    - Introduction to Environmental Management System (EMS) developed at the facility
    - An understanding of their role and responsibility in procedures required to control potentially significant impacts.
    - Importance of adherence to operational procedures and consequences of non-conformance.
    - Reporting/communication procedures with regard to issues or concerns with the environmental management system (EMS) and environmental practices or in the event of an incident or non-compliance with the waste licence.

- The environmental awareness training programme will be reviewed and updated annually and/or more regularly, in accordance with any significant changes to the EMS system i.e. changes of operations on-site.
- All employees will attend refresher/revision courses annually and/or more regularly, if there are any significant changes to the EMS system.
- A copy of the Waste Licence and the EMS Manual is available at designated areas at the facility so that all employees can access it, for reference.
- Any updates to the EMS manual or procedures will be communicated to all personnel.

Prevention and Corrective Action Procedure

Purpose of Procedure:

To ensure that all non – compliance's with the waste licence and public complaints are investigated, corrected and that effective preventative measures or modifications to the operational procedures of the facility are put in place and implemented so that the non – compliance does not reoccur.

In the event of an incident occurring at the landfill (incident situations listed below), it is of **higher priority to immediately investigate**, identify and execute measures to minimise any environmental emissions, and the effects caused by the incident.

Table 8 - List of Operational Procedures 2011

	Contents	Reference / Comment
This list of procedures has been prepared in accordance with the EMS as required by Condition 2 of the site licence. The EMS procedures for Youghal Landfill site has been developed by Cork County Council	Waste Acceptance Procedure Waste Characterisation Procedure Waste Placement and Covering Procedure Communication and Public Awareness Procedure Awareness and Training Procedure Control and Management of Documents Prevention and Corrective Action Procedure Refuse Drivers Operational Procedure Site Security Procedure Leachate Control and Handling Absorbent Materials Procedure Environmental Monitoring Procedure Environmental Nuisance Procedure Site Inspection Procedure	

Management and Staff Structure

Cork County Council operates the landfill facility under the management structure illustrated in Figure 8.1, overleaf. Detailed curricula are presented in Appendix 5.

Budget

Cork County Council is committed to environmental protection and will ensure the provision of the necessary funds to maintain waste licence compliance.

Program for Public Information

Purpose of Programme:

- To ensure that clear guidelines for internal communications exist for resolving environmental issues/concerns between landfill operatives and the Landfill Manager during the day-to-day operations of the facility.
- To ensure that all external communication related to the environmental performance at the facility is received, documented and responded to in a standard and effective manner. External communication includes communications from regulatory bodies, such as the EPA or the Local Council, customers or members of the public, environmental groups or media.

To comply with Condition 2.4 of the waste licence and ensure that members of the public can obtain information at the facility, at all reasonable times, concerning the environmental performance of the facility.

Figure 11 - Management Structure

Director Of Service **Sharon Corcoran**			
Senior Engineer Liam Singleton			
Facility Manager John Paul O'Neill			
Deputy Manager Jerome O'Brien		Deputy Manager Marie Mortell	Deputy Manager Lisa Collins
General Operative Michael Sheehan	General Operative Richard Collins	General Operative James McCarthy	General Operative Colin O'Brien

Bund Testing and Inspection Report

Waste engine oil is contained in a new triple skinned PVC tank. This tank has replaced the double walled PVC tank, which was contained in an open top steel tank. This new tank has been subject to all the regulatory and manufacturing testing required during construction. Bund testing will no longer be required on the open top steel tank as it has been removed.

The only other fuel used on site is diesel for earth moving plant. This fuel is delivered by tanker delivery truck and transferred directly to the machines. At no time is fuel for plant stored on site, as per the requirements of the licence.

Any Other Items Specified by the Agency

The Agency has not specified any additional items to be included in this report.

9. Resource Consumption

During the year 2011 the following resources were utilised at the site:

Energy Consumption

Diesel	200,000 litres
Electricity	13,700 kilowatt hours
Heavy fuel oil	2,000 litres

The machinery on site all use diesel. These machines are used for waste deposition, compaction and site maintenance. All the site offices use electricity and also the cardboard compactor in the Civic Amenity site. Heavy fuel oil is used to keep all the site machinery is good working order.

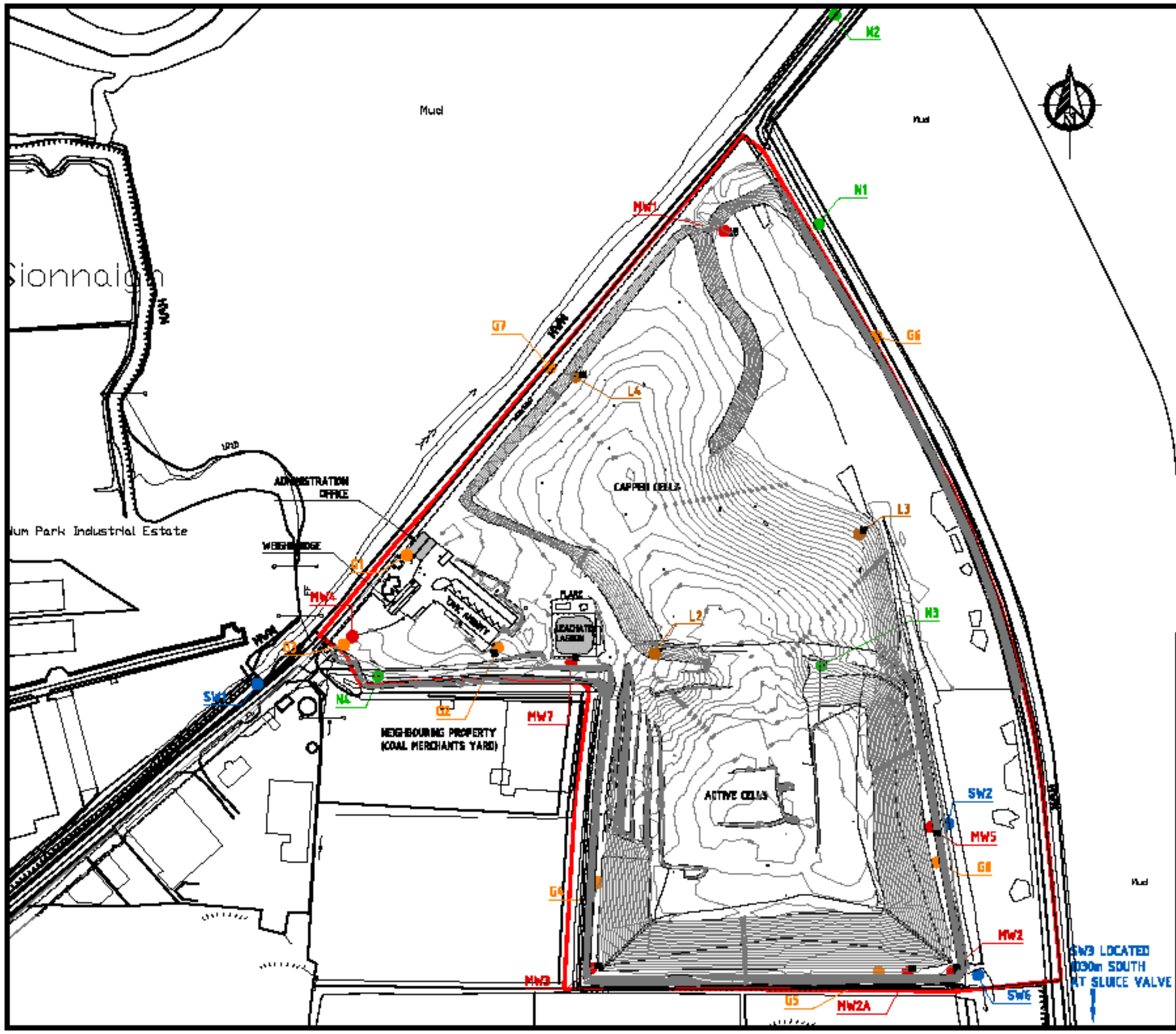
Water Consumption

Water consumption at the facility is estimated at 2,500 litres.

Water use on site was for domestic use, spraying requirements and wash down purposes.

Appendices

Appendix 1 – Location Map of Environmental Monitoring Points



Environmental Monitoring Points		
Monitoring Point ID	Easting	Northing
GAS WELLS		
G1	209772	79952
G2	209834	79889
G3	209730	79891
G4	209901	79731
G5	210050	79571
G6	210859	80099
G7	209869	80077
G8	210130	79744
LEACHATE WELLS		
L1	209833	79880
L2	209830	79886
L3	210077	79885
L4	209856	80071
GROUND WATER WELLS		
MW1	209956	80158
MW2	210140	79571
MW2A	210110	79570
MW3	209897	79373
MW4	209730	79390
MW5	210128	79768
MW7	209853	79378
DUST MONITORING		
ST1	210050	80119
ST2	209772	79951
ST3	209873	79589
SURFACE WATER		
SW1	209872	79556
SW3	210340	78857
SW6	210157	79508
GA127	209900	79850
NOISE MONITORING		
N1	210050	80174
N2	210061	80315
N3	210052	79377
N4	209753	79570

Rev	Date	Drawn	Checked	Issue
A	16.11.11	KL	JOB	ISSUE FOR INFORMATION

Client:
CORK COUNTY COUNCIL

Name of Job:
YOUGHAL LANDFILL 2011

Drawing Title:
ENVIRONMENTAL MONITORING MAP

Drawing Number:
CE-2011-01-YLF-001

CUTHBERT ENVIRONMENTAL
14 ALLENDALE, MELBOURNE, BISHOPSTOWN CORK

SCALE:
1:2500

Appendix 2 –Methane Gas Emissions

Year	Landfill Gas	CH_4	CO_2	NMOC	Landfill Gas	Methane	Waste Placed
	(m^3/year)	*(m^3/year)*	*(m^3/year)*	*(m^3/year)*	*(m^3/hr)*	*(m^3/hr)*	*tonnes*
1972	0	0	0	0	0	0	0
1973	50,824	25,412	25,412	30	6	3	6,468
1974	99,655	49,828	49,828	60	11	6	12,936
1975	146,572	73,286	73,286	88	17	8	19,404
1976	191,648	95,824	95,824	115	22	11	25,872
1977	234,958	117,479	117,479	141	27	13	32,340
1978	276,569	138,284	138,284	166	32	16	38,808
1979	316,548	158,274	158,274	190	36	18	45,276
1980	354,960	177,480	177,480	213	41	20	51,744
1981	391,866	195,933	195,933	235	45	22	58,212
1982	427,325	213,662	213,662	256	49	24	64,680
1983	461,393	230,697	230,697	277	53	26	71,148
1984	494,126	247,063	247,063	296	56	28	77,616
1985	525,575	262,787	262,787	315	60	30	84,083
1986	555,791	277,895	277,895	333	63	32	90,551
1987	584,822	292,411	292,411	351	67	33	97,019
1988	612,715	306,357	306,357	368	70	35	103,487
1989	639,514	319,757	319,757	384	73	37	109,955
1990	665,262	332,631	332,631	399	76	38	116,423
1991	690,001	345,000	345,000	414	79	39	122,891
1992	713,769	356,885	356,885	428	81	41	129,359
1993	736,606	368,303	368,303	442	84	42	135,827
1994	758,547	379,274	379,274	455	87	43	142,295

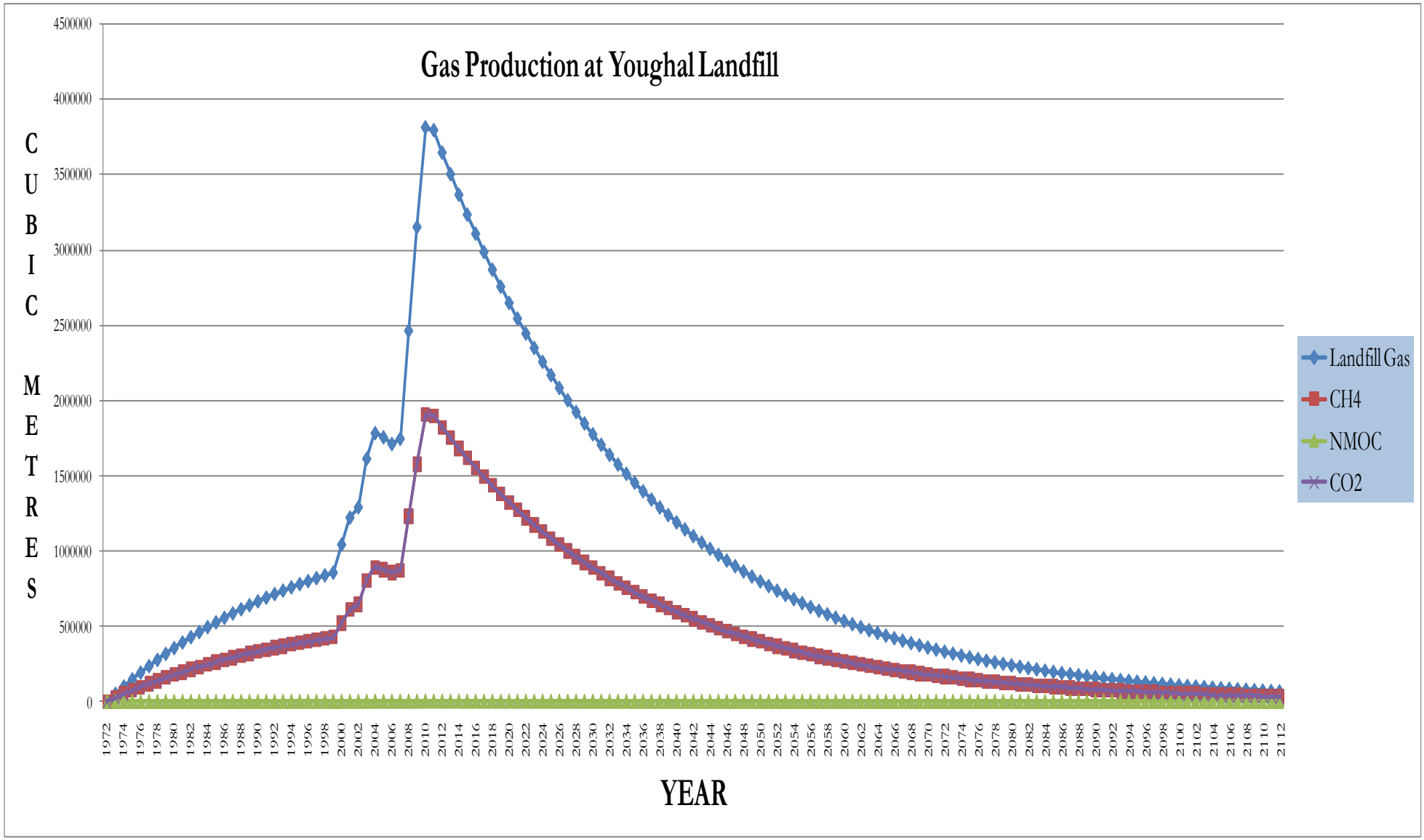
1995	779,628	389,814	389,814	468	89	44	148,763
1996	799,882	399,941	399,941	480	91	46	155,231
1997	819,343	409,671	409,671	492	94	47	161,699
1998	838,040	419,020	419,020	503	96	48	168,167
1999	856,004	428,002	428,002	514	98	49	174,635
2000	1,042,458	521,229	521,229	625	119	60	202,635
2001	1,221,601	610,801	610,801	733	139	70	230,635
2002	1,290,060	645,030	645,030	774	147	74	245,443
2003	1,612,761	806,380	806,380	968	184	92	292,948
2004	1,782,476	891,238	891,238	1,069	203	102	322,594
2005	1,754,828	877,414	877,414	1,053	200	100	327,970
2006	1,710,324	855,162	855,162	1,026	195	98	331,063
2007	1,745,249	872,624	872,624	1,047	199	100	344,042
2008	2,462,597	1,231,299	1,231,299	1,478	281	141	444,042
2009	3,151,818	1,575,909	1,575,909	1,891	360	180	544,042
2010	3,814,014	1,907,007	1,907,007	2,288	435	218	644,042
2011	**3,795,423**	**1,897,711**	**1,897,711**	**2,277**	**433**	**217**	**660,708**
2012	3,646,602	1,823,301	1,823,301	2,188	416	208	660,708
2013	3,503,617	1,751,808	1,751,808	2,102	400	200	660,708
2014	3,366,238	1,683,119	1,683,119	2,020	384	192	660,708
2015	3,234,246	1,617,123	1,617,123	1,941	369	185	660,708
2016	3,107,429	1,553,715	1,553,715	1,864	355	177	660,708
2017	2,985,585	1,492,793	1,492,793	1,791	341	170	660,708
2018	2,868,519	1,434,259	1,434,259	1,721	327	164	660,708
2019	2,756,042	1,378,021	1,378,021	1,654	315	157	660,708
2020	2,647,977	1,323,988	1,323,988	1,589	302	151	660,708
2021	2,544,148	1,272,074	1,272,074	1,526	290	145	660,708

2022	2,444,390	1,222,195	1,222,195	1,467	279	140	660,708
2023	2,348,544	1,174,272	1,174,272	1,409	268	134	660,708
2024	2,256,457	1,128,228	1,128,228	1,354	258	129	660,708
2025	2,167,980	1,083,990	1,083,990	1,301	247	124	660,708
2026	2,082,972	1,041,486	1,041,486	1,250	238	119	660,708
2027	2,001,298	1,000,649	1,000,649	1,201	228	114	660,708
2028	1,922,826	961,413	961,413	1,154	220	110	660,708
2029	1,847,431	923,715	923,715	1,108	211	105	660,708
2030	1,774,992	887,496	887,496	1,065	203	101	660,708
2031	1,705,393	852,697	852,697	1,023	195	97	660,708
2032	1,638,524	819,262	819,262	983	187	94	660,708
2033	1,574,276	787,138	787,138	945	180	90	660,708
2034	1,512,548	756,274	756,274	908	173	86	660,708
2035	1,453,240	726,620	726,620	872	166	83	660,708
2036	1,396,258	698,129	698,129	838	159	80	660,708
2037	1,341,510	670,755	670,755	805	153	77	660,708
2038	1,288,909	644,454	644,454	773	147	74	660,708
2039	1,238,370	619,185	619,185	743	141	71	660,708
2040	1,189,813	594,906	594,906	714	136	68	660,708
2041	1,143,159	571,580	571,580	686	130	65	660,708
2042	1,098,335	549,168	549,168	659	125	63	660,708
2043	1,055,269	527,635	527,635	633	120	60	660,708
2044	1,013,891	506,946	506,946	608	116	58	660,708
2045	974,136	487,068	487,068	584	111	56	660,708
2046	935,940	467,970	467,970	562	107	53	660,708
2047	899,241	449,620	449,620	540	103	51	660,708
2048	863,981	431,991	431,991	518	99	49	660,708

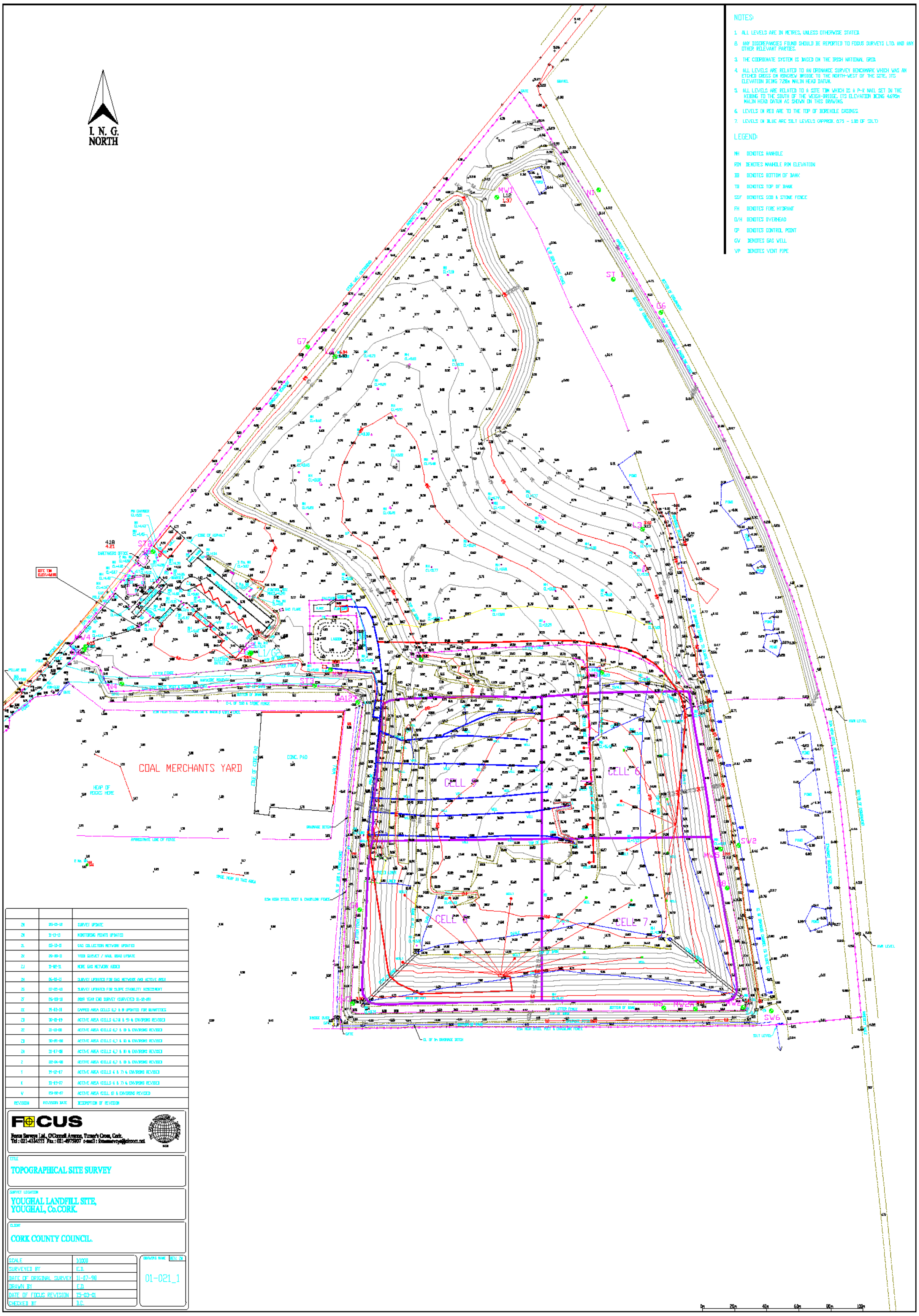
2049	830,104	415,052	415,052	498	95	47	660,708
2050	797,555	398,778	398,778	479	91	46	660,708
2051	766,283	383,141	383,141	460	87	44	660,708
2052	736,236	368,118	368,118	442	84	42	660,708
2053	707,368	353,684	353,684	424	81	40	660,708
2054	679,632	339,816	339,816	408	78	39	660,708
2055	652,983	326,491	326,491	392	75	37	660,708
2056	627,379	313,690	313,690	376	72	36	660,708
2057	602,779	301,390	301,390	362	69	34	660,708
2058	579,144	289,572	289,572	347	66	33	660,708
2059	556,435	278,218	278,218	334	64	32	660,708
2060	534,617	267,309	267,309	321	61	31	660,708
2061	513,655	256,827	256,827	308	59	29	660,708
2062	493,514	246,757	246,757	296	56	28	660,708
2063	474,163	237,081	237,081	284	54	27	660,708
2064	455,571	227,785	227,785	273	52	26	660,708
2065	437,708	218,854	218,854	263	50	25	660,708
2066	420,545	210,272	210,272	252	48	24	660,708
2067	404,055	202,028	202,028	242	46	23	660,708
2068	388,212	194,106	194,106	233	44	22	660,708
2069	372,990	186,495	186,495	224	43	21	660,708
2070	358,365	179,182	179,182	215	41	20	660,708
2071	344,313	172,156	172,156	207	39	20	660,708
2072	330,812	165,406	165,406	198	38	19	660,708
2073	317,841	158,920	158,920	191	36	18	660,708
2074	305,378	152,689	152,689	183	35	17	660,708
2075	293,404	146,702	146,702	176	33	17	660,708

2076	281,900	140,950	140,950	169	32	16	660,708
2077	270,846	135,423	135,423	163	31	15	660,708
2078	260,226	130,113	130,113	156	30	15	660,708
2079	250,023	125,011	125,011	150	29	14	660,708
2080	240,219	120,110	120,110	144	27	14	660,708
2081	230,800	115,400	115,400	138	26	13	660,708
2082	221,750	110,875	110,875	133	25	13	660,708
2083	213,055	106,528	106,528	128	24	12	660,708
2084	204,701	102,351	102,351	123	23	12	660,708
2085	196,675	98,337	98,337	118	22	11	660,708
2086	188,963	94,481	94,481	113	22	11	660,708
2087	181,554	90,777	90,777	109	21	10	660,708
2088	174,435	87,217	87,217	105	20	10	660,708
2089	167,595	83,798	83,798	101	19	10	660,708
2090	161,024	80,512	80,512	97	18	9	660,708
2091	154,710	77,355	77,355	93	18	9	660,708
2092	148,644	74,322	74,322	89	17	8	660,708
2093	142,815	71,408	71,408	86	16	8	660,708
2094	137,215	68,608	68,608	82	16	8	660,708
2095	131,835	65,917	65,917	79	15	8	660,708
2096	126,666	63,333	63,333	76	14	7	660,708
2097	121,699	60,850	60,850	73	14	7	660,708
2098	116,927	58,464	58,464	70	13	7	660,708
2099	112,342	56,171	56,171	67	13	6	660,708
2100	107,937	53,969	53,969	65	12	6	660,708
2101	103,705	51,853	51,853	62	12	6	660,708
2102	99,639	49,819	49,819	60	11	6	660,708

2103	95,732	47,866	47,866	57	11	5	660,708
2104	91,978	45,989	45,989	55	10	5	660,708
2105	88,372	44,186	44,186	53	10	5	660,708
2106	84,907	42,453	42,453	51	10	5	660,708
2107	81,577	40,789	40,789	49	9	5	660,708
2108	78,379	39,189	39,189	47	9	4	660,708
2109	75,305	37,653	37,653	45	9	4	660,708
2110	72,353	36,176	36,176	43	8	4	660,708
2111	69,516	34,758	34,758	42	8	4	660,708
2112	66,790	33,395	33,395	40	8	4	660,708


Gas Production at Youghal Landfill
CUBIC METRES
4500000
4000000
3500000
3000000
2500000
2000000
1500000
1000000
500000
0
1972 1974 1976 1978 1980 1982 1984 1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010 2012 2014 2016 2018 2020 2022 2024 2026 2028 2030 2032 2034 2036 2038 2040 2042 2044 2046 2048 2050 2052 2054 2056 2058 2060 2062 2064 2066 2068 2070 2072 2074 2076 2078 2080 2082 2084 2086 2088 2090 2092 2094 2096 2098 2100 2102 2104 2106 2108 2110 2112
YEAR
Landfill Gas
CH4
NMOC
CO2

Appendix 3 – Topographical Survey Contour Drawing



I. N. G.
NORTH
COAL MERCHANTS YARD
CELL 5
CELL 6
CELL 7
CELL 8
NOTES:
1. ALL LEVELS ARE IN METRES, UNLESS OTHERWISE STATED.
2. ANY DISCREPANCIES FOUND SHOULD BE REPORTED TO FOCUS SURVEYS LTD. AND ANY OTHER RELEVANT PARTIES.
3. THE COORDINATE SYSTEM IS BASED ON THE IRISH NATIONAL GRID.
4. ALL LEVELS ARE RELATED TO AN ORDNANCE SURVEY BENCHMARK WHICH WAS AN ETCHED CROSS ON RINCREW BRIDGE TO THE NORTH-WEST OF THE SITE, ITS ELEVATION BEING 7.28m MALIN HEAD DATUM.
5. ALL LEVELS ARE RELATED TO A SITE TBM WHICH IS A P-K NAIL SET IN THE KERBING TO THE SOUTH OF THE WEIGH-BRIDGE. ITS ELEVATION BEING 4.695m MALIN HEAD DATUM AS SHOWN ON THIS DRAWING.
6. LEVELS IN RED ARE TO THE TOP OF BOREHOLE CASINGS.
7. LEVELS IN BLUE ARE SILT LEVELS (APPROX. 0.75 - 1.00 OF SILT)
LEGEND:
MH DENOTES MANHOLE
RIM DENOTES MANHOLE RIM ELEVATION
BB DENOTES BOTTOM OF BANK
TB DENOTES TOP OF BANK
S&SF DENOTES SOD & STONE FENCE
FH DENOTES FIRE HYDRANT
O/H DENOTES OVERHEAD
CP DENOTES CONTROL POINT
GW DENOTES GAS WELL
VP DENOTES VENT PIPE
REVISION
REVISION DATE
DESCRIPTION OF REVISION
FOCUS
TITLE
TOPOGRAPHICAL SITE SURVEY
SURVEY LOCATION
YOUGHAL LANDFILL SITE,
YOUGHAL, Co.CORK.
CLIENT
CORK COUNTY COUNCIL.
SCALE 1:1000
SURVEYED BY E.D.
DATE OF ORIGINAL SURVEY 11-07-98
DRAWN BY E.D.
DATE OF FOCUS REVISION 15-03-01
CHECKED BY D.C.
DRAWING NAME
01-021_1

Appendix 4 – Water Balance Calculations

Water Balance Calculation Sheet

Month	Active Cell No.	Active Area (m^2)	Waste Input (t)	Waste Input (m^3)	Rainfall (mm)	Active Infiltration (m^3)	Total Leachate (m^3)	Cumulative Leachate (m^3)	Absorptive Capacity (m^3)	**Leachate Generation (m^3)**
January	**9**	17000	1583.56	1583.56	75.4	1281.8	1281.8	1281.8	110.83	**1170.97**
February	**9**	17000	3348.68	3348.68	114.4	1944.8	1944.8	3226.6	234.37	**1710.43**
March	**9**	17000	2894.08	2894.08	22.6	384.2	384.2	3610.8	202.56	**181.64**
April	**9**	17000	2879.04	2879.04	16.4	278.8	278.8	3889.6	201.50	**77.30**
May	**9**	17000	3029.58	3029.58	81.6	1387.2	1387.2	5276.8	212.04	**1175.16**
June	**9**	17000	3175.22	3175.22	114.6	1948.2	1948.2	7225	222.23	**1725.97**
July	**9**	17000	3208.42	3208.42	39.6	673.2	673.2	7898.2	224.56	**448.64**
August	**9**	17000	1763.16	1763.16	66	1122	1122	9020.2	123.40	**998.60**
September	**9**	17000	784.24	784.24	50.6	860.2	860.2	9880.4	54.89	**805.31**
October	**9**	17000	887.88	887.88	80.4	1366.8	1366.8	11247.2	62.14	**1304.66**
November	**9**	17000	932.63	932.63	156.4	2658.8	2658.8	13906	65.27	**2593.53**
December	**9**	17000	861.95	861.95	78.6	1336.2	1336.2	15242.2	60.33	**1275.87**
									Total	**13,648.06**

Appendix 5 – Details of Staff Curriculum Vitae

Details of Operator

Operator Name:	Cork County Council
Operator Address:	County Hall, Victoria Cross, Carrigrohane, Cork City 021 - 4276891
Site Name:	Youghal Landfill
Site Address:	Youghal Mudlands, Youghal, Co Cork 024-93834 / 91084

Details of Management Structure

Cork County Council has overall responsibility for the management and operation of the Youghal Landfill site. The Senior Engineer, Waste Management (Operations), Southern Division is responsible for the management of municipal waste and waste facilities in the Southern Division. The site manager with responsibility for day-to-day site operation and implementation of the Waste Licence is an Executive Engineer, who is supported by a Senior Executive Engineer, an Executive Engineer and an Environmental Technician in their roles of deputy managers.

Cork County Council has appointed outside consultants in various fields to provide technical, management and site engineering support. These consultants have been authorised to assist Cork County Council with the following site management activities: -

- Provision of site engineering assistance and support;
- Leachate assessment and management;
- Landfill gas assessment and management;
- Environmental Monitoring in accordance with the waste licence; and
- Engineering design and document preparation.

Details of Curriculum Vitae:

Senior Engineer:

Mr. Liam Singleton **021 - 4276891**

Executive Engineer: Manager

Mr. John Paul O'Neill **024-93834 / 91084/**

086 - 3898364

Qualifications

• Bachelor of Civil & Environmental Engineering	1997
• FÁS Waste Management Training Course	2005/2006
• Project Management Course	2004
• Safe Pass Course	2010
• FÁS Landfill Site Assessment	2006
• Landfill Gas Course	2009
• First Aid Course	2011

Relevant Experience

Cork County Council
Landfill Manager
Youghal Landfill
Waste Licence 68-3

Mar.2005 – Present

Cork County Council
Deputy Landfill Manager
East Cork Landfill
Waste Licence 22-1

Mar 2005 - Present

RPS Engineering Consultants — Jan 2000 – Jan 2001

Design Engineer

Derryconnell Landfill

Waste Licence 89-1

Environmental Technicians

Miss Lisa Collins

021-4533934

Qualifications

• National Certificate in Environmental Engineering.	1996-1998
• National Diploma in Environmental Engineering.	1999-2000
• Course on Health & Safety	2000
• Waste Management Training Course	2000
• Course on Waste Minimisation.	2000

Relevant Experience

Deputy Landfill Manager East Cork Landfill — Oct 2000 – Present

Deputy Landfill Manager Youghal Landfill — Dec 2000 - Present

Environmental Technician

Miss Marie Mortell

Education

Bachelor of Science in Environmental Science and Technology	1998-2002
Certificate in Occupational Health and Safety	2001-2002
FÁS Waste Management Training Course	2008-2009

Safe Pass course

Experience

Deputy Manager Bottlehill Landfill	March 2008 - Present
Deputy Manager Youghal Landfill	May 2009 - Present