WATERFORD COUNTY COUNCIL

COMHAIRLE CHONTAE PHORTLAIRGE

ANNUAL ENVIRONMENTAL REPORT 2008

BALLYNAMUCK WASTE DISPOSAL SITE

BALLYNAMUCK MIDDLE

DUNGARVAN CO. WATERFORD

Waste Licence Register No. W0032-2

Report Compiled by;
Mr David Regan, Facility Manager, Dungarvan Landfill
Mr Paul Carroll, Executive Scientific Officer, Adamstown Laboratory

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Introduction

Waterford County Council was granted a Waste Licence (Ref 32-1) by the Environmental Protection Agency on the 29th November 2002 for the continued acceptance of municipal waste within the existing footprint of the Dungarvan Landfill Facility at Ballynamuck Middle, Dungarvan Co. Waterford. The landfill ceased to accept waste on the 30th June 2003. This licence was updated by Waste Licence (Ref 32-2) which included permission for a Transfer Station and Composting facilities. This is the sixth Annual Environmental Report for the Facility and includes the monitoring period 1st January 2008 – 31st December 2008. The report has been prepared in accordance with Condition 11.7 and Schedule G of the Waste Licence.

1. Reporting Period

This is the sixth Annual Environmental Report for the Dungarvan Waste Disposal Site, which covers the period 1st January 2008 to 31st December 2008. This report incorporates the fourth quarter report for 2008.

2. Waste Activities carried out at the Facility

Part 1 of the Waste Licence details the activities authorised by the licence:

Waste Management Act 1996: Third Schedule

Class 4. Surface impoundment, including placement of liquid or sludge discards in to pits, ponds or lagoons:

This activity is limited to the storage of leachate generated within the facility in a lined leachate lagoon and the storage of surface water run off in surface water retention (s) ponds

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 was produced:**

This activity is limited to the storage of rejected waste in the waste Inspection and Quarantine area and the Construction and Demolition Recovery Area prior to the removal of such waste off site for the disposal at an appropriate facility

Waste Management Act, 1996, Fourth Schedule

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

This activity is limited to recycling of organic waste including cardboard and paper at the civic waste facility only and the acceptance and storage of waste oils in appropriate containers at the civic waste facility prior to removal offsite.

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

This activity is limited to the acceptance of white goods within a designated Metal Recovery Area, the acceptance and storage of beverage cans in the appropriate containers at the civic waste facility prior to removal offsite.

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

This activity is limited to the acceptance and storage in appropriate containers of glass bottles, batteries and fluorescent tubes and the recovery of inert waste at the facility for use in site development and restoration works.

Class 9. **Use of any waste principally as a fuel or other means to generate energy**

Class 11. **Use of waste obtained from any activity referred to in a preceding paragraph of this Schedule:**

This activity is limited to the use of suitable inert waste in site development and restoration works.

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

This activity is limited to the storage of wastes within designated areas and receptacles prior to recovery offsite and the storage of inert waste prior to restoration of the facility.

3. Quantity and Composition of Waste received, disposed of and removed during the reporting period and each year previous

The quantity and composition of waste received, disposed of and removed for the reporting period 1st January 2007 – 31st December 2007 is attached in Appendix A.

4. Methods of deposition of inert waste for restoration

Inert waste is brought on site in dumper trucks where it is tipped in the relevant areas that needed temporary capping. Acceptance criteria are as outlined in Schedule F of the Waste Licence. An excavator then levels the inert waste. Due to capping works started in 2007, a large quantity of clay was required on-site. 48990 tonnes of clay was accepted in 2007. This material was stocked piled and then spread on the liner as required.

5.0 Environmental Monitoring

Introduction

Dungarvan landfill is located in County Waterford approximately 2km north west of Dungarvan off the N25 road on the southern edge of the Colligan River. The total area of the landfill site is approximately 6.5 hectares, and has been in operation since 1968. The landfill closed on 30th June 2003, but still acts as a transfer station for recyclable material.

Monitoring of surface waters, groundwater's and leachate and landfill gas was carried out in accordance with the waste licence, conditions 8. EPA and Waterford County Council staff carried out sampling and field measurements. Analysis was carried out at EPA Laboratories, Waterford County Council Laboratory and Euro environmental Laboratory. Toxicity tests were conducted at Enterprise Ireland. The ecological survey was carried out by Limosa Scientific.

Sampling sites are as set out in Table 1 and attached Drawing, DUN-EIS-003.

Surface water stations	Groundwater station	Leachate station	Gas monitoring station	Noise	Dust
SW1*, SW2*, EPA station 280, EPA station 300 Also - Annual biological survey	GW1*, GW2a, RC3a, RC4*, RC6a, RC7*, RC8*	L1, L2a, L3*, L4* L5a, L6*, Leachate tank	L1*, L2a, L3*, L4*, L5a, L6, RC1*, RC3, RC4*, RC6, RC7, RC8, GW1*, GW2a	B1*, B2*, B3*, B4*, NSL1*	B1, B2, B3, B4, D1

Table 1: Monitoring locations, Dungarvan Landfill

*Baseline results available for these sites

Baseline Monitoring

One of the purposes of compliance monitoring is to determine if there has been a release of contaminants to the environmental media, and to demonstrate compliance with landfill licence conditions. ***Baseline monitoring*** is monitoring which serves as a reference point to which later monitoring results are compared. While there is no data available preceding the landfill, for the purpose of this report, water quality results obtained during 2001 will be used as baseline monitoring data. Two new groundwater monitoring boreholes (RC7 and RC8) were installed since 2001, and results of tests carried out in 2002 at these sites are used as baseline. Noise measurements taken during the 1998 survey will also be used as comparison with this 2008 study.

5.1 SURFACE WATER.

5.1.1 Introduction

Sampling was carried out by EPA and Waterford County Council personnel at sites SW1, SW2, EPA site 300, EPA Site 280 and the landfill lagoon, as per attached map. Analysis was carried out at EPA Laboratories in Kilkenny and Dublin.

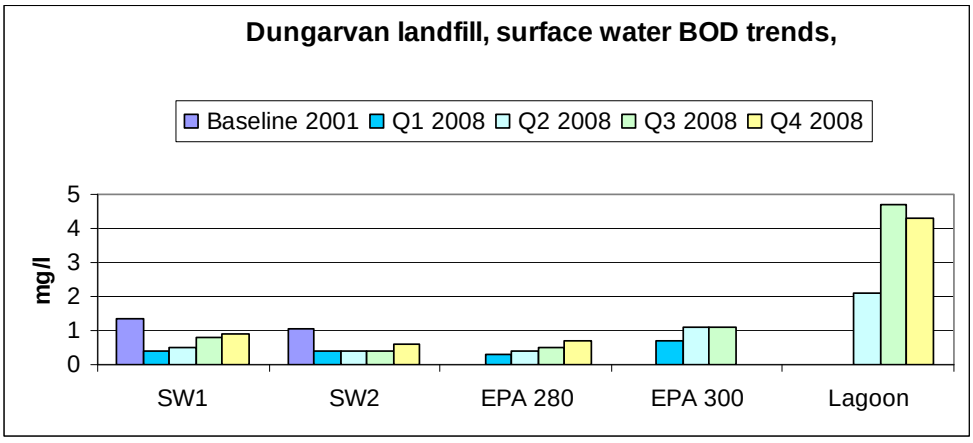
Sampling site EPA 300, at Ballyneety Bridge downstream of the landfill site, is subject to saline intrusion from Dungarvan Estuary. There are difficulties involved in monitoring surface water pollution from landfills adjacent to estuaries, as the salinity of the samples can interfere with many of the tests, (*ammonia, COD, arsenic, copper*). Additionally, many of the ions, which are considered indicators of leachate contamination, are also major components of sea/brackish water, *(chloride, sulphate, sodium, magnesium, calcium, boron).*

5.1.2 Results – see table 5.1.1 to 5.1.4 below.

River water quality was satisfactory. The lagoon had somewhat elevated levels of BOD, which may be related to algal and plant activity in this enclosed pond.

Key Parameter – BOD

The BOD test is a measure of the amount of oxygen consumed by microorganisms in breaking down organic matter in water. Respiration by phytoplankton or their decay, can also lead to oxygen depletion during the BOD test resulting in a high BOD value. Surface waters supporting fish life should have a BOD value < 4 mg/l BOD.



Discussion

BOD levels were low at river sites throughout the year and slightly elevated in the lagoon.

Table 5.1.1 Dungarvan landfill surface water monitoring 5/3/2008

Test	SW 1	SW 2	SW 280	SW 300	Pond L6	Drinking Water Standards (SI 278 2007)	Bathing Water Standards (SI 155 1992)	Estuarine Water Standards (DOELG 2001)	Comments	Environmental significance
BOD mg/l O2	0.4	0.4	0.3	0.7	6.9				BOD satisfactory in river, somewhat elevated in lagoon.	None
COD	<8	10	<8	13	40				COD satisfactory.	None
Conductivity µS/cm	174	184	171	1448	819	1500			Elevated conductivity at SW300 reflects tidal nature of this point.	None
Dissolved Oxygen % Sat	107	109	110	107	nm	-	70 - 120 95% compliance	70 - 130 (Brackish) 80-120 (Saline)	DO satisfactory	None
pH	7.9	7.9	7.9	8	7.9	6.5 to 9.5			pH normal	None
Suspended Solids mg/l	<6	<6	<7	<6	nm				SS satisfactory	None
Temperature °c	7.8	7.9	8.3	8.2	7.5	25			Temperature normal	None

nm -pond L6 some parameters not measured as designated a leachate pond in error this round

Table 5.1.2 Surface water quality Dungarvan landfill 13/5/2008

Test	SW 1	SW 2	SW 280	SW 300	Pond L6	Drinking Water Standards (SI 278 2007)	Bathing Water Standards (SI 155 1992)	Estuarine Water Standards (DOELG 2001)	Comments	Environmental significance
Ammonia mg/l N	0.1	0.23	0.01	0.24	0.34				Somewhat elevated at SW2, SW300 and in pond L6	Slight elevation of ammonia in river downstream of landfill
BOD mg/l O2	0.5	0.5	0.4	1.1	2.1				BOD satisfactory	None
Chloride mg/l Cl	15	14	18	4651	48				Elevated chloride at SW300 reflects tidal nature of this point.	None
COD	<8	10	<8	175	34				Apparently high COD at SW300 reflects interference in test due to salinity	None
Conductivity µS/cm	180	170	185	12550	571	1500			Elevated conductivity at SW300 reflects tidal nature of this point.	None
Dissolved Oxygen % Sat	137	125	125	110	nt	-	70 - 120 95% compliance	70 - 130 (Brackish) 80-120 (Saline)	DO slightly elevated at SW1, otherwise satisfactory	None
pH	8.3	8.3	8.2	8	8.2	6.5 to 9.5			pH normal	None
Suspended Solids mg/l	<10	<10	<10	18	53				SS generally satisfactory. Slightly elevated in pond L6, possibly due to algal agrowth	None
Temperature °c	7.8	7.9	8.3	17.7	20.3	25			Temperature normal	None

Table 5.1.3 Surface water quality Dungarvan landfill 27/8/08

Test	SW 1	SW 2	SW 280	SW 300	Pond L6	Drinking Water Standards (SI 278 2007)	Bathing Water Standards (SI 155 1992)	Estuarine Water Standards (DOELG 2001)	Comments	Environmental significance
Ammonia mg/l N	0.025	0.009	0.009	0.073	0.25				Somewhat elevated in pond L6	ammonia levels in river satisfactory downstream of landfill
BOD mg/l O2	0.8	0.4	0.5	1.1	4.7				BOD satisfactory in river, slightly elevated in pond, possibly due to algae	None
Chloride mg/l Cl	14	14	14	91	17				Elevated chloride at SW300 reflects tidal nature of this point.	None
COD	14	51	<8	18	29				COD levels satisfactory	None
Conductivity µS/cm	163	162	158	461	423	1500			Elevated conductivity at SW300 reflects tidal nature of this point.	None
Dissolved Oxygen % Sat	102	102	103	108	61.5	-	70 - 120 95% compliance	70 - 130 (Brackish) 80-120 (Saline)	DO slightly low at pond, possibly due to algal activity, otherwise satisfactory	None
pH	8	7.7	7.7	7.9	7.8	6.5 to 9.5			pH normal	None
Suspended Solids mg/l	<6	<7	<10	11	7				SS generally satisfactory.	None
Temperature °c	14.2	14	15.3	16.5	18	25			Temperature normal	None

Table 5.1.4 Dungarvan landfill surface water monitoring 18/11/08

Test	SW 1	SW 2	SW 280	SW 300	Pond L6	Drinking Water Standards (SI 278 2007)	Bathing Water Standards (SI 155 1992)	Estuarine Water Standards (DOELG 2001)	Comments	Environmental significance
Ammonia mg/l N	nr	nr	nr		nr				n/a	n/a
BOD mg/l O2	0.9	0.6	0.7		4.3				BOD satisfactory in river, slightly elevated in pond, possibly due to algae	None
Chloride mg/l Cl	nr	nr	nr		nr				n/a	n/a
COD	nr	nr	nr		nr				n/a	n/a
Conductivity µS/cm	157	147	146		326	1500			Slightly elevated conductivity at Pond 6 may reflect tidal nature of this point.	None
Dissolved Oxygen % Sat	103	103	103		92	-	70 - 120 95% compliance	70 - 130 (Brackish) 80-120 (Saline)	DO satisfactory	None
pH	7.5	7.6	7.6		8	6.5 to 9.5			pH normal	None
Suspended Solids mg/l	<6	<6	<10		14				SS generally satisfactory.	None
Temperature °c	10.2	10.3	10.2		9.4	25			Temperature normal	None

Sampled 18/11/08
SW300 not sampled - tide out

5.2 Groundwater

5.2.1 INTRODUCTION

Sites GW1, GW2a, RC3a, RC4, RC6a, RC7 ands RC8 were sampled during 2008. RC1 is no longer in place.

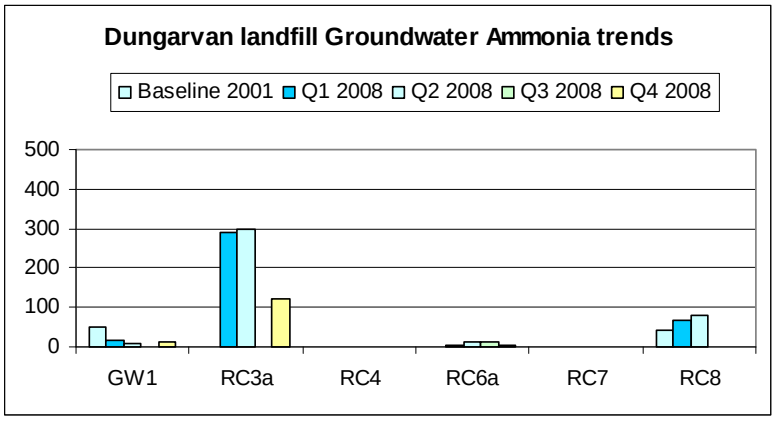
RC4 (south west of site) and RC7 (east of site) are outside the waste deposit area.

All the other ground water stations are within the site boundary, either within or immediately adjacent to waste deposit areas. Ground-water flow through the site has previously been described as south to north.

5.2.2 RESULTS

Results for 2008 are presented on tables 5.2.1 to 5.2.4 below, and appendices. High ammonia levels were detected at sites GW2a, RC3a, RC6a and RC8, within the landfill site. Metals levels were generally low, although high iron levels were detected at GW1 and RC3a. Trace organics were not detected in groundwaters. Intermittently high conductivity levels detected at site RC7, outside the landfill boundary, and at RC8 indicate likely saline intrusion from the estuary.

Key Parameter – Ammonia



Results for 2008 were similar to baseline monitoring. The boreholes, RC4 and RC7, outside the landfilling area, consistently had relatively low ammonia.

5.2.3 DISCUSSION

Ammonia was elevated at sites GW1, RC3a, RC6a, and RC8. In general, RC4 and RC7, outside the landfill area, had relatively low *ammonia*. RC7 had a high ionic content at times, possibly indicating brackish water intrusion.

Heavy metals and organics were not detected or else present in low concentrations.

The results of groundwater monitoring are in line with results from previous rounds of testing.. The sites within and closely adjacent to the working area appear to be impacted by landfill leachate in terms of ammonia and iron concentration. Site RC4 at the south-western boundary had relatively good water quality. Site RC7, 200 metres east of the facility, and outside the landfill area, had generally satisfactory water quality and appeared to be unaffected by the landfill, though saline intrusion is evident.

Table 5.2.1 Dungarvan landfill groundwater monitoring March 2008

Test	GW 1	GW 2a	RC 3a	RC4	RC 6a	RC 7	RC 8	Drinking Water Standards (SI 278 2007)	Comments	Environmental significance
Ammonia mg/l N	**16**	-	**290**	**1**	**2.7**	**0.93**	**68**	0.23	Ammonia elevated at GW1, RC3a and RC8	Depends on flow rate and path and available dilution. May contribute at times to ammonia at SW300
Chloride mg/l Cl	45	-	>**256**	32	110	>**443**	>**457**	250	Elevated chloride at RC3a, RC7 and RC8. May be influenced by tidal infiltration at RC7 and possibly RC8.	None, as receiving environment is estuarine.
Conductivity µS/cm	**1508**	-	**5080**	675	1109	**6330**	**8140**	1500	Elevated conductivity at RC3a, RC7 and RC8. May be influenced by tidal infiltration.	None
Dissolved Oxygen % Sat	14.2	-	18.2	53.7	20.5	17.1	23.6		Quite low, reflecting reducing conditions in most boreholes	None
Iron ug/l	45500	-	9620	131	101	176	894	200	Elevated at GW1, RC3a. Likely source is landfill leachate.	None, given distance from receiving surface waters and available dilution.
pH	**6.6**	-	7.3	7.4	7.3	7.5	7.4	7 to 9	Somewhat low at GW1	None
Potassium ug/l	16.1	-	216	1.3	11.3	43.4	127		Potassium results broadly reflect salinity, also see chloride and conductivity	None, as receiving environment is estuarine.
Sodium mg/l	35.6		609	13.8	73.2	1200	1560		Sodium results broadly reflect salinity, also see chloride and conductivity	None, as receiving environment is estuarine.
Temperature °c	12.3	-	12.6	11.2	11.9	11.8	12.8	25	results normal	None

GW2a borehole dry

Table 5.2.2. Groundwater quality Dungarvan landfill May 2008

Test	GW 1	GW 2a	RC 3a	RC4	RC 6a	RC 7	RC 8	Drinking Water Standards (SI 278 2007)	Comments	Environmental significance
Ammonia mg/l N	9.3	500	300	0.05	11	0.3	80	0.23	Ammonia elevated at GW2a, RC3a and RC8	Depends on flow rate and path and available dilution. May contribute at times to ammonia at SW300
Chloride mg/l Cl	29	664	477	29	150	5449	1992	250	Elevated chloride at GW2a, RC3a, RC7 and RC8. May be influenced by tidal infiltration at RC7 and possibly RC8.	None, as receiving environment is estuarine.
Conductivity µS/cm	1234	6680	5440	677	1282	16110	8170	1500	Elevated conductivity at GW2a, RC3a, RC7 and RC8. May be influenced by tidal infiltration.	None
Dissolved Oxygen % Sat	11.8	56.8	21.2	58.9	16.7	26.7	18.9		Quite low, reflecting reducing conditions in most boreholes	None
E coli per 100 mls	nt	nt	nt	nt	nt	nt	nt		not tested	n/a
Iron ug/l	8082	5614	4163	<500	464	543	1760	200	Elevated at GW1, GW2a, RC3a. Likely source is landfill leachate.	None, given distance from receiving surface waters and available dilution.
pH	6.9	7.9	7.6	7.5	7.4	7.6	7.4	7 to 9	normal levels	None
Phenols mg/l	nt	nt	nt	nt	nt	nt	nt		not tested	n/a
Potassium ug/l	12	193	203	<10	17.5	112	119		Potassium results broadly reflect salinity, also see chloride and conductivity	None, as receiving environment is estuarine.
Sodium mg/l	20.1	419	405	10.9	70.6	2196	899		Sodium results broadly reflect salinity, also see chloride and conductivity	None, as receiving environment is estuarine.
Temperature °c	13.8	14.7	14.2	12.7	12.7	12.1	13.9	25	results normal	None
TOC mg/l C	nt	nt	nt	nt	nt	nt	nt		not tested	n/a
TON mg/l N	<0.1	2.8	0.5	12	14	2.5	0.1		Relatively low levels	none
Total coliforms per 100 mls	nt	nt	nt	nt	nt	nt	nt		not tested	n/a

Table 5.2.3. Groundwater quality Dungarvan landfill August 2008

Test	GW 1	RC 3a	RC4	RC 6a	RC 7	RC 8	Drinking Water Standards (SI 278 2007)	Comments	Environmental significance
Ammonia mg/l N			0.01	13	0.42		0.23	Ammonia elevated at RC6	Depends on flow rate and path and available dilution. May contribute at times to ammonia at SW300
Chloride mg/l Cl			30	116	592		250	Elevated chloride at RC6 and RC7. May be influenced by tidal infiltration at RC7.	None, as receiving environment is estuarine.
Conductivity µS/cm			680	1178	2190		1500	Elevated conductivity at RC6 and RC7. May be influenced by tidal infiltration.	None
Dissolved Oxygen % Sat			51.5	20	22			Quite low, reflecting reducing conditions in most boreholes	None
E coli per 100 mls			nt	nt	nt			not tested	n/a
Iron ug/l			212	287	327		200	Relatively low..	None, given distance from receiving surface waters and available dilution.
pH			7.5	7.4	7.7		7 to 9	normal levels	None
Phenols mg/l			nt	nt	nt			not tested	n/a
Potassium ug/l			1.61	15.7	18.1			Relatively low..	None, as receiving environment is estuarine.
Sodium mg/l			19.5	72.3	321			Sodium results broadly reflect salinity, also see chloride and conductivity	None, as receiving environment is estuarine.
Temperature °c			14.4	12.8	12.8		25	results normal	None
TOC mg/l C			0.5	2.4	3.4			not tested	n/a
TON mg/l N			13	14	1.3			Relatively low levels	none
Total coliforms per 100 mls			nt	nt	nt			not tested	n/a

GW1, RC3a no access due to site works. RC8 - no sample - no tubing.

Table 5.2.4 Dungarvan landfill groundwater monitoring 18/11/08

Test	GW 1	RC 3a	RC4	RC 6a	RC 7	Drinking Water Standards (SI 278 2007)	Comments	Environmental significance
Ammonia mg/l N	12	120	0.019	4.9	0.007	0.23	Ammonia elevated at GW1, RC3a and RC6.	Depends on flow rate and path and available dilution. May contribute at times to ammonia at SW300
Chloride mg/l Cl	24	269	30	94	493	250	Elevated chloride at RC6 and RC7. May be influenced by tidal infiltration at RC7.	None, as receiving environment is estuarine.
Conductivity µS/cm	1605	3700	684	1027	2070	1500	Elevated conductivity at GW1, RC3a, RC6 and RC7. May be influenced by tidal infiltration.	None
Dissolved Oxygen % Sat	23	23.8	61	21.5	33.9		Quite low, reflecting reducing conditions in most boreholes	None
E coli per 100 mls	nr	nr	nr	nr	nr		not tested	n/a
Iron ug/l	41000	1100	190	350	390	200	Elevated at GW1 and RC3a, likely reflecting impact from landfill leachate	None, given distance from receiving surface waters and available dilution.
pH	6.8	7.3	7.4	7.3	7.8	7 to 9	normal levels	None
Phenols mg/l	nr	nr	nr	nr	nr		not tested	n/a
Potassium ug/l							Relatively low..	None, as receiving environment is estuarine.
Temperature °c	12.5	12.3	11	11.7	12.2	25	results normal	None
TON mg/l N	<0.1	0.9	14	16	1.7		Elevated in RC4 and RC6a	None, given distance from receiving surface waters and available dilution.

GW2a no access due to site works. RC8 - no sample - borehole damaged.

5.3 LEACHATE

5.3.1 INTRODUCTION

Boreholes L1, L2a, L4, L5a, and the leachate holding tank were sampled during 2008.
Results of analysis are presented in table 5.3.1 to 5.3.4, below, and laboratory results appendices.
Values are compared with the median of typical landfill leachate, as published in the EPA document "*Landfill Operational Practices*" 1998.

5.3.2 RESULTS

COD was high in L1, L5a and occasionally in the leachate interception tank. Heavy metals and organic concentrations were low at all sites.

Key Parameter – COD

The COD test measures the organic matter in a sample that is amenable to chemical oxidation. The COD test is usually applied to polluted waters and waste-waters.

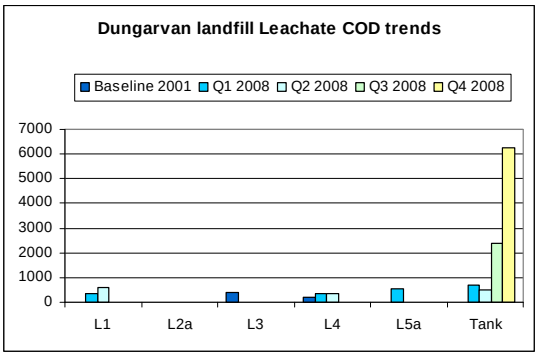


Figure 5.3.1 Leachate COD trends

COD levels were typical of landfill leachate, and similar to baseline levels. An increase in COD occurred in the leachate manhole sample in the 3rd and 4th quarters of 2008, possibly as a result of increased run-off to this tank during wet weather, due to leachate management infrastructure, or a general concentration of leachate due to drying of landfill infiltration due to capping. The contents of this tank are removed and treated off-site, as required. Continued monitoring will indicate any trends.

DISCUSSION

High ammonia and COD concentrations, combined with low metals levels and trace organics, indicate leachate typical of domestic landfills

Table 5.3.1 Leachate quality Dungarvan landfill, March 2008

Test	L1	L2A	L3	L4	L5a	Leachate Tank Inteceptor	Typical Leachate Analysis (EPA, 1997)	Comment	Environmental significance
Ammonia mg/l N	250			240	590		453	results in line with typical leachate	May cause elevated ammonia in adjacent receiving ground or surface waters. Impact, which is likely to be small, will depend on leachate flow and available dilution.
BOD mg/l O_2	11			12	58	112	270	results lower than typical leachate	none, given expected dilution in receiving waters
Chloride mg/l Cl	>353			>297	>315			results as expected for leachate	none, given expected dilution in receiving waters, and estuarine environment
COD mg/l O_2	366			337	551	671	954	results lower than typical leachate	none, given expected dilution in receiving waters
Conductivity µS/cm	6050			6690	9130	7010	7180	results in line with typical leachate	none, given expected dilution in receiving waters, and estuarine environment
pH	7.1			7.3	7.3	7.5	7.1	all results normal	none
Temperature °c	12			13	12	10		all results normal	none

L2a, L3 no sample - borehole damaged

Table 5.3.2 Leachate Quality Dungarvan landfill, May 2008

Test	L1	L4	Leachate Tank Inteceptor	GW2a	Typical Leachate Analysis (EPA, 1997)	Comment	Environmental significance
Aluminium ug/l al	499	-250	495	647		low levels	none
Ammonia mg/l N	340	240	180	500	453	results in line with typical leachate	May cause elevated ammonia in adjacent receiving ground or surface waters. Impact, which is likely to be small, will depend on leachate flow and available dilution.
Antimony ug/l Sb	-10	-10	-10	-10		low levels	none
Arsenic ug/l	10.4	-10	15.5	10.9		low levels	none
Barium ug/l	133	221	342	121		moderate levels, possible saline influence	none
Beryllium ug/l	-10	-10	-10	-10		low levels	none
BOD mg/l O_2	54	36	146		270	results lower than typical leachate	none, given expected dilution in receiving waters
Boron ug/l	846	3302	2326	1418		moderate levels, possible saline influence	none
Cadmium ug/l	-10	-10	-10	-10		low levels	none
Calcium mg/l	137	163	212	83.4		moderate levels, possible saline influence	none
Chloride mg/l Cl	1026	587	322	664		results as expected for leachate	none, given expected dilution in receiving waters, and estuarine environment
Chromium ug/l	27.7	91.5	37.5	132		moderate levels, possible saline influence	none, given expected dilution in receiving waters, and estuarine environment
Cobalt ug/l	16.4	-10	10.9	10.1		low levels	none
COD mg/l O_2	601	352	507		954	results lower than typical leachate	none, given expected dilution in receiving waters
Conductivity µS/cm	7420	6600	4350	6680	7180	results in line with typical leachate	none, given expected dilution in receiving waters, and estuarine environment
Copper ug/l	28.2	12.1	26.8	28.3		moderate levels, possible saline influence	none
Fluoride mg/l F	4.19	3.06	10.84	1.77		moderate levels, possible saline influence	none
Iron ug/l	55108	2280	9838	5614		elevated at L1	May cause elevated iron in adjacent receiving ground or surface waters. Impact, which is likely to be small, will depend on leachate flow and available dilution.
Lead ug/l	34.3	17.1	28.8	43.4		low to moderate levels	none, given expected dilution in receiving waters, and estuarine environment
Magnesium mg/l	60.9	63.9	43.8	37.9		moderate levels, possible saline influence	none
Manganese ug/l	2436	475	5614	727		low to moderate levels	none, given expected dilution
Mercury ug/l	-0.5	-0.5	-0.5	-0.5		low	none
Molybdenum ug/l	-10	-10	-10	-10		low	none
Nickel ug/l	107	46.2	37.8	40.4		moderate levels, possible saline influence	none, given expected dilution
Nitrite mg/l N	-0.001	-0.001	-0.001	0.3		low	none
Ortho-phosphate mg/l P	-0.006	0.042	1.4	0.92		low	none
pH	7.2	7.6	7.4	7.9	7.1	all results normal	none
Potassium mg/l	188	312	184	193		moderate levels, possible saline influence	none
Selenium ug/l	16.2	13.3	-10	10.2		low to moderate levels	none
Silver ug/l	-10	-10	-10	-10		low levels	none
Sodium mg/l	563	576	252	419		moderate levels, possible saline influence	none

Table 5.3.3 Leachate Quality Dungarvan landfill, Aug 2008

Test	L1	L2A	L3	L4	L5a	Leachate Tank Inteceptor	GW2a	Typical Leachate Analysis (EPA, 1997)	Comment	Environmental significance
Ammonia mg/l N						55		453	result in line with typical leachate	May cause elevated ammonia in adjacent receiving ground or surface waters. Impact, which is likely to be small, will depend on leachate flow and available dilution.
BOD mg/l O_2						1300		270	result lower than typical leachate	none, given expected dilution in receiving waters
Chloride mg/l Cl						145			result as expected for leachate	none, given expected dilution in receiving waters, and estuarine environment
COD mg/l O_2						2390		954	result lower than typical leachate	none, given expected dilution in receiving waters
Conductivity µS/cm						2310		7180	result in line with typical leachate	none, given expected dilution in receiving waters, and estuarine environment
pH						6.3		7.1	pH quite low	none
Temperature °C						15			result normal	none
TON mg/l N						0.1			low levels	none

L1, L2a, L4 missing due to site works. GW2a, L5a no access. L3 damaged.

Table 5.3.4 Dungarvan landfill leachate monitoring 18/11/08

Test	L1	L2A	L3	L4	L5a	Leachate Tank Inteceptor	GW2a	Typical Leachate Analysis (EPA, 1997)	Comment
BOD mg/l O_2						3000		270	Result higher than typical leachate, indicating concentrated leachate collecting at this point
COD mg/l O_2						6265		954	Result higher than typical leachate, indicating concentrated leachate collecting at this point
Conductivity µs/cm						4560		7180	result in line with typical leachate
pH						6.1		7.1	pH quite low
Temperature °c						11.9			result normal

L1, L2a, L3, L4, L5a no sample due to site works

5.4. Groundwater and Leachate Levels

5.4.1 Introduction

Groundwater and leachate levels are determined monthly, by dip meter, at boreholes GW1, RC3a, RC4, RC6a, RC7, RC8, L4, and L5a.

5.4.2 Results

Results of monitoring are presented in table 4.1.

Table 5.4.1 Dungarvan landfill leachate levels 2008

Date	RC 7	RC 6A	GW 2A	L 5A	L 4	RC 3 A	RC 4	RC 8	GW1
28/04/2008	10.6	7.7	1.5	4.7	1.5	12.5	15.2	12.5	4.5
01/05/2008	10.6	7.7	1.5	4.7	1.5	12.5	15.2	12.5	4.5
04/06/2008	10.6	7.7	1.5	4.7	1.5	12.5	15.2	12.5	4.5
05/07/2008	10.6	7.7	1.5	4.7	1.5	12.5	15.2	12.5	4.5
08/08/2008	10.6	7.7	1.5	4.7	1.5	12.5	15.2	12.5	4.5
10/09/2008	10.6	7.7	1.5	4.7	1.5	12.5	15.2	12.5	4.5
29/10/2008	10.6	7.7	1.5	4.7	1.5	12.5	15.2	12.5	4.5
30/11/2008	10.6	7.7	1.5	4.7	1.5	12.5	15.2	12.5	4.5
11/12/2008	10.6	7.7	1.5	4.7	1.5	12.5	15.2	12.5	4.5

5.4.3 Discussion

There was no detectable variation in levels over the monitoring period..

5.5 LANDFILL GASES

5.5.1 Introduction

Gases (mainly methane –65% and carbon dioxide – 35%) are given off by the biodegradation of organic matter within the landfill waste. The rate of gas generation is dependent on waste type, moisture content and age of waste. Gas is monitored weekly at the site building, and monthly at the groundwater and leachate boreholes. Results of gas monitoring are presented in tables 5.1 to 5.4 below.

5.5.2 Results

KEY PARAMETER –METHANE

Methane is a colourless, odourless gas generated by the biodegradation of organic matter. Landfill gas contains about 65% methane.

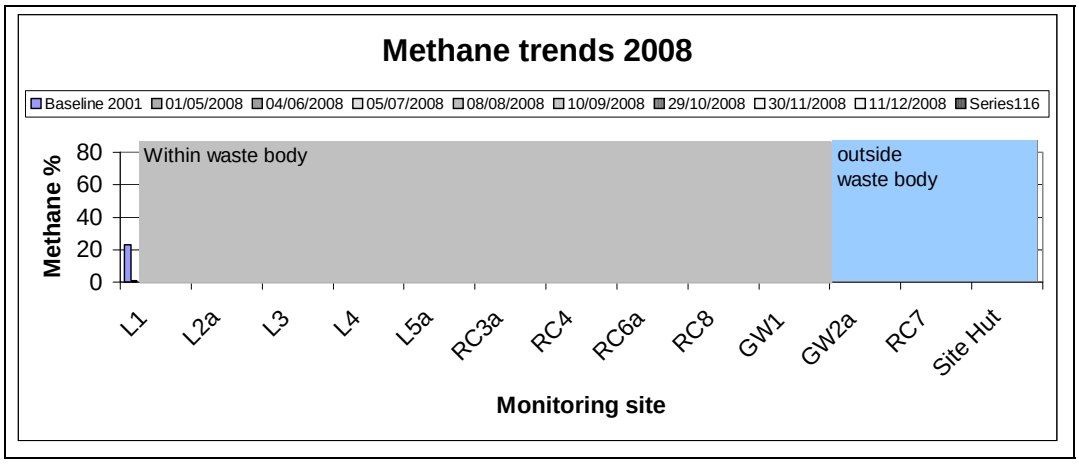


Figure 5.5.1 Methane trends 2008

Relatively high levels of methane were detected at most boreholes within the waste deposit area, indicating active decomposition of waste, in line with previous monitoring results. Methane levels detected at L3, L4, L5a, RC4 and GW1 were quite constant over the year and compared to baseline levels in 2001. .

No methane was detected in the site buildings or at monitoring points outside the landfill area.

Table 5.1 Dungarvan Landfill Gas Monitoring Q1 2008

Week No	Date	Operator	Gas	Site Hut	GW 1	GW 2A	RC 3A	RC 4	RC 6A	LT 1	LT 2A	LT 3	LT 4	LT 5A	RC 7	RC 8
1	04/01/2008	TL	CH_4, CO_2, O_2 Air Pressure	0 0 20.9 988												
2	09/01/2008	TL	CH_4, CO_2, O_2 Air Pressure	0 0 20.9 996												
3	15/01/2008	TL	CH_4, CO_2, O_2 Air Pressure	0 0 20.9 974												
4	25/01/2008	TL	CH_4, CO_2, O_2 Air Pressure	0 0 20.9 1026	7.4 5.3 18.0 1026	0 0 20.9 1026	0.7 0.1 20.1 1026	0 0 20.9 1027	0 0 20.9 1027	4.4 1.5 19.6 1026	30.4 14.2 9.6 1027	Damaged	22.4 9.9 12.6 1027	40.5 27.4 5.5 1027	0 0 20.9 1027	10.2 8.5 18.6 1026
5	01/02/2008	TL	CH_4, CO_2, O_2 Air Pressure	0 0 20.9 998												
6	04/02/2008	TL	CH_4, CO_2, O_2 Air Pressure	0 0 20.9 988												
7	13/02/2008	TL	CH_4, CO_2, O_2 Air Pressure	0 0 20.9 1027	10.3 7.6 14.4 1027	0 0 20.9 1026	0.0 0.0 20.9 1027	0.0 0.0 20.9 1027	0.0 0.0 20.9 1027	1.4 1.1 20.8 1026	22.7 11.4 12.2 1027	Damaged	12.6 8.3 14.9 1027	63.2 30.4 1.3 1026	0.0 0.0 20.9 1027	1.8 0.9 20.0 1026
8	19/02/2008	TL	CH_4, CO_2, O_2 Air Pressure	0 0 20.9 1016												
9	28/02/2008	TL	CH_4, CO_2, O_2 Air Pressure	0 0 20.9 1014												
10	03/03/2008	TL	CH_4, CO_2, O_2 Air Pressure	0 0 20.9 998												
11	11/03/2008	TL	CH_4, CO_2, O_2 Air Pressure	0 0 20.9 1010												
12	19/03/2008	TL	CH_4, CO_2, O_2 Air Pressure	0 0 20.9 1001												
13	27/03/2008	TL	CH_4, CO_2, O_2 Air Pressure	0 0 20.9 998	5.7 2.2 18.9 998	0 0 20.9 998	0.0 0.0 20.9 999	0.0 0 20.9 999	0 0 20.9 999	0.9 0.5 20.8 999	20.2 9.6 14.8 998	Damaged	15.5 7.8 16.3 998	65.5 31.1 1.2 998	0 0 20.9 998	2.0 0.6 20.4 1000
Week No	**Date**	**Operator**	**Gas**	**Site Hut**	**GW 1**	**GW 2A**	**RC 3A**	**RC 4**	**RC 6A**	**LT 1**	**LT 2A**	**LT 3**	**LT 4**	**LT 5A**	**RC 7**	**RC 8**

Table 5.2 Dungarvan Landfill Gas Monitoring Q2 2008

Week No	Date	Operator	Gas	Site Hut	GW 1	GW 2A	RC 3A	RC 4	RC 6A	LT 1	LT 2A	LT 3	LT 4	LT 5A	RC 7	RC 8
14	04/04/2008	TL	CH_4, CO_2, O_2 Air Pressure	0 0 20.9 1028												
15	08/04/2008	TL	CH_4, CO_2, O_2 Air Pressure	0 0 20.9 1015												
16	18/04/2008	TL	CH_4, CO_2, O_2 Air Pressure	0 0 20.9 998												
17	23/04/2008	TL	CH_4, CO_2, O_2 Air Pressure	0 0 20.9 1021												
18	28/04/2008	TL	CH_4, CO_2, O_2 Air Pressure	0 0 20.9 1001	5.5 1.8 17.5 1000	0 0 20.9 1000	0.7 0.4 20.6 999	0 0.2 20.6 1001	0 0 20.9 1001	0.9 0.5 20.8 999	9.4 3.4 18.7 1000	Damaged	44.1 20.2 8.2 999	66.6 31.8 0.5 1000	0 0 20.9 1001	14.1 6.1 16.0 1000
19	01/05/2008	DR	CH_4, CO_2, O_2 Air Pressure	0 0 20.9 1027	6.4 2.1 17.9 1027	0 0 20.9 1027	0.9 0.4 20.9 1026	0 0 20.9 1027	0 0 20.9 1027	1.1 0.5 20.9 1026	9.0 4.1 17.8 1026	Damaged	45.6 20.6 10.3 1026	64.3 33.1 0.7 1027	0 0 20.9 1027	15.2 6.7 16.4 1027
20	06/05/2008	DR	CH_4, CO_2, O_2 Air Pressure	0 0 20.9 998												
21	15/05/2008	DR	CH_4, CO_2, O_2 Air Pressure	0 0 20.9 996												
22	23/05/2008	DR	CH_4, CO_2, O_2 Air Pressure	0 0 20.9 1014												
23	04/06/2008	DR	CH_4, CO_2, O_2 Air Pressure	0 0 20.9 1024	5.6 2.1 11.2 1024	0 0 20.3 1025	0.7 0.7 20.9 1024	0 0.1 20.9 1024	0 0 20.9 1025	0 0 20.0 1024	11.4 6.9 17.0 1023	Damaged	0 0 6.7 1025	60.6 35.2 0.2 1024	0 0 20.9 1024	9.9 4.5 17.0 1024
24	12/06/2008	DR	CH_4, CO_2, O_2 Air Pressure	0 0 20.9 1006												
25	16/06/2008	DR	CH_4, CO_2, O_2 Air Pressure	0 0 20.9 1001												
26	26/06/2008	DR	CH_4, CO_2, O_2 Air Pressure	0 0 20.9 1017												
Week No	**Date**	**Operator**	**Gas**	**Site Hut**	**GW 1**	**GW 2A**	**RC 3A**	**RC 4**	**RC 6A**	**LT 1**	**LT 2A**	**LT 3**	**LT 4**	**LT 5A**	**RC 7**	**RC 8**

Table 5.3 Dungarvan Landfill Gas Monitoring Q3 2008

Week No	Date	Operator	Gas	Site Hut	GW 1	GW 2A	RC 3A	RC 4	RC 6A	LT 1	LT 2A	LT 3	LT 4	LT 5A	RC 7	RC 8
27	03/07/2008	DR	CH_4, CO_2, O_2 Air Pressure	0 0 20.9 1023	5.6 2.1 16.5 1023	0 0 20.7 1024	0.7 0.7 20.9 1024	0 0.1 20.1 1024	0 0 20.0 1024	0 0 20.6 1024	0 6.9 20.6 1024	Damaged	14.0 0 8.7 1024	61.7 35.2 0.4 1023	0 0 19.9 1023	15.2 4.5 19.9 1024
28	11/07/2008	DR	CH_4, CO_2, O_2 Air Pressure	0 0 20.9 1004												
29	16/07/2008	DR	CH_4, CO_2, O_2 Air Pressure	0 0 20.9 1014												
30	22/07/2008	DR	CH_4, CO_2, O_2 Air Pressure	0 0 20.9 1021												
31	31/07/2008	DR	CH_4, CO_2, O_2 Air Pressure	0 0 20.9 999												
32	08/08/2008	DR	CH_4, CO_2, O_2 Air Pressure	0 0 19.0 1021	0 0 18.8 1021	0 0 18.8 1021	0 0 19.2 1021	0 0 18.9 1021	0 0 18.8 1021	Damaged	Damaged	Damaged	0 0 18.7 1021	0 0 19.1 1021	0 0 19.0 1021	0 0 18.9 1021
33	14/08/2008	DR	CH_4, CO_2, O_2 Air Pressure	0 0 19.1 1009												
34	18/08/2008	DR	CH_4, CO_2, O_2 Air Pressure	0 0 18.9 1015												
35	28/08/2008	DR	CH_4, CO_2, O_2 Air Pressure	0 0 19.0 1011												
36	02/09/2008	DR	CH_4, CO_2, O_2 Air Pressure	0 0 18.9 1014												
37	10/09/2008	DR	CH_4, CO_2, O_2 Air Pressure	0 0 19.1 1012	0 0 18.7 1012	0 0 18.9 1012	0 0 19.1 1012	0 0 18.9 1012	0 0 18.9 1012	Damaged	Damaged	Damaged	0 0 18.8 1012	0 0 19.0 1012	0 0 19.1 1012	0 0 18.9 1012
38	19/09/2008	DR	CH_4, CO_2, O_2 Air Pressure	0 0 18.9 1021												
39	29/09/2008	DR	CH_4, CO_2, O_2 Air Pressure	0 0 18.7 1002												
Week No	**Date**	**Operator**	**Gas**	**Site Hut**	**GW 1**	**GW 2A**	**RC 3A**	**RC 4**	**RC 6A**	**LT 1**	**LT 2A**	**LT 3**	**LT 4**	**LT 5A**	**RC 7**	**RC 8**

Table 5.4 Dungarvan Landfill Gas Monitoring Q4 2008

Week No	Date	Operator	Gas	Site Hut	GW 1	GW 2A	RC 3A	RC 4	RC 6A	LT 1	LT 2A	LT 3	LT 4	LT 5A	RC 7	RC 8
40	07/10/2012	DR	CH_4, CO_2, O_2 Air Pressure	0 0 17.9 1012												
41	13/10/2008	DR	CH_4, CO_2, O_2 Air Pressure	0 0 18.9 1024												
42	24/10/2008	DR	CH_4, CO_2, O_2 Air Pressure	0 0 19.0 1001												
43	29/10/2008	DR	CH_4, CO_2, O_2 Air Pressure	0 0 18.2 1023	0 0 18.9 1023	0 0 18.8 1023	0 0 19.0 1023	0 0 18.9 1023	0 0 18.5 1023	Damaged	Damaged	Damaged	0 0 18.5 1023	0 0 18.8 1023	0 0 18.2 1023	0 0 18.6 1023
44	09/11/2008	DR	CH_4, CO_2, O_2 Air Pressure	0 0 18.6 1009												
45	14/11/2008	DR	CH_4, CO_2, O_2 Air Pressure	0 0 18.8 1004												
46	19/11/2008	DR	CH_4, CO_2, O_2 Air Pressure	0 0 19.0 1029												
47	28/11/2008	DR	CH_4, CO_2, O_2 Air Pressure	0 0 18.1 1013	0 0 19.1 1013	0 0 18.8 1013	0 0 19.1 1013	0 0 19.1 1013	0 0 18.7 1013	Damaged	Damaged	Damaged	0 0 18.7 1013	0 0 18.9 1013	0 0 18.1 1013	0 0 18.5 1013
48	05/12/2008	DR	CH_4, CO_2, O_2 Air Pressure	0 0 18.7 1011												
49	11/12/2008	DR	CH_4, CO_2, O_2 Air Pressure	0 0 18.0 1028	0 0 18.0 1028	0 0 18.0 1028	0 0 17.8 1026	0 0 17.6 1026	0 0 17.9 1028	Damaged	Damaged	Damaged	0 0 17.7 1026	19.3 9.4 12.6 1026	0 0 17.7 1028	1.1 0 17.5 1026
50	17/12/2008	DR	CH_4, CO_2, O_2 Air Pressure	0 0 18.6 1010												
51	22/12/2008	DR	CH_4, CO_2, O_2 Air Pressure	0 0 18.5 1011												
52	30/12/2008	DR	CH_4, CO_2, O_2 Air Pressure	0 0 18.9 1022												
Week No	**Date**	**Operator**	**Gas**	**Site Hut**	**GW 1**	**GW 2A**	**RC 3A**	**RC 4**	**RC 6A**	**LT 1**	**LT 2A**	**LT 3**	**LT 4**	**LT 5A**	**RC 7**	**RC 8**

5.6 NOISE

5.6.1 Introduction

Daytime noise levels were recorded in November 2006 at five locations at Dungarvan Landfill Site, B1-4 and NSL1, as specified in the licence monitoring schedule D. These locations are shown in fig. DUN-EIS-003, attached. There are limits of 55 dB Leq(30) daytime, and 45 dB Leq(30) night-time imposed as a condition of the licence. Night-time measurements were not considered necessary as the landfill does not operate at night.

A Cirrus 800A Sound Level Meter was used. The meter was calibrated and checked with a 94 dB calibrator before and after each measurement. Broadband and Frequency Band analysis measurements were conducted at each location. A summary of results is presented in the table below. Octave band analysis for 5 monitoring locations are presented in figures 6.1 to 6.5 below.

5.6.2 Noise levels

Table 5.6.1 - 2008 Noise levels

1998 "Baseline" noise levels

Site	*Date of Monitoring*	*L(A)eq[30mins] dB*	*L(A)$_{10}$ [30 mins]*	*L(A)$_{90}$ [30 mins]*
B1	14/4/08 *Baseline 1998*	52.8 56	53.1 68	42.8 58
B2	14/4/0/8 *Baseline 1998*	53.2 50	52.1 51	42.3 46
B3	14/4/08 *Baseline 1998*	42.5 46	42.9 47	41.9 43
B4	14/4/08 *Baseline 1998*	37.5 47	44.0 50	42.1 45
NSL1	14/4/08 *Baseline 1998*	54.7 54	59.4 55	42.5 34

5.6.3 Discussion

Noise levels were compliant at all locations with the noise emission requirement of 55 dB(A) LAeq (30 mins).

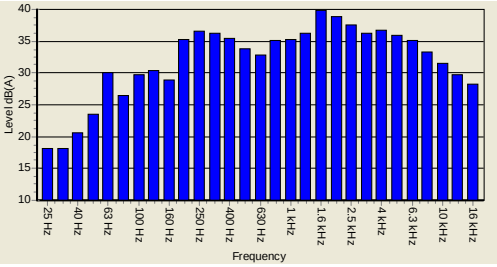


Fig 5.6.1 Dungarvan landfill noise monitoring 14/4/08, location B1, octave band analysis, A weighting

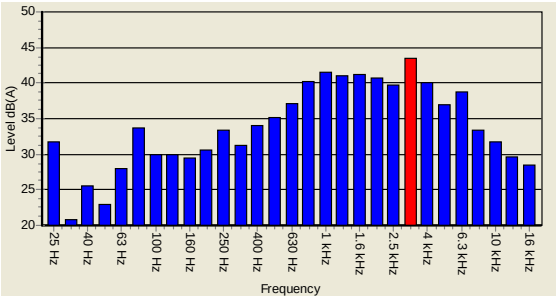


Fig 5.6.2 Dungarvan landfill noise monitoring14/4/08, location B2, octave band analysis, A weighting

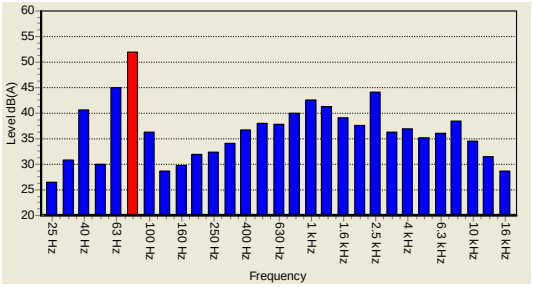


Fig 5.6.3 Dungarvan landfill noise monitoring14/4/08, location B3, octave band analysis, A weighting

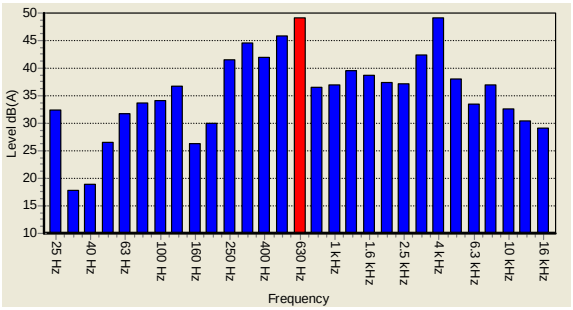


Fig 5.6.4 Dungarvan landfill noise monitoring 2/11/06, location B4, octave band analysis, A weighting

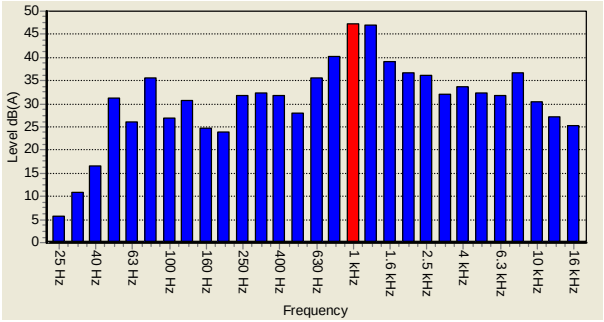


Fig 5.6.5 Dungarvan landfill noise monitoring 14/4/08, location NSL1, octave band analysis, A weighting

5.7 DUST

5.7.1 Introduction / Methodology

Dust deposition rates were measured three times during 2008, at five locations (B1, B2, B3, B4, and D1) at Dungarvan Landfill. The measurement method was the Bergerhoff deposition method.

5.7.2 Results

Table 5.7.1 - Dust Deposition at Dungarvan Landfill 30/1/08 to 5/3/08

Dust Monitoring Dungarvan Landfill

Monitoring interval. 30/01/08-05/03/08
No Of Days 35

Location	Weight 1	Weight 2	No of Days	Deposition Rate mg/sq. m/day
B1	0.3209	0.3328	35	154.5
B2	0.3301	0.3444	35	185.7
B3	0.3268	0.3406	35	179.2
B4	0.3224	0.3331	35	139
D1	0.3319	0.3445	35	163.6

Table 5.7.2 - Dust Deposition at Dungarvan Landfill 14/10/08 to 13/11/08

Dust Monitoring Dungarvan Landfill

Monitoring interval. 14/10/08-13/11/08
No Of Days 30

Location	Weight 1	Weight 2	No of Days	Deposition Rate mg/sq. m/day
B1	0.3317	0.3416	30	150
B2	0.3339	0.3492	30	231.8
B3	0.3284	0.3389	30	159.1
B4	0.3298	0.3425	30	192.4
D1	0.3315	0.3406	30	137.9

Table 5.7.3 - Dust Deposition at Dungarvan Landfill 14/11/08 to 10/12/08

Dust Monitoring Dungarvan Landfill

Monitoring interval. 14/11/08-10/12/08
No Of Days 27

Location	Weight 1	Weight 2	No of Days	Deposition Rate mg/sq. m/day
B1	0.3323	0.339	27	112.8
B2	0.3362	0.3408	27	77.4
B3	0.3347	0.3382	27	58.9
B4	0.3341	0.3411	27	117.8
D1	0.3355	0.3394	27	65.7

5.7.3 Discussion

Dust deposition rates were below the limit expected to give rise to nuisance (350 mg/m2/day).

5.8 LEACHATE TOXICITY

5.8.1 Introduction / Methodology

The tests described in this section were conducted to comply with condition 8.11.1(ii) of the landfill licence, which requires "an assessment of the toxicity of leachate using appropriate organisms which reflect the habitats… in the vicinity of the site."

The toxicity tests were carried out at the Aquatic Toxicity Laboratory, Enterprise Ireland, Shannon. A representative sample of leachate was obtained by compositing four grab samples, taken on 16/12/08 from leachate boreholes and the leachate tank.

Two test species were used, namely *Daphnia magna* (freshwater copepod), and *Vibrio fischeri* (bacterium). The tests consisted of exposing populations of the tests species to various concentrations of the leachate sample, and noting the concentration at which the species exhibited a response (usually mortality or growth inhibition) for 50% of the population thus exposed. This concentration is termed the EC50 (Effective concentration for 50% of the exposed population). The EC50 can also be expressed as *Toxic Units*, which are calculated by dividing 100 by the EC50.

5.8.2 Results

A full report, reference 09T023, was prepared by Enterprise Ireland and results are summarized below.

Table 5.8.1 Summary of leachate toxicity tests 2008

SPECIES	*D.magna*	V. fischeri	
EC50	43.4% vol/vol 48 hr EC50	4.1% vol/vol 5 min EC50	2.5% vol/vol 15 min EC50
TOXIC UNITS	2.3	24.4	40

5.8.3 Discussion

The highest toxicity units (40) were obtained for *Vibrio,* the bacterium. There was an increase in toxicity compared to the previous year, when TUs were less than 10. The likely explanation is the fact that leachate is becoming more concentrated as the landfill dries out due to capping and water management. The chemical analysis of leachate in the fourth quarter of 2008, at the collection tank L6, confirms that this is the case. As part of this landfill remediation process the leachate volumes will decrease, leading to higher available dilution in the receiving environment. Therefore there is likely to be no change in the environmental significance of toxicity results.

5.9 CHEMICAL ANALYSIS OF ESTUARINE SEDIMENT AND BENTHIC MACROFAUNA

5.9.1 Introduction

Small concentrations of metals exist naturally in the environment and living organisms require trace amounts in order to exist. However some metals can be hazardous to the environment if concentrations exceed certain thresholds. An evaluation of the heavy metal content of riverine / estuarine sediment and invertebrate (mussel) tissue is required by condition 8.11 of the landfill licence. The results of monitoring of River Colligan sediments and mussels are presented below. Samples were obtained however on 16/12/08. See text and fig 9.1 for sampling locations.

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

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

** The threshold is "the pollutant concentration beyond which deleterious environmental change is observable".

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

Background trace metals in estuarine sediments generally reflect the occurrence and abundance of metals in the geological formations in the catchment area of the estuary, and any metals discharged to the environment due to human activities.

Prior to their closure, Dungarvan Crystal and Dungarvan Tannery were licenced to discharge lead and chromium to Dungarvan Harbour.

Sediment

Samples of sediment (approx 2 kg) were taken on 16/12/08 at five sampling points, shown on fig 9.1.

- S1 – just upstream of disused railway bridge upstream of landfill (EPA stn 280)
- S2 – immediately upstream of the landfill site
- S3 – opposite most downstream drain from the landfill
- S4 – 150 m downstream of landfill
- S5 – Ballyneety Bridge, downstream of landfill (EPA stn 300)

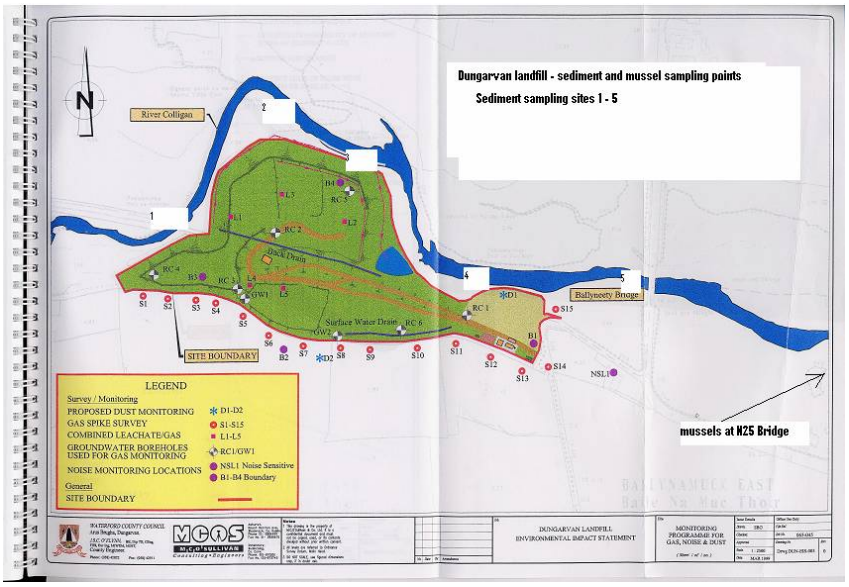


Figure 5.9.1 Dungarvan landfill, sediment and mussel sampling sites

The samples were hand mixed on-site, and a portion (approx 200g) taken for analysis. The samples were dried at 105 deg for two days, and pulverized with mortar and pestle in Adamstown laboratory. Portions of the powdered samples were analysed for metals at Environmental Services Laboratory, Cork. QC and reference materials were processed with the samples.

5.9.2 Results and discussion

a) Sediment Table 5.9.1

Dungarvan Sediments 2008 Results
[2004] and (2003) Results in brackets)

Parameter	Units	S1	S2	S3	S4	S5	Waterford Harbour EPA Survey, 2003, average of 5 samples	Wexford Harbour EPA Survey, 2002, average of 4 samples	Dungarvan Harbour EPA Survey, 2004[1] Average of 4 samples	Sediment Quality Standards (Jeffrey et al)
Arsenic	Mg/kg	**1.7** [2.5] *(5.2)*	**1.4** [2.7] *(6.5)*	**1.2** [2.1] *(3.7)*	**2.3** [3.5] *(3.5)*	**1.6** [3.7] *(4.6)*	8	8.6	6.7	
Cadmium	mg/kg	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**				
Chromium	Mg/kg	**5.1**	**<5**	**<5**	**13.5**	**<5**	20	31	22.8	
Copper	Mg/kg	**<5.0** [6.1] *(7.4)*	**5.5** [5.7] *(9.3)*	**<5.0** [6.6] *(7.2)*	**7.3** [8.7] *(6.4)*	**5.0** [204] *(13.6)*	9.8	11.4	23.4	50
Lead	Mg/kg	**6.1** [17.1] *(13)*	**36.1** [5.7] *(23)*	**7.6** [6.9] *(10)*	**22.7** [35.2] *(10)*	**7.3** [72] *(14)*	26	15	93	
Zinc	Mg/kg	**62.0** [38.6] *(43)*	**34.3** [40.8] *(49)*	**35.9** [31.5] *(88)*	**51.8** [38.8] *(450*	**55.0** [1526] *(41)*	141	70	102	100

Discussion

Metals levels in sediment in 2008 were broadly in line with other years, and complied with sediment quality standards and were lower than results from other part of the coast.

Shellfish

Mussels samples (Mytilis edulis) were taken at a location downstream of the landfill, at the N25 Bridge at Dungarvan bypass road, on 16/12/08, as shown on fig 9.1. Twelve individual mussels, of 6 cm average length, yielding approximately 30 grammes wet weight of flesh were sampled. Mussels were depurated overnight in clean aerated estuarine water before de-shelling. The flesh was blotted dry and dried at 60deg for 3 days. The dried flesh was ground to powder and portions were analysed for metals at Environmental Laboratory Services Cork. QC and reference materials were processed with the samples.

b) Mussel Samples Table 5.9.2

Metals Content

Parameter	units	Dungarvan Mussels 2008 results {2005} [2004] and *(2003) results in brackets*	Waterford Harbour EPA Survey, 2001, average of 4 samples	Wexford Harbour EPA Survey, 2004, average of 4 samples	Dungarvan Harbour EPA Survey, 2004, Average of 4 samples	SHELLFISH QUALITY STANDARDS (Glynn et al)	Marine Institute Study Maximum Values (Glynn et al)
Arsenic	mg/kg WET WEIGHT	**1.90** {2.2} [9.8] *(2.6)*	3.7	1.6			
Cadmium	mg/kg WET WEIGHT	**0.14** {0.1} [0.34] *(0.03)*	0.4	0.1	0.2	1	0.44
Chromium	mg/kg WET WEIGHT	**<1** {0.5}	1.1	0.9	0.9		0.86
Iron	mg/kg WET WEIGHT	**14.24** {66.4} [212] *(49)*	115	62	140		
Lead	mg/kg WET WEIGHT	**0.86** {2.1} [15.4] *(3.8)*	1.5	<0.4	7.5	1.5	0.77
Manganese	mg/kg WET WEIGHT	**1.36** {2.4} [18] *(1.4)*	5.7	3.4	2.5		
Zinc	mg/kg WET WEIGHT	**13.14** {11.6} [51] *(13.2)*	39	22.4	26		28.5

Ref:** ***Trace Metals and chlorinated Hydrocarbon Concentrations in Shellfish from Irish Waters, 1997-1999**, E McGovern et al, Marine Institute, 2001.**

Discussion

Metals levels in mussels were similar to levels detected in recent years. Metals levels were compliant with relevant quality standards and were similar to or lower than comparable sites around the coast.

5.10 ECOLOGICAL SURVEY OF BACKSTRAND AND DUNES

5.10.1 INTRODUCTION

An ecological survey of Dungarvan Municipal Landfill and environs was carried out by Limosa Environmental and Ecological consultants in August 2006, on behalf of Waterford County Council. A full report was issued and a summary is presented below.

The scope and objectives of the survey were.

1. Habitat quality at landfill and environs. Mapping of main habitat types, and identification of main flora and fauna present. Interpretation of findings with regard to previous studies.
2. Flora (macroalgae) and fauna (including macroinvertebrates) at five River Colligan sites, map attached. Application of appropriate rating systems, such as the EPA Q-rating system, and estuarine evaluation systems. Interpretation of results in light of previous studies.
3. Interpretation and comment on bird count data –to be obtained from annual IWeBs counts, by Birdwatch Ireland, and the landfill bird control contractor

EXECUTIVE SUMMARY

Dungarvan Landfill site is located at Ballynamuck Middle, Dungarvan, Co Waterford. It is mostly surrounded by agricultural land although wetland habitats occur in association with the River Colligan which flows in a west to east direction along the northern perimeter of the site before flowing down the River Colligan Estuary into Dungarvan Harbour.

The study comprised the following elements: habitat and fauna survey, freshwater biological survey of the River Colligan, and the assessment of the avian fauna of the landfill and nearby Dungarvan harbour.

The landfill site is comprised of six principal habitats: spoil and bare ground (ED2), other artificial lakes and ponds (FL8), buildings and artificial surfaces (BL3), scrub (WS1), wet grassland (GS4) and reed and large sedge swamps (FS1). The one major change within the site since the previous survey (2006) has been the construction of a series of artificial lagoons (constructed wetland) on the landfill cap. Habitats outside the landfill site (but within the study area) appear to have changed little in recent years.

The results of the 2008 biological assessment of the River Colligan indicated good water quality status at the upstream sampling site (Site 1) following analysis of both the surface water quality and biological water quality data recorded. An improvement of the water quality at Site 1 (in

comparison with 2006) and the increase in the diversity of species at downstream connecting sites, coupled with the review of water quality measurements taken on site and EPA chemical water quality data between 2007 and 2008, reflects good water quality indicating that Dungarvan Landfill site is not negatively impacting the River Colligan.

The European Eel was recorded at the three brackish water sites. It is evident that there are good numbers of juvenile eels present in the tidal reaches of the River Colligan indicating it may be an important nursery habitat.

Dungarvan landfill and its environs support a fairly wide diversity of birds. The river corridor, with its many trees, is particularly species-rich, and it provides a good feeding area for many passerine species. It is also an ideal feeding habitat for those species that rely on the water column directly (e.g. Little Grebe, Little Egret, Common Sandpiper, Kingfisher and Dipper). Of note is the presence of Little Egret and Kingfisher, both of which are Annex I species under the EU Birds Directive. The Kingfisher is considered an indicator species or 'bioindicator' of the health of river ecosystems and will rapidly disappear from polluted waters. Its continued presence in the same area is therefore a positive sign as to the health of the river. Likewise, the presence of Little Egrets suggests a healthy and adequate fish supply.

During the winter months, Dungarvan Harbour supports four species that are listed on Annex I of the EU Birds Directive: Great Northern Diver, Little Egret, Golden Plover and Bar-tailed Godwit. Current data from the Irish Wetland Bird Survey (I-WeBS) shows that the harbour supports two species in internationally important numbers (Light-Bellied Brent Goose and Black-tailed Godwit) and a further 10 species in nationally important numbers. However, a review of recent and previous I-WeBS data suggests a possible trend for decrease in Curlew and potentially for Black-tailed Godwits. The data also shows a trend for increase in Redshank, Little Egret and Light-bellied Brent Geese.

Five mammal species were recorded in the survey area: Rabbit, Brown rat, Fox, Otter and Mink. Small mammals such as the Pygmy shrew, Field mouse, House mouse, and Bank vole are also likely to be present, but because of their small size and nocturnal habits are easily overlooked. Stoat, Hedgehog and Badger are also likely to be present in the area, although it is unlikely that they occur within the landfill site itself. Bats also probably use the river corridor as a feeding habitat.

The River Colligan is an important habitat for Otters which are protected under both Irish and European legislation. Numerous sprainting sites, some of which are obviously in long-term use, indicate that otters are resident and successful there. The high level of otter activity indicates that the River Colligan contains a healthy and reliable population of fish, again highlighting the biological health of the River Colligan.

5.11 CONCLUSIONS

Water quality at the River Colligan surface water sites in the vicinity of the landfill were satisfactory throughout 2008.

The results of groundwater monitoring are in line with results from previous rounds of testing carried out since 1999. As indicated in previous reports, water in boreholes within the current working area appears to be impacted by leachate from the landfill in terms of ammonia and iron, however groundwater outside the landfill site was generally satisfactory.

Leachate quality was as expected for a landfill accepting mainly domestic and inert waste. Metal and trace organics concentrations were low. Based on toxicity tests carried out and leachate management, attenuation and dilution, no toxic effect from landfill leachate is expected.

No noise nuisance was indicated during the annual noise survey.

Dust deposition levels were below nuisance levels.

Metals levels in sediments and biota were low compared to quality standards and other coastal and estuarine sites.

The ecological survey of the landfill and estuarine area carried out during 2008 recorded a diversity of habitats and wildlife and concluded that the increase in the diversity of species at downstream connecting sites, coupled with the review of water quality measurements taken on site and EPA chemical water quality data between 2007 and 2008, reflects good water quality indicating that Dungarvan Landfill site is not negatively impacting the River Colligan.

Overall, water and ecological quality in the vicinity of the landfill were satisfactory and there was no indication that the landfill was having a detrimental impact on the surrounding environment.

5.12 Meteorological Data.

Monthly meteorological data is attached in Appendix F.

6. Sequence and timescale for development and restoration of the facility

a) Landfill Capping and Restoration

A Restoration and Aftercare Plan has been approved by the EPA and capping commenced in 2007. Capping was completed in 2008

b) Landfill Gas & Leachate Management

The gas collection & leachate system is currently being installed in conjunction with the Restoration and Aftercare Plan. The EPA and Waterford County Council have reached agreement on the proposed treatment of leachate by use of a series of reed beds.

7. Topographical survey

A Topographical survey is attached in Appendix G.

8. Schedule of Environmental Objectives and Targets for the forthcoming year

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

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

Objective 2 – That no specified emissions from the facility, shall exceed the limit values, set out in Condition 6 and Schedule C of the Waste Licence.

Objective 3 – To maintain the Monitoring Programme as outlined in Condition 8 and Schedule D of the Waste Licence.

Target 3.1 – To carry out the monitoring programme as outlined in Condition 8 and Schedule D of the Waste Licence.

Target 3.2 – To submit Monitoring Reports to the Agency within the timescale as outlined in Schedule E of the Waste Licence.

Objective 4 – To establish good record keeping and that all records are held at the facility office to comply with Condition 10 of the Waste Licence.

Objective 5 – That no emergency situation occurs on the site.

Target 5.1 – Ensure the contingency arrangements as outlined in Condition 9 of the Waste Licence are implemented throughout the year. A document entitled 'Emergency Response Procedures' forms the nucleus of the contingency arrangements and is currently with the Agency.

Objective 6 – To restore the landfill on an on going basis in such a way that final works have a minimal impact on the surrounding environment.

Objective 7 – To complete Gas Management System.

Objective 8 – To comlete Leachate Management System

Objective 9 – To complete Landscaping and Seeding of Landfill Cap

Objective 10 – To complete Gas collection pipework and initially install temporary flare and subsequently install permanent flare.

Objective 11 – Finalise tenders for SCADA dilution system

Objective 12 - Install leachate dilution tanks by direct labour

Objective 13 – Complete Contract for SCADA system

9. Full title and a written summary of any procedures continued during the reporting period

The European Council Directive 90/313/EEC on the *Freedom of Access to Information on the Environment* recognises the significance of the public's access to information relating to the environment. At present, copies of all documents and correspondence relating to Waste Licence 32-2 are on display at the Civic Offices, Dungarvan.

A communications programme will be put in place as required under condition 2.4.1 of the Waste Licence to ensure that members of the public can obtain information concerning the environmental performance of Ballynamuck Landfill. This in turn will address any local community concerns and allow the public the opportunity to provide feedback on the facility.

The Facility Manager will be responsible for the implementation of this programme, which shall form part of the routine operation and management of the facility. Further support will be provided from the Environment Section of Waterford County Council if required.

Programme

Information to be provided at the Facility

1. The following information will be available for inspection at the Site Office, and will be maintained by the Facility Manager.

- Map of the Facility showing all environmental monitoring points
- Current Waste Licence for the Facility
- All records relating to the Facility
- Civic Waste Records
- Nuisance Inspection
- Integrity Tests of Bunds
- Complaints Register

- Incidents Register

- Environmental Monitoring Records (Groundwater, Surface water, Leachate, Landfill Gas, Noise and Meteorological Data).
- Emergency Response Procedure
- Programme for the control and Eradication of Vermin and Flies
- The current EMS for the Facility
- Annual Environmental Report
- Visitors Book

2. The Waste Acceptance hours under condition 1.7.1.2 of the Waste Licence are

Monday – Friday 9.00am – 1.00pm and 1.30pm – 5.00pm,

Saturday's 9.00am – 1.00pm.

3. All visitors are required to sign a Visitors Book at the site office outlining their reason for visiting. Unauthorised personnel are not allowed access to the site.

4. Members of the public may arrange a site visit by contacting the Facility Manager prior to their visit. For Health and Safety reasons all visitors must have appropriate clothing (High Vis-jacket, Walking boots/Wellingtons). The Facility Manager or Caretaker shall accompany all visitors on site visits.

5. If information is requested that is not available at the site, the interested party will be directed to the Environment Section of Waterford County Council at the Civic Offices in Dungarvan.

6. Written Requests for Information

All requests concerning the environmental performance of the facility should be made in writing to:

Facility Manager

Ballynamuck Waste Disposal Site

Dungarvan, Co. Waterford.

7. The Facility Manager shall copy all requests to:

Senior Engineer
Environment Section
Waterford County Council
Civic Offices
Dungarvan
Co. Waterford

8. Each request should indicate the name, address and contact telephone number of the concerned party, an outline of the required information and the manner in which they require the information i.e. copy of record, e-mail etc.

9. Waterford County Council shall make replies in writing within twenty working days of receiving the written request.

10. The information required shall be issued in paper format unless otherwise requested by the concerned party. Requests that require information in digital format may require more time than the twenty working days as outlined previously.

11. If requested Waterford County Council will provide a clear explanation of the information provided.

12. If the concerned party requests the examination of a particular report/document relating to the facility, then it will be made available for viewing at the Landfill site office.

13. ***Media Requests***

The Director of Services within the Environment Section of Waterford County Council shall nominate a liaison person to respond to requests made by the media for information relating to the environmental performance of the facility.

14. ***Feedback from the public***

The Facility Manager will record any comments or suggestions made by the public during their visits and the opportunity will also be available to submit a written comment to the landfill site office. Copies of such minutes or submissions will be kept in a register by the Facility Manager and will also be copied to the Environment Section, for the attention of the Senior Engineer. If requested a reply will be provided by the Council within twenty working days.

Emergency Response Procedures

Scope

The Emergency Response Procedures apply but is not limited to the following incidents occurring:

- Fire / Explosions
- Spillages
- Migration of Landfill Gas
- Environmental Pollution
- Injury or serious accident to persons
- Any other incident, which may pose a significant threat to persons or the environment.

Responsibility

1. The Facility Manager is responsible for the implementation of the Emergency Response Procedure and for the training of all landfill personnel and contractors in effective emergency response procedures.
2. In the event of a major fire or an explosion the Senior Rostered Fire Officer will be notified immediately via the Regional Fire
3. In the event of a serious accident or injury to a person the Ambulance service should be contacted
4. In the event of other incidents e.g. spillages or environmental pollution the Senior Environment Engineer will be notified and will assume responsibility along with the Facility Manager.

Procedure

In the event of an accident occurring the following procedure will be adopted:

- Evacuate the immediate area within the site if necessary
- Inform other site users
- Remain upwind of any hazard area
- Contact site office and advise in detail of the emergency
- Ensure entrance/exit gate is not obstructed
- Contact fire Brigade, Ambulance, Gardaí, and / or Senior Engineer, Waterford County Council as required by dialing 999 or 112

- If incident occurs outside office hours an emergency telephone contact number will be provided on the site notice board
- Personnel shall report to the designated assembly point at the site office
- All areas affected by the incident shall remain closed until given the all-clear by an authorised person

In the event of landfill gas being detected in the site office the following procedure will be followed:

- Raise the alarm
- Evacuate the site office
- Notify relevant senior personnel in Waterford County Council or emergency services if necessary
- Immediately conduct gas survey to identify source
- Remedy cause of problem
- Document incident properly

In the event of a spillage, the Facility Manager shall apply a suitable absorbent material to contain and absorb any spillage at the facility. Once contained the Facility Manager shall have regard to the Corrective Action Procedure.
In the event of a serious threat to the environment, the Facility Manager shall take all necessary short-term action to minimise any further impact and allow the Corrective Action Procedure.

Records

Details of any incident will be recorded in a written register, which will be maintained at the site office

Waste Characterisation & Acceptance Procedures for the Acceptance, Storage and Segregation of Waste

The Civic Waste Facility at Dungarvan Landfill accepts waste from Domestic Householders only.
The following items are accepted:

Waste Electronic and Electrical Equipment – Cages are provided for the collection and storage of small electrical goods. Members of the public are instructed to place all items into these cages by Waterford County Council Employees.

Paint – A 20ft container allows for the collection and storage of paint cans. Members of the public are instructed to place all items on the floor of the container where they are later packed in to steel drums by Waterford County Council Employees.

White Goods (Cookers, washing machines, driers, fridges, freezers) - A 20 ft container allows for the collection and storage of all White goods. Members of the public are instructed to leave all items near the door of the container where they are later double stacked by Waterford County Council Employees.

Glass – Bottle banks are in place to facilitate the disposal of green, brown and clear glass bottles. There is also a small skip in place for the collection of flat glass where it is removed off site for recovery at a later stage**.**

Hazardous Materials (These are collected and stored in a 40ft container)

Cooking Oil – Waterford County Council employees place all cooking oil in steel drums.

Car oil – Members of the public are instructed to leave all cans beside the oil collection unit where it is later emptied in to the unit by Waterford County Council employees.

Fluorescent tubes – Are collected and stored in a specifically made timber coffin.

Domestic Batteries – These are collected and stored in plastic barrels.

Car Batteries – These are collected are stored in specifically designed battery receptacles.

Obsolete medicines - These are collected and stored in plastic barrels.

Aerosols – These are collected and stored in plastic barrels (all aerosols are separated in to flammable, non – flammable, toxic prior to packing. The aerosols are stacked in layers and covered with vermiculite which is a fire proofing material)

Pesticides - These are collected and stored in plastic barrels.

Scrap metal – Members of the public are instructed to place all metal items in to an open skip where it is later removed off site for recovery

Bulky Items (Beds, Carpets, Mattresses, etc) - Members of the public dispose of these items in to a 20ft container where they are later disposed of to the tip head.

Household Waste – Members of the Public place domestic waste in to a closed skip where it is later disposed of to the tip head.

Rubble - Members of the Public place rubble waste in to an open skip. This is kept on site for use in the haul roads

Clay & Top soil - Members of the Public place clay & topsoil in to an open skip. This is kept on site for use in restoration works.

Household Dry Recyclables – Members of the public dispose of recycling material in to a closed skip where it is later removed off site for recovery.

Timber - Members of the Public place timber products in to an open skip where it is later removed off site for recovery.

10. Reported Incidents and Complaints

There were no reported incidents or complaints for the reported period.

11. Management and Staffing of the Facility

Management and staffing of the facility is attached in Appendix H.

12. Programme for Public Information

All files are held at the site office and at the Civic Offices Dungarvan Co. Waterford

13. Report on training of staff

Both the Facility Manager and Deputy Manager have attended the Fás Waste Management Training Course. Site personnel have attended the Fás Safe Pass program, Waste Facility Operative Course and site operatives attended a course in the handling, storage and removal of Waste from the Civic Amenity Site. Training Courses for 2007 will include manual handling training, Waste Facility Operative Course, Fire Fighting and fire extinguisher training and a refresher First Aid Course.

APPENDIX A

Quantity & Composition of Waste Received, Disposed of & Recovered during the reporting period.

Waste Tonnages for Dungarvan Landfill / Civic Amenity Site 2008

Waste Disposed	Type	EWC Code	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08	Oct-08	Nov-08	**Dec-08**	Total
Domestic	Domestic Bulky CoCo	20 03 01	10.64	9.5	10.84	11.90	9.52	9.52	8.06	13.76	9.8	9.04	7.84	7.06	**117.48**
	Bulky CoCo	20 03 01	0	0	0	13.10	6	3.08	6.78	3.3	3.32	8.04	0.98	17.96	**62.56**
	Domestic Bulky UDC	20 03 01	40.92	22.44	6.62	13.32	62.54	28.58	12.66	18.92	12.56	22.28	59.52	34.58	**334.94**
	Civic Skip	20 03 01	6.68	8.62	5.42	6.60	7.12	7.12	6.6	13.04	7.52	6.5	8.42	7.8	**91.44**
	Transferred from Lismor	20 03 99	30.12	31.32	25.72	27.16	38.36	27.1	43.04	32.18	31.48	25.56	28	35.7	**375.74**
	WCC Housing	20 03 99	0	0.32	0.26	0.94	0.18	0	0.36	0.78	0.16	0.5	0.94	1.08	**5.52**
	Spring Clean Up	20 03 99	0	11.04	12.98	0.00	0	0	0	0	0	1.46	0		**25.48**
	Domestic CoCo	20 03 01	161.82	246.54	106.98	198.80	166.52	145.3	243.1	151.68	223.44	108.5	244.16	137.52	**2134.34**
	UDC Domestic	20 03 99	63.74	98.42	42.56	84.44	86.8	54.84	76.88	42.22	85.26	41.34	91.26	51.12	**818.88**
MRF Plant	MRF Plant	20 03 99	0	2.02	1.76	0.00	4.08	3.14	0	0	0	4.26	0	3.6	**18.86**
Litter	Roadsweeper	20 03 99	0	0	0	0.00	0	0	0	6.7	0	12.2	0	4.56	**23.46**
	RoadsweeperUDC	20 03 99	45.78	44.66	42.58	46.92	60.98	41.62	50.86	32.22	40.12	37.4	35.34	37	**515.48**
	Litterbins	20 03 99	15.3	16.52	14.32	13.24	11.38	11.72	14.5	13.9	11.76	9.34	6.2	16.08	**154.26**
	LitterbinsUDC	20 03 99	22.92	20.96	19.72	24.60	19.14	25.04	16.24	16.82	25.1	20.34	18.08	17.12	**246.08**
Total Disposed			**397.92**	**512.36**	**289.76**	**441.02**	**472.62**	**357**	**479**	**345.52**	**450.52**	**306.8**	**500.74**	**371.18**	**4924.52**

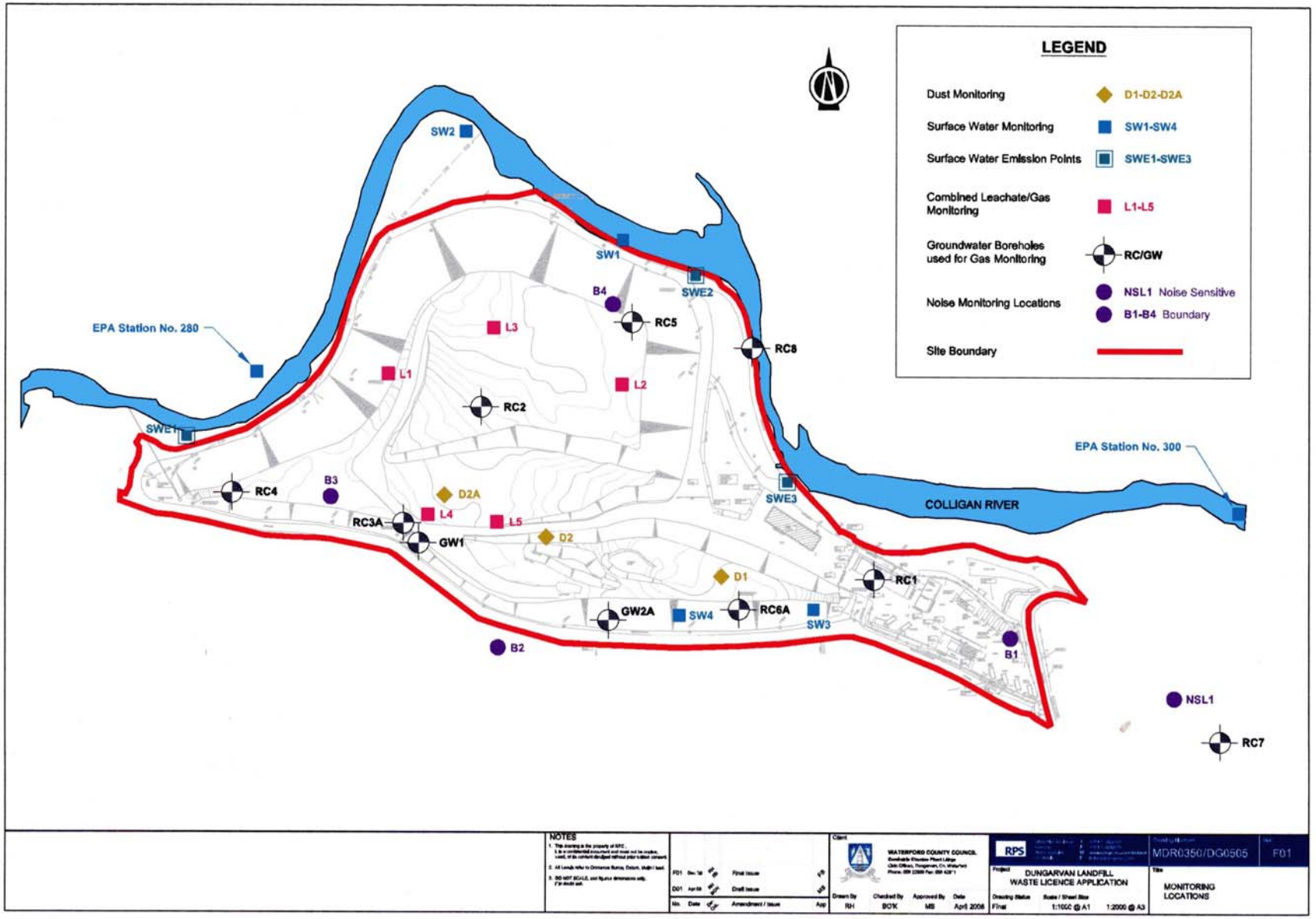
Recycling	Dry Material	15 01 01	9.74	6.86	6.9	5.96	6.04	8.48	10.4	13.7	8.02	7.36	7.68	11.16	**102.30**
	Textiles	04 02 22	0.46	0	0.32	0	0.56	0	0	0.24	0.24	0.34	0.32	0.18	**2.66**
	Fridges	16 02 11	2.6	3.14	2.16	0	0	2.16	2.2	2.6	0	4.38	0	6.2	**25.44**
	WEEE	16 02 13	6.06	5.46	3.84	4.96	11.74	5.5	8.26	5.98	7.82	3.18	5.92	2.7	**71.42**
	Large Household	16 02 13	19.66	8.56	10	3.08	9.46	10.36	7.34	10.88	9.36	3.66	10.9	8.02	**111.28**
	Small Household	16 02 13	0	0	0	0	0	0	0	0	0	0	0	0	**0.00**
	Polluted Appliances	16 02 13	0	0	0	0	0	0	0	0	0	0	0	0	**0.00**
	TV's Monitors	16 02 09	0	0	0	0	0	0	0	0	0	0	0	0	**0.00**
Scrapmetal	Scrap metal	17 04 07	3.64	2.68	3.26	5.66	1.32	3.26	4.58	4.7	3	1.84	1.28	3.36	**38.58**
Recovery	Clay		0	0	0	0	0	68.98	0	0	0	0	0	0	**68.98**
	Clay on Purchase		821.06	163.88	1792.24	13,262.90	7.24	13165.7	9603.38	9021.08	10655.98	0	0	4660.52	**63153.98**
	Rubble	17 01 07	0	14.22	0	5.54	8.08	0	9.06	7.9	0	6.42	6.1	0	**57.32**
Glass	Flat Glass	17 02 02	0	0	0	0	2.16	0	0	0	0	0	1.5	0	**3.66**
Compost	Compost	02 01 07	2.28	0	0	0	0	0	0	0	0	0	0	13.06	**15.34**
	Brown Bin	02 01 07	0	0	0	0	0	0	22.5	94.88	58.78	162.46	114.88	163.56	**617.06**
	Brown Bin UDC	02 01 07	0	0	0	0	0	0	0	0	13.52	50.6	25.52	30.94	**120.58**
	Brown Bin Commercial	02 01 07	0	0	0	0	0	0	0	0	0	0	0	0	**0.00**
	Garden CoCo	02 01 07	0	0	0.84	0	0.06	0	0.28	0.16	0.1	0	0	0	**1.44**
	Garden UDC	02 01 07	0	0	0	0	5.48	0	0	0	0	0	0	0	**5.48**
	Garden Private	02 01 07	0	0	0	0	0	0	0	0	0	0	0	0	**0.00**
	Garden waste Lismore	02 01 07	43.84	0	0	0	0	0	0	0	0	0	0	0	**43.84**
	Garden waste Tramore	02 01 07	0	2.46	0	0	0	0	0	0	0	0	0	0	**2.46**
Timber	Timber	17 02 01	11.2	3.82	7.82	8.3	6.48	10.24	15.84	12.62	7.02	6.36	6.3	4.64	**100.64**
Hazardous	Aerosols	16 05 04	0	0	0	0	0	0	0	0	0	0	0	0	**0.00**
	Flourescent Lamps	16 02 11	0	0	0	0.08	0.08	0.08	0	0	0.08	0	0.16	0	**0.48**
	Cooking Oil	02 03 99	0.84	0	0	0	0.28	0	0	0	0	0	0	0	**1.12**
	Paint	08 01 21	0	0	0	0	0	0	2.08	0	0.62	0	0	0	**2.70**
	Car Filters	13 02 06	0	0	0	0	0	0	0	0	0.5	0	0	0	**0.50**
	Batteries	16 06 01	0	0	0	0	0	0	0	0	0.8	0	0	0	**0.80**
Total Accepted			**1319.3**	**723.44**	**2117.14**	**13737.5**	**531.6**	**13631.8**	**10165**	**9520.26**	**11216.36**	**553.4**	**681.3**	**5275.52**	**69472.58**

Waste Transfered															
Compost	Compost	02 01 07	0	0	0	1.78	0	0	0	0	0	0	0	0	1.78
	CompostUDC	02 01 07	0	0	0	2.12	7.82	1.2	0	0	0	0	10.42	0	21.56
	Brown Bins	02 01 07	0	0	0	0	0	0	19.08	78.3	64.8	176.38	151.5	153.38	643.44
	Fridges	16 02 11	2.52	2.98	2.16	2.66	0	2.06	2.2	2.52	0	4.36	0	6.2	27.66
	WEEE	16 02 13	6.04	5.32	3.82	2.26	10.74	5.42	8.22	5.92	7.76	4.92	5.78	2.7	68.9
	Large Household	16 02 13	19	8.58	9.86	5.98	9.46	10.36	7.34	10.76	2.64	3.7	10.9	8.04	106.62
	Small Household	16 02 13	0	0	0	0	0	0	0	0	0	0	0	0	0
	Polluted Appliances	16 02 13	0	0	0	0	0	0	0	0	0	0	0	0	0
	TV's Monitors	16 02 09	0	0	0	0	0	0	0	0	0	0	0	0	0
Recycling*	Dry Materials	15 01 01	9.36	6.68	7.1	5.76	5.92	8.44	10.5	13.52	0	7.08	7.72	10.94	93.02
	Textiles	04 02 22	0.46	0	0.32	0	0.5	0	0	0.24	0.24	0	0.32	0.16	2.24
	Timber	17 02 01	11.24	3.86	7.84	8.06	5.16	10.32	14.36	12.7	6.86	4.16	6.34	4.72	95.62
Scrapmetal	Scrapmetal	17 04 07	3.72	2.42	3.36	5.72	1.32	3.32	4.58	4.58	3.04	1.86	1.28	3.36	38.56
Recovery	Clay		0	0	0	0	0	0	0	0	0	0	0	0	0
	Rubble	17 01 07	0	14.26	0	5.58	7.98	0	9.06	7.82	0	0	6.12	0	50.82
	Dom CoCo	20 03 01	413.72	452.14	341.64	401.42	469.44	347.8	483.12	325.78	465.32	304.52	430.96	473.92	4909.78
	Garden CoCo	02 01 07	0	0	0	0	0	0	0	0	0	0	0	0	0
Glass	Flat Glass	17 02 02	0	0	0	0	2.16	0	0	0	0	0	1.52	0	3.68
	Leachate		0	0	0	0	0	0	0	0	0	0	0	0	0
Hazardous	Aerosols	16 05 04	0	0	0	0	0	0	0	0	0	0	0	0	0
	Flourescent Lamps	16 02 11	0	0	0	0.08	0.08	0.08	0	0	0.08	0	0.16	0	0.48
	Cooking Oil	02 03 99	0.84	0	0	0	0.16	0	0	0	0	0	0	0	1
	Paint	08 01 21	0	0	0	0.74	0	0	2.08	0	0	0	0	0	2.82
	Car Filters	13 02 06	0	0	0	0	0	0	0	0	0	0	0	0	0
	Batteries	16 06 01	0	0	0	0	0	0	0	0	0.7	0	0	0	0.7
Total			**466.9**	**496.24**	**376.1**	**442.16**	**520.74**	**389**	**560.54**	**462.14**	**551.44**	**506.98**	**633.02**	**663.42**	6068.68

Mr Binman	125	106	105	135	131	103	101	0	99	87	78	66	

Appendix B

Monitoring Locations


LEGEND
Dust Monitoring
D1-D2-D2A
Surface Water Monitoring
SW1-SW4
Surface Water Emission Points
SWE1-SWE3
Combined Leachate/Gas Monitoring
L1-L5
Groundwater Boreholes used for Gas Monitoring
RC/GW
Noise Monitoring Locations
NSL1 Noise Sensitive
B1-B4 Boundary
Site Boundary
SW2
SW1
SWE2
B4
RC5
RC8
EPA Station No. 280
L3
L1
L2
RC2
SWE1
EPA Station No. 300
B3
RC4
D2A
SWE3
COLLIGAN RIVER
L4
L5
RC3A
GW1
D2
D1
RC1
GW2A
SW4
RC6A
SW3
B2
B1
NSL1
RC7
NOTES
1. This drawing is the property of RPS ...
2. All Levels refer to Ordnance Survey, Dalkey, Malin Head.
3. DO NOT SCALE, use figured dimensions only. For detail only.
F01 Final Issue
D01 Draft Issue
No. Date Amendment / Issue App
Client
WATERFORD COUNTY COUNCIL
Drawn By RH
Checked By BO'K
Approved By MS
Date April 2006
RPS
Project DUNGARVAN LANDFILL WASTE LICENCE APPLICATION
Drawing Status Final
Scale / Sheet Size 1:1000 @ A1 1:2000 @ A3
MDR0350/DG0505
F01
Title MONITORING LOCATIONS

Appendix C

Surface Water Results

Environmental Protection Agency
Regional Inspectorate
Seville Lodge, Callan Road,
Kilkenny

Report of:	Analysis of landfill site sample(s)
Report to:	Waterford County Council
Report date:	22/04/08

Facility:	**Dungarvan Waste Disposal Site** Ballynamuck Middle, Dungarvan, Co. Waterford
Reference No:	W0032-01

Date collected:	05/03/2008	Date received:	05/03/2008

37

				Laboratory Ref:	2801277	2801278	2801279	2801280	
				Type of sample:	Surface Water	Surface Water	Surface Water	Surface Water	
				Location code:	WST-W0032-01-SW1	WST-W0032-01-SW2	WST-W0032-01-SW280	WST-W0032-01-SW300	
				Sampling point:	Clear sample	Clear sample	Clear sample	Clear sample	
				Sampled by:	Jim McGarry	Jim McGarry	Jim McGarry	Jim McGarry	
				Time Sampled:	14:15	14:25	17:00	13:57	
				Start/End - Dates of Analysis:					
				Status of results:	**Final Report**	**Final Report**	**Final Report**	**Final Report**	
Parameter		**Units**	**Limits**						
F	Temperature	°C			7.8	7.9	8.3	8.2	
F	Dissolved Oxygen	% Saturation			106.6	109.0	110.4	107.1	
	pH	pH			7.9	7.9	7.9	8.0	
	Conductivity	µS/cm			174	184	171	1448	
	Chemical Oxygen Demand	mg/l O2			<8	10	<8	13	
	Biochemical Oxygen Demand	mg/l O2			0.4	0.4	0.3	0.7	
	Suspended Solids	mg/l			<6	<6	<7.0	<6	

Comments:

1) Results highlighted and in bold are outside specified limits.
2) All Metals Analysed in the EPA Dublin Laboratory.
   Cyanide Analysed in the EPA Cork Laboratory.
   Phenols Analysed in the EPA Castlebar Laboratory.
3) nm "Not measured"
4) nd "None detected"
5) nt "No time" - Time not recorded
6) tntc "Too numerous to count"
7) F "Field measured parameters"

Signed: Jan Smith Date: 22/4/08

pp Michael Neill, Regional Chemist

Report number:KK2800566/1

ALcontrol Laboratories (Dublin)

18a Rosemount Business Park,
Ballycoolin,
Dublin 11
Ireland
Tel: +353 (0) 1 8829893
Fax: +353 (0) 1 8829895

CERTIFICATE OF ANALYSIS

Client: EPA (Kilkenny)

Seville Lodge
Callan Road
Kilkenny

Attention: Jean Smith

Date: 18 June, 2008

Our Reference: 08-B03426/01

Your Reference:

Location:

A total of 11 samples was received for analysis on Thursday, 5 June 2008 and authorised on Wednesday, 18 June 2008. Accredited laboratory tests are defined in the log sheet, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation. We are pleased to enclose our final report, it was a pleasure to be of service to you, and we look forward to our continuing association.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Signed

Lorraine McNamara
Laboratory Technical Manager

Compiled By

Paul Barry

UKAS TESTING
1291
GROUP

Printed at 12:39 on 19/06/2008

ALcontrol Laboratories Ireland

Test Schedule

Ref Number: 08-B03426/01
Client: EPA (Kilkenny)
Date of Receipt: 05/06/2008

Sample Type: WATER
Location:
Client Contact: Jean Smith
Client Ref:

Detection Method				HPLC	SPECTRO
UKAS Accredited [Testing Laboratory] No. 1291					✓
ALcontrol Reference	Sample Identity	Other ID	P / V	Speciated Phenols by HPLC	Total Cyanide
08-B03426-S0005-A01	Blank	UNKNOWN	Plastic Bottle + NaOH	-	X
08-B03426-S0005-A03	Blank	UNKNOWN	Glass Bottle + NaOH	X	-
08-B03426-S0006-A01	GW1-2363	UNKNOWN	Plastic Bottle + NaOH	-	X
08-B03426-S0006-A03	GW1-2363	UNKNOWN	Glass Bottle + NaOH	X	-
08-B03426-S0007-A01	GW3a-2364	UNKNOWN	Plastic Bottle + NaOH	-	X
08-B03426-S0007-A03	GW3a-2364	UNKNOWN	Glass Bottle + NaOH	X	-
08-B03426-S0008-A01	GW6a-2365	UNKNOWN	Plastic Bottle + NaOH	-	X
08-B03426-S0008-A03	GW6a-2365	UNKNOWN	Glass Bottle + NaOH	X	-
08-B03426-S0009-A01	RC7-2365	UNKNOWN	Plastic Bottle + NaOH	-	X
08-B03426-S0009-A03	RC7-2365	UNKNOWN	Glass Bottle + NaOH	X	-
08-B03426-S0010-A01	L4-2367	UNKNOWN	Plastic Bottle + NaOH	-	X
08-B03426-S0011-A01	GW2a-2420	UNKNOWN	Plastic Bottle + NaOH	-	X
08-B03426-S0011-A03	GW2a-2420	UNKNOWN	Glass Bottle + NaOH	X	-
08-B03426-S0012-A01	RC4-2421	UNKNOWN	Plastic Bottle + NaOH	-	X
08-B03426-S0012-A03	RC4-2421	UNKNOWN	Glass Bottle + NaOH	X	-
08-B03426-S0013-A01	RC8-2422	UNKNOWN	Plastic Bottle + NaOH	-	X
08-B03426-S0013-A03	RC8-2422	UNKNOWN	Glass Bottle + NaOH	X	-
08-B03426-S0014-A01	L1-2423	UNKNOWN	Plastic Bottle + NaOH	-	X
08-B03426-S0015-A01	Interceptor-2427	UNKNOWN	Plastic Bottle + NaOH	-	X

Notes : NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING

Printed at 12:39 on 19/06/2008

* SUBCONTRACTED TO OTHER LABORATORY / ** SAMPLES ANALYSED AT THE CHESTER LABORATORY

ALcontrol Laboratories Ireland

Test Schedule Summary

Ref Number: 08-B03426/01
Client: EPA (Kilkenny)
Date of Receipt: 05/06/2008

Sample Type: WATER
Location:
Client Contact: Jean Smith
Client Ref:

* SUBCONTRACTED TO OTHER LABORATORY / ** SAMPLES ANALYSED AT THE CHESTER LABORATORY

SCHEDULE	METHOD	TEST NAME	TOTAL
X	HPLC	Speciated Phenols by HPLC	8
X	SPECTRO	Total Cyanide	11

☐ Interim
☑ Validated

ALcontrol Laboratories Ireland

Table Of Results

Ref Number: 08-B03426/01
Client: EPA (Kilkenny)
Date of Receipt: 05/06/2008
(of first sample)

Sample Type: WATER
Location:
Client Contact: Jean Smith
Client Ref:

	Detection Method		HPLC	HPLC	HPLC	HPLC	HPLC	HPLC	HPLC	HPLC	HPLC	SPECTRO
	Method Detection Limit		<0.01mg/l	<0.01mg/l	<0.01mg/l	<0.01mg/l	<0.01mg/l	<0.01mg/l	<0.01mg/l	<0.01mg/l	<0.01mg/l	<0.05mg/l
UKAS Accredited [Testing Laboratory] No. 1291												✓
ALcontrol Reference	Sample Identity	Other ID	1 Naphthol	2- Isopropyl Phenol	2,3,5 -Trimethyl Phenol	Catechol	Phenol	Resorcinol	Total Cresols	Total Phenols	Total Xylenols	Total Cyanide
			mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
08-B03426-S0005	Blank	UNKNOWN	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	0.01	<0.01	<0.05
08-B03426-S0006	GW1-2363	UNKNOWN	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	0.01	<0.01	<0.05
08-B03426-S0007	GW3a-2364	UNKNOWN	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	0.01	<0.01	<0.05
08-B03426-S0008	GW6a-2365	UNKNOWN	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	0.01	<0.01	<0.05
08-B03426-S0009	RC7-2366	UNKNOWN	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	0.01	<0.01	<0.05
08-B03426-S0010	14-2367	UNKNOWN	-	-	-	-	-	-	-	-	-	<0.05
08-B03426-S0011	GW2a-2420	UNKNOWN	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	0.01	<0.01	<0.05
08-B03426-S0012	RC4-2421	UNKNOWN	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	0.03	<0.01	<0.05
08-B03426-S0013	RC8-2422	UNKNOWN	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05
08-B03426-S0014	L1-2423	UNKNOWN	-	-	-	-	-	-	-	-	-	<0.05
08-B03426-S0015	Interceptor-2427	UNKNOWN	-	-	-	-	-	-	-	-	-	<0.05

Notes : METHOD DETECTION LIMITS ARE NOT ALWAYS ACHIEVABLE DUE TO VARIOUS CIRCUMSTANCES BEYOND OUR CONTROL. **NDP** = NO DETERMINATION POSSIBLE

Checked By : Paul Barry

Printed at 12:39 on 19/06/2008

* SUBCONTRACTED TO OTHER LABORATORY / ** SAMPLES ANALYSED AT THE CHESTER LABORATORY

APPENDIX

1. Results are expressed as mg/kg dry weight (dried at 30°C) on all soil analyses except for the following: NRA Leach tests, flash point, and ammoniacal N_2 by the BRE method, VOC, PRO, Cyanide, Acid Soluble Sulphide,TPH by IR, OFGs and SEM.

2. Samples will be run in duplicate upon request, but an additional charge may be incurred.

3. A sub sample of all samples received will be retained free of charge for one month for soils and one month for waters (sample size permitting), but may then be discarded unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage.

4. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

5. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

6. When requested, an asbestos screen is done in-house on soils and if no fibres are found will be reported as NFD – no fibres detected. If fibres are detected, then identification and quantification is carried out by ALcontrol Technichem or Alcontrol Shutlers in the UK . If a sample is suspected of containing asbestos, then drying and crushing will be suspended on that sample until the asbestos results are known. If asbestos is present, then no analysis requiring dry sample are undertaken.

7. If no separate volatile sample is supplied by the client, the integrity of the data may be compromised if the laboratory is required to create a sub-sample from the bulk sample – similarly, if a headspace is present in the volatile sample.

8. NDP – No Determination Possible due to insufficient/unsuitable sample.

9. Metals in water are performed on a filtered sample, and therefore represent dissolved metals – total metals must be requested separately.

10. A table containing the date of analysis for each parameter is not routinely included with the report, but is available upon request.

Last updated February 2005

Environmental Protection Agency
Regional Inspectorate
Seville Lodge, Callan Road,
Kilkenny

eport of: Analysis of landfill site sample(s)
eport to: Waterford County Council
eport date: 18/06/08

acility: **Dungarvan Waste Disposal Site**
Ballynamuck Middle, Dungarvan, Co Waterford
eference No: W0032-01

ate collected: 13/05/2008 Date received 13/05/2008

		Laboratory Ref:	2802417	2802418	2802419
		Type of sample:	Surface Water	Surface Water	Surface Water
		Location code:	WST W0032-01-SW1	WST-W0032-01-SW2	WST-W0032-01-SW280
		Sampling point:	Clear sample	Clear sample	Clear sample
		Sampled by:	Jim McGarry	Jim McGarry	Jim McGarry
		Time Sampled:	13 00	13 10	13 20
		Start/End - Dates of Analysis:			
		Status of results:	**Final Report**	**Final Report**	**Final Report**
rameter	**Units**	**Limits**			
Temperature	°C		16 7	16 6	16 7
Dissolved Oxygen	% Saturation		130 7	125 1	125 2
Chemical Oxygen Demand	mg/l O2		<8	<8	<8
Biochemical Oxygen Demand	mg/l O2		0 5	0 5	0 4
Suspended Solids	mg/l		<10	<10	<10
Ammonia	mg/l N		0 1	0 23	0 01
Chloride	mg/l Cl		15	14	16
Nitrite	mg/l N		0 004	0.004	0.004
Ortho-Phosphate	mg/l P		0 009	0.009	0 007
Total Oxidised Nitrogen	mg/l N		3 1	3.1	3 1
pH	pH		8 3	8 3	8 2
Conductivity	µS/cm		180	170	185

Report number KK2801074/1

Page 1 of 2

17-APR-2009 12:47 From:WATERFORD CO CO 051 384238 To:058 45606 P.5/19

Environmental Protection Agency
Regional Inspectorate
Seville Lodge, Callan Road,
Kilkenny

Report of: Analysis of landfill site sample(s)
Report to: Waterford County Council
Report date: 18/06/08

Facility: **Dungarvan Waste Disposal Site**
Ballynamuck Middle, Dungarvan, Co. Waterford
Reference No: W0032-01

Sampling location: **WST-W0032-01-SW300, Dungarvan landfill site - W0032-01 -- SW300 - EPA Surface Water station 300**

Date collected: 12/05/2008 Date received 12/05/2008

			Laboratory Ref:	2802362
			Type of sample:	Surface Water
			Sampling point:	Clear sample
			Sampled by:	Jim McGarry
			Time Sampled:	12:20
			Start/End - Dates of Analysis:	
			Status of results:	**Final Report**
Parameter		**Units**	**Limits**	
F	Temperature	°C		17 7
F	Dissolved Oxygen	% Saturation		110.4
	pH	pH		8.0
	Conductivity	µS/cm		12550
	Ammonia	mg/l N		0 24
	Chloride	mg/l Cl		4651
	Nitrite	mg/l N		0.011
	Ortho-Phosphate	mg/l P		0 014
	Total Oxidised Nitrogen	mg/l N		1 5
	Chemical Oxygen Demand	mg/l O2		175
	Biochemical Oxygen Demand	mg/l O2		1 1
	Alkalinity	mg/l CaCO3		78
	Suspended Solids	mg/l		18
	Total Organic Carbon	mg/l C		nm

Report number KK2801048/1

Environmental Protection Agency
Regional Inspectorate
Seville Lodge, Callan Road,
Kilkenny

Report of:	Analysis of landfill site sample(s)
Report to:	Waterford County Council
Report date:	08/12/08

Facility:	**Dungarvan Waste Disposal Site** Ballynamuck Middle, Dungarvan, Co. Waterford
Reference No:	W0032-01

Date collected:	27/08/2008	Date received:	27/08/2008

			Laboratory Ref.	2804321	2804322	2804323	2804324	2804325
			Type of sample:	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
			Location code:	WST-W0032-01-SW1	WST-W0032-01-SW2	WST-W0032-01-SW280	WST-W0032-01-SW300	WST-W0032-01-SW lagoon
			Sampling point:	Clear sample	Clear sample	Clear sample	Clear sample	Light brown colour
			Sampled by:	Jim McGarry	Jim McGarry	Jim McGarry	Jim McGarry	Jim McGarry
			Time Sampled:	13:15	13:07	14:35	15:30	15:02
			Start/End - Dates of Analysis:					
			Status of results:	**Final Report**	**Final Report**	**Final Report**	**Final Report**	**Final Report**
Parameter		**Units**	**Limits**					
F	Temperature	°C		14.2	14.0	15.3	16.5	18.0
F	Dissolved Oxygen (as %Sat)	% Saturation		101.8	102.4	103.4	107.9	61.5
	pH	pH		8.0	7.7	7.7	7.9	7.8
	Conductivity @25°C	µS/cm		163	162	158	461	423
	Ammonia	mg/l N		0.025	0.009	0.009	0.073	0.25
	Chloride	mg/l Cl		14	14	14	91	17
	Chemical Oxygen Demand	mg/l O2		14	51	<8	18	29
	Biochemical Oxygen Demand	mg/l O2		0.8	0.4	0.5	1.1	4.7
	Suspended Solids	mg/		<6	<6.8	<9.8	11	7

Comments:

1) Results highlighted and in bold are outside specified limits.
2) All Metals Analysed in the EPA Dublin Laboratory.
   Cyanide Analysed in the EPA Cork Laboratory.
   Phenols Analysed in the EPA Castlebar Laboratory.
3) **nm** "Not measured"
4) **nd** "None detected"
5) **nt** "No time" - Time not recorded
6) **tntc** "Too numerous to count"
7) **F** "Field measured parameters"

Signed: Jean Smith Date: 8/12/18

Michael Neill, Regional Chemist

Environmental Protection Agency
Regional Inspectorate
Seville Lodge, Callan Road,
Kilkenny

Report of:	Analysis of landfill site sample(s)
Report to:	Waterford County Council
Report date:	19/12/08

Facility:	**Dungarvan Waste Disposal Site** Ballynamuck Middle, Dungarvan, Co. Waterford
Reference No:	W0032-02

Date collected:	18/11/2008	Date received:	18/11/2008

			Laboratory Ref:	2806073	2805074	2806075	2806076	2806077
			Type of sample:	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
			Location code:	WST-W0032-01-SW1	WST-W0032-01-SW2	WST-W0032-01-SW230	WST-W0032-01-SW300	WST-W0032-01-SW lagoon
			Sampling point:	Clear sample	Clear sample	Clear sample	No sample - Tide was out	Clear sample
			Sampled by:	Jim McGarry	Jim McGarry	Jim McGarry	Jim McGarry	Jim McGarry
			Time Sampled:	15:11	15:04	14:59	13:40	16:25
			Start/End - Dates of Analysis:				/	
			Status of results:	**Final Report**	**Final Report**	**Final Report**	**Final Report**	**Final Report**
Parameter		**Units**	**Limits**					
F	Temperature	°C		10.2	10.3	10.2	-	9.4
F	Dissolved Oxygen (as %Sat)	% Saturation		103.0	103.0	103.0	-	92.0
	Conductivity @25°C	µS/cm		157	147	146	-	326
	pH	pH		7.5	7.6	7.6	-	8.0
	Biochemical Oxygen Demand	mg/l O2		0.9	0.6	0.7	-	4.3
	Suspended Solids	mg/l		<6	<6	<10	-	14

Comments:

1) Results highlightec and in bold are outside specified limits
2) All Metals Analysed in the EPA Dublin Laboratory.
   Cyanide Analysed in the EPA Cork Laboratory
   Phenols Analysed in the EPA Castlebar Laboratory
3) **nm** "Not measured"
4) **nd** "None detected"
5) **nt** "No time" - Time not recorded
6) **tntc** "Too numerous to count"
7) **F** "Field measured parameters"

Signed: Jan Smith Date: 19/12/08

pp Michael Neill, Regional Chemist

Appendix D

Ground Water Results

Environmental Protection Agency
Regional Inspectorate
Seville Lodge, Callan Road,
Kilkenny

Report of:	Analysis of landfill site sample(s)
Report to:	Waterford County Council
Report date:	22/04/08

Facility:	**Dungarvan Waste Disposal Site** Ballynamuck Middle, Dungarvan, Co. Waterford
Reference No:	W0032-01

Date collected:	05/03/2008	Date received:	05/03/2008

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				Laboratory Ref:	2801277	2801278	2801279	2801280	
				Type of sample:	Surface Water	Surface Water	Surface Water	Surface Water	
				Location code:	WST-W0032-01-SW1	WST-W0032-01-SW2	WST-W0032-01-SW280	WST-W0032-01-SW300	
				Sampling point:	Clear sample	Clear sample	Clear sample	Clear sample	
				Sampled by:	Jim McGarry	Jim McGarry	Jim McGarry	Jim McGarry	
				Time Sampled:	14:15	14:25	17:00	13:57	
				Start/End - Dates of Analysis:					
				Status of results:	**Final Report**	**Final Report**	**Final Report**	**Final Report**	
Parameter		**Units**	**Limits**						
F	Temperature	°C			7.8	7.9	8.3	8.2	
F	Dissolved Oxygen	% Saturation			106.6	109.0	110.4	107.1	
	pH	pH			7.9	7.9	7.9	8.0	
	Conductivity	µS/cm			174	184	171	1448	
	Chemical Oxygen Demand	mg/l O2			<8	10	<8	13	
	Biochemical Oxygen Demand	mg/l O2			0.4	0.4	0.3	0.7	
	Suspended Solids	mg/l			<6	<6	<7.0	<6	

Comments:

1) Results highlighted and in bold are outside specified limits.
2) All Metals Analysed in the EPA Dublin Laboratory.
   Cyanide Analysed in the EPA Cork Laboratory.
   Phenols Analysed in the EPA Castlebar Laboratory.
3) nm "Not measured"
4) nd "None detected"
5) nt "No time" - Time not recorded
6) tntc "Too numerous to count"
7) F "Field measured parameters"

Signed: Jan Smith Date: 22/4/08

pp Michael Neill, Regional Chemist

Report number:KK2800566/1

ALcontrol Laboratories (Dublin)

18a Rosemount Business Park,
Ballycoolin,
Dublin 11
Ireland
Tel: +353 (0) 1 8829893
Fax: +353 (0) 1 8829895

CERTIFICATE OF ANALYSIS

Client: EPA (Kilkenny)

Seville Lodge
Callan Road
Kilkenny

Attention: Jean Smith

Date: 18 June, 2008

Our Reference: 08-B03426/01

Your Reference:

Location:

A total of 11 samples was received for analysis on Thursday, 5 June 2008 and authorised on Wednesday, 18 June 2008. Accredited laboratory tests are defined in the log sheet, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation. We are pleased to enclose our final report, it was a pleasure to be of service to you, and we look forward to our continuing association.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Signed

Lorraine McNamara

Lorraine McNamara
Laboratory Technical Manager

Compiled By Paul Barry

Paul Barry

UKAS TESTING
1291
GROUP

Printed at 12:39 on 19/06/2008
ALcontrol [illegible] is a trading division of [illegible]
Registered Office: [illegible] House, [illegible] Close, Rotherham, [illegible]. Registered in England and Wales No. [illegible]

ALcontrol Laboratories Ireland

Test Schedule

Ref Number: 08-B03426/01
Client: EPA (Kilkenny)
Date of Receipt: 05/06/2008

Sample Type: WATER
Location:
Client Contact: Jean Smith
Client Ref:

Detection Method				HPLC	SPECTRO
UKAS Accredited [Testing Laboratory] No. 1291					✓
ALcontrol Reference	Sample Identity	Other ID	P / V	Speciated Phenols by HPLC	Total Cyanide
08-B03426-S0005-A01	Blank	UNKNOWN	Plastic Bottle + NaOH	-	X
08-B03426-S0005-A03	Blank	UNKNOWN	Glass Bottle + NaOH	X	-
08-B03426-S0006-A01	GW1-2363	UNKNOWN	Plastic Bottle + NaOH	-	X
08-B03426-S0006-A03	GW1-2363	UNKNOWN	Glass Bottle + NaOH	X	-
08-B03426-S0007-A01	GW3a-2364	UNKNOWN	Plastic Bottle + NaOH	-	X
08-B03426-S0007-A03	GW3a-2364	UNKNOWN	Glass Bottle + NaOH	X	-
08-B03426-S0008-A01	GW6a-2365	UNKNOWN	Plastic Bottle + NaOH	-	X
08-B03426-S0008-A03	GW6a-2365	UNKNOWN	Glass Bottle + NaOH	X	-
08-B03426-S0009-A01	RC7-2365	UNKNOWN	Plastic Bottle + NaOH	-	X
08-B03426-S0009-A03	RC7-2365	UNKNOWN	Glass Bottle + NaOH	X	-
08-B03426-S0010-A01	L4-2367	UNKNOWN	Plastic Bottle + NaOH	-	X
08-B03426-S0011-A01	GW2a-2420	UNKNOWN	Plastic Bottle + NaOH	-	X
08-B03426-S0011-A03	GW2a-2420	UNKNOWN	Glass Bottle + NaOH	X	-
08-B03426-S0012-A01	RC4-2421	UNKNOWN	Plastic Bottle + NaOH	-	X
08-B03426-S0012-A03	RC4-2421	UNKNOWN	Glass Bottle + NaOH	X	-
08-B03426-S0013-A01	RC8-2422	UNKNOWN	Plastic Bottle + NaOH	-	X
08-B03426-S0013-A03	RC8-2422	UNKNOWN	Glass Bottle + NaOH	X	-
08-B03426-S0014-A01	L1-2423	UNKNOWN	Plastic Bottle + NaOH	-	X
08-B03426-S0015-A01	Interceptor-2427	UNKNOWN	Plastic Bottle + NaOH	-	X

Notes : NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING

Printed at 12:39 on 19/06/2008

* SUBCONTRACTED TO OTHER LABORATORY / ** SAMPLES ANALYSED AT THE CHESTER LABORATORY

ALcontrol Laboratories Ireland

Test Schedule Summary

Ref Number: 08-B03426/01
Client: EPA (Kilkenny)
Date of Receipt: 05/06/2008

Sample Type: WATER
Location:
Client Contact: Jean Smith
Client Ref:

* SUBCONTRACTED TO OTHER LABORATORY / ** SAMPLES ANALYSED AT THE CHESTER LABORATORY

SCHEDULE	METHOD	TEST NAME	TOTAL
X	HPLC	Speciated Phenols by HPLC	8
X	SPECTRO	Total Cyanide	11

☐ Interim
☑ Validated

ALcontrol Laboratories Ireland

Table Of Results

Ref Number: 08-B03426/01
Client: EPA (Kilkenny)
Date of Receipt: 05/06/2008
(of first sample)

Sample Type: WATER
Location:
Client Contact: Jean Smith
Client Ref:

	Detection Method		HPLC	HPLC	HPLC	HPLC	HPLC	HPLC	HPLC	HPLC	HPLC	SPECTRO
	Method Detection Limit		<0.01mg/l	<0.01mg/l	<0.01mg/l	<0.01mg/l	<0.01mg/l	<0.01mg/l	<0.01mg/l	<0.01mg/l	<0.01mg/l	<0.05mg/l
UKAS Accredited [Testing Laboratory] No. 1291												✓
ALcontrol Reference	Sample Identity	Other ID	1 Naphthol	2- Isopropyl Phenol	2,3,5 -Trimethyl Phenol	Catechol	Phenol	Resorcinol	Total Cresols	Total Phenols	Total Xylenols	Total Cyanide
			mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
08-B03426-S0005	Blank	UNKNOWN	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	0.01	<0.01	<0.05
08-B03426-S0006	GW1-2363	UNKNOWN	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	0.01	<0.01	<0.05
08-B03426-S0007	GW3a-2364	UNKNOWN	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	0.01	<0.01	<0.05
08-B03426-S0008	GW6a-2365	UNKNOWN	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	0.01	<0.01	<0.05
08-B03426-S0009	RC7-2366	UNKNOWN	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	0.01	<0.01	<0.05
08-B03426-S0010	14-2367	UNKNOWN	-	-	-	-	-	-	-	-	-	<0.05
08-B03426-S0011	GW2a-2420	UNKNOWN	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	0.01	<0.01	<0.05
08-B03426-S0012	RC4-2421	UNKNOWN	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	0.03	<0.01	<0.05
08-B03426-S0013	RC8-2422	UNKNOWN	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05
08-B03426-S0014	L1-2423	UNKNOWN	-	-	-	-	-	-	-	-	-	<0.05
08-B03426-S0015	Interceptor-2427	UNKNOWN	-	-	-	-	-	-	-	-	-	<0.05

Notes : METHOD DETECTION LIMITS ARE NOT ALWAYS ACHIEVABLE DUE TO VARIOUS CIRCUMSTANCES BEYOND OUR CONTROL. **NDP** = NO DETERMINATION POSSIBLE

Checked By : Paul Barry

Printed at 12:39 on 19/06/2008

* SUBCONTRACTED TO OTHER LABORATORY / ** SAMPLES ANALYSED AT THE CHESTER LABORATORY

APPENDIX

1. Results are expressed as mg/kg dry weight (dried at 30°C) on all soil analyses except for the following: NRA Leach tests, flash point, and ammoniacal N_2 by the BRE method, VOC, PRO, Cyanide, Acid Soluble Sulphide,TPH by IR, OFGs and SEM.

2. Samples will be run in duplicate upon request, but an additional charge may be incurred.

3. A sub sample of all samples received will be retained free of charge for one month for soils and one month for waters (sample size permitting), but may then be discarded unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage.

4. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

5. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

6. When requested, an asbestos screen is done in-house on soils and if no fibres are found will be reported as NFD – no fibres detected. If fibres are detected, then identification and quantification is carried out by ALcontrol Technichem or Alcontrol Shutlers in the UK . If a sample is suspected of containing asbestos, then drying and crushing will be suspended on that sample until the asbestos results are known. If asbestos is present, then no analysis requiring dry sample are undertaken.

7. If no separate volatile sample is supplied by the client, the integrity of the data may be compromised if the laboratory is required to create a sub-sample from the bulk sample – similarly, if a headspace is present in the volatile sample.

8. NDP – No Determination Possible due to insufficient/unsuitable sample.

9. Metals in water are performed on a filtered sample, and therefore represent dissolved metals – total metals must be requested separately.

10. A table containing the date of analysis for each parameter is not routinely included with the report, but is available upon request.

Last updated February 2005

Environmental Protection Agency
Regional Inspectorate
Seville Lodge, Callan Road,
Kilkenny

eport of: Analysis of landfill site sample(s)
eport to: Waterford County Council
eport date: 18/06/08

acility: **Dungarvan Waste Disposal Site**
Ballynamuck Middle, Dungarvan, Co Waterford
eference No: W0032-01

ate collected: 13/05/2008 Date received 13/05/2008

		Laboratory Ref:	2802417	2802418	2802419
		Type of sample:	Surface Water	Surface Water	Surface Water
		Location code:	WST W0032-01-SW1	WST-W0032-01-SW2	WST-W0032-01-SW280
		Sampling point:	Clear sample	Clear sample	Clear sample
		Sampled by:	Jim McGarry	Jim McGarry	Jim McGarry
		Time Sampled:	13 00	13 10	13 20
		Start/End - Dates of Analysis:			
		Status of results:	**Final Report**	**Final Report**	**Final Report**
rameter	**Units**	**Limits**			
Temperature	°C		16 7	16 6	16 7
Dissolved Oxygen	% Saturation		130 7	125 1	125 2
Chemical Oxygen Demand	mg/l O2		<8	<8	<8
Biochemical Oxygen Demand	mg/l O2		0 5	0 5	0 4
Suspended Solids	mg/l		<10	<10	<10
Ammonia	mg/l N		0 1	0 23	0 01
Chloride	mg/l Cl		15	14	16
Nitrite	mg/l N		0 004	0.004	0.004
Ortho-Phosphate	mg/l P		0 009	0.009	0 007
Total Oxidised Nitrogen	mg/l N		3 1	3.1	3 1
pH	pH		8 3	8 3	8 2
Conductivity	µS/cm		180	170	185

Report number KK2801074/1

Page 1 of 2

17-APR-2009 12:47 From:WATERFORD CO CO 051 384238 To:058 45606 P.5/19

Environmental Protection Agency
Regional Inspectorate
Seville Lodge, Callan Road,
Kilkenny

Report of: Analysis of landfill site sample(s)
Report to: Waterford County Council
Report date: 18/06/08

Facility: **Dungarvan Waste Disposal Site**
Ballynamuck Middle, Dungarvan, Co. Waterford
Reference No: W0032-01

Sampling location: **WST-W0032-01-SW300, Dungarvan landfill site - W0032-01 -- SW300 - EPA Surface Water station 300**

Date collected: 12/05/2008 Date received 12/05/2008

			Laboratory Ref:	2802362
			Type of sample:	Surface Water
			Sampling point:	Clear sample
			Sampled by:	Jim McGarry
			Time Sampled:	12:20
			Start/End - Dates of Analysis:	
			Status of results:	**Final Report**
Parameter		**Units**	**Limits**	
F	Temperature	°C		17 7
F	Dissolved Oxygen	% Saturation		110.4
	pH	pH		8.0
	Conductivity	µS/cm		12550
	Ammonia	mg/l N		0 24
	Chloride	mg/l Cl		4651
	Nitrite	mg/l N		0.011
	Ortho-Phosphate	mg/l P		0 014
	Total Oxidised Nitrogen	mg/l N		1 5
	Chemical Oxygen Demand	mg/l O2		175
	Biochemical Oxygen Demand	mg/l O2		1 1
	Alkalinity	mg/l CaCO3		78
	Suspended Solids	mg/l		18
	Total Organic Carbon	mg/l C		nm

Report number KK2801048/1

Environmental Protection Agency
Regional Inspectorate
Seville Lodge, Callan Road,
Kilkenny

Report of:	Analysis of landfill site sample(s)
Report to:	Waterford County Council
Report date:	08/12/08

Facility:	**Dungarvan Waste Disposal Site** Ballynamuck Middle, Dungarvan, Co. Waterford
Reference No:	W0032-01

Date collected:	27/08/2008	Date received:	27/08/2008

			Laboratory Ref.	2804321	2804322	2804323	2804324	2804325
			Type of sample:	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
			Location code:	WST-W0032-01-SW1	WST-W0032-01-SW2	WST-W0032-01-SW280	WST-W0032-01-SW300	WST-W0032-01-SW lagoon
			Sampling point:	Clear sample	Clear sample	Clear sample	Clear sample	Light brown colour
			Sampled by:	Jim McGarry	Jim McGarry	Jim McGarry	Jim McGarry	Jim McGarry
			Time Sampled:	13:15	13:07	14:35	15:30	15:02
			Start/End - Dates of Analysis:					
			Status of results:	**Final Report**	**Final Report**	**Final Report**	**Final Report**	**Final Report**
	Parameter	**Units**	**Limits**					
F	Temperature	°C		14.2	14.0	15.3	16.5	18.0
F	Dissolved Oxygen (as %Sat)	% Saturation		101.8	102.4	103.4	107.9	61.5
	pH	pH		8.0	7.7	7.7	7.9	7.8
	Conductivity @25°C	µS/cm		163	162	158	461	423
	Ammonia	mg/l N		0.025	0.009	0.009	0.073	0.25
	Chloride	mg/l Cl		14	14	14	91	17
	Chemical Oxygen Demand	mg/l O2		14	51	<8	18	29
	Biochemical Oxygen Demand	mg/l O2		0.8	0.4	0.5	1.1	4.7
	Suspended Solids	mg/		<6	<6.8	<9.8	11	7

Comments:

1) Results highlighted and in bold are outside specified limits.
2) All Metals Analysed in the EPA Dublin Laboratory.
   Cyanide Analysed in the EPA Cork Laboratory.
   Phenols Analysed in the EPA Castlebar Laboratory.
3) **nm** "Not measured"
4) **nd** "None detected"
5) **nt** "No time" - Time not recorded
6) **tntc** "Too numerous to count"
7) **F** "Field measured parameters"

Signed: Jean Smith Date: 8/12/08

Michael Neill, Regional Chemist

Environmental Protection Agency
Regional Inspectorate
Seville Lodge, Callan Road,
Kilkenny

Report of:	Analysis of landfill site sample(s)
Report to:	Waterford County Council
Report date:	19/12/08

Facility:	**Dungarvan Waste Disposal Site** Ballynamuck Middle, Dungarvan, Co. Waterford
Reference No:	W0032-02

Date collected:	18/11/2008	Date received:	18/11/2008

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			Laboratory Ref:	2806073	2805074	2806075	2806076	2806077
			Type of sample:	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
			Location code:	WST-W0032-01-SW1	WST-W0032-01-SW2	WST-W0032-01-SW230	WST-W0032-01-SW300	WST-W0032-01-SW lagoon
			Sampling point:	Clear sample	Clear sample	Clear sample	No sample - Tide was out	Clear sample
			Sampled by:	Jim McGarry	Jim McGarry	Jim McGarry	Jim McGarry	Jim McGarry
			Time Sampled:	15:11	15:04	14:59	13:40	16:25
			Start/End - Dates of Analysis:				/	
			Status of results:	**Final Report**	**Final Report**	**Final Report**	**Final Report**	**Final Report**
Parameter		**Units**	**Limits**					
F	Temperature	°C		10.2	10.3	10.2	-	9.4
F	Dissolved Oxygen (as %Sat)	% Saturation		103.0	103.0	103.0	-	92.0
	Conductivity @25°C	µS/cm		157	147	146	-	326
	pH	pH		7.5	7.6	7.6	-	8.0
	Biochemical Oxygen Demand	mg/l O2		0.9	0.6	0.7	-	4.3
	Suspended Solids	mg/l		<6	<6	<10	-	14

Comments:

1) Results highlightec and in bold are outside specified limits
2) All Metals Analysed in the EPA Dublin Laboratory.
   Cyanide Analysed in the EPA Cork Laboratory
   Phenols Analysed in the EPA Castlebar Laboratory
3) **nm** "Not measured"
4) **nd** "None detected"
5) **nt** "No time" - Time not recorded
6) **tntc** "Too numerous to count"
7) **F** "Field measured parameters"

Signed: Jan Smith Date: 19/12/08

pp Michael Neill, Regional Chemist

Appendix E

Leachate Results

Environmental Protection Agency
Regional Inspectorate
Seville Lodge, Callan Road,
Kilkenny

Report of:	Analysis of landfill site sample(s)
Report to:	Waterford County Council
Report date:	22/04/08

Facility:	**Dungarvan Waste Disposal Site** Ballynamuck Middle, Dungarvan, Co. Waterford
Reference No:	W0032-01

Date collected:	05/03/2008	Date received:	05/03/2008

				Laboratory Ref:	2801288	2801289	2801290	2801291	2801292	2801293	2801294
				Type of sample:	Leachate	Leachate	Leachate	Leachate	Leachate	Leachate	Leachate
				Location code:	WST-W0032-01-L1	WST-W0032-01-L2a	WST-W0032-01-L3	WST-W0032-01-L4	WST-W0032-01-L5a	WST-W0032-01-L6	WST-W0032-01-L Interceptor
				Sampling point:	Black colour	No sample - borehole damaged	No sample - borehole damaged	Black colour	Black colour	Light brown colour	Black colour
				Sampled by:	Jim McGarry	Jim McGarry	Jim McGarry	Jim McGarry	Jim McGarry	Jim McGarry	Jim McGarry
				Time Sampled:	12:53	12:00	12:00	12:45	12:35	14:46	14:50
				Start/End - Dates of Analysis:		/	/				
				Status of results:	**Final Report**	**Final Report**	**Final Report**	**Final Report**	**Final Report**	**Final Report**	**Final Report**
Parameter		**Units**	**Limits**								
F	Temperature	°C			12.0	-	-	13.0	12.0	7.5	10.0
	pH	pH			7.1	-	-	7.3	7.3	7.9	7.5
	Conductivity	µS/cm			6050	-	-	6690	9130	819	7010
	Ammonia	mg/l N			250	-	-	240	590	-	-
	Chloride	mg/l Cl			>353	-	-	>297	>315	-	-
	Chemical Oxygen Demand	mg/l O2			366	-	-	337	551	40	671
	Biochemical Oxygen Demand	mg/l O2			11.0	-	-	12.0	58.0	6.9	112.0

Comments:

1) Results highlighted and in bold are outside specified limits.
2) All Metals Analysed in the EPA, Dublin Laboratory
   Cyanide Analysed in the EPA Cork Laboratory.
   Phenols Analysed in the EPA Castlebar Laboratory.
3) nm "Not measured"
4) nd "None detected"
5) nt "No time" - Time not recorded
6) tntc "Too numerous to count"
7) F "Field measured parameters"

Signed: [signature] Date: 22/4/08

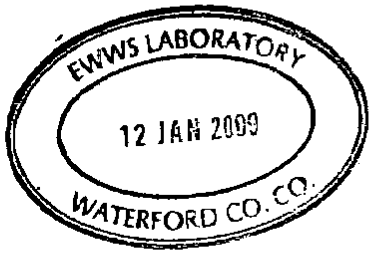
Michael Neill, Regional Chemist

Environmental Protection Agency
Regional Inspectorate
Seville Lodge, Callan Road,
Kilkenny

Report of:	Analysis of landfill site sample(s)
Report to:	Waterford County Council
Report date:	18/06/08

Facility:	**Dungarvan Waste Disposal Site** Ballynamuck Middle, Dungarvan, Co. Waterford
Reference No:	W0032-01

Date collected:	13/05/2008	Date received	13/05/2008



Laboratory Ref:		2802423	2802424	2802425	2802426	2802427
Type of sample:		Leachate	Leachate	Leachate	Leachate	Leachate
Location code:		WST-W0032-01-L1	WST-W0032-01-L2a	WST-W0032-01-L3	WST-W0032-01-L5	WST-W0032-01-L Interceptor
Sampling point:		Black colour	Borehole missing	Borehole dry - no sample	Clear sample	Black colour
Sampled by:		Jim McGarry	Jim McGarry	Jim McGarry	Jim McGarry	Jim McGarry
Time Sampled:		14:17	14:15	14:15	12:00	12:15
Start/End - Dates of Analysis:		/	/	/	/	/
Status of results:		Final Report	Final Report	Final Report	Final Report	Final Report
Parameter	Units	Limits				
Depth of Borehole	m		-	-	-	-	-
Leachate Level	m		nm	-	-	Lagoon	Manhole
Temperature	°C		12.0	-	-	nm	nm
pH	pH		7.2	-	-	20.3	13.0
Conductivity	uScm		7420	-	-	8.2	7.2
Ammonia	mg/l N		340	-	-	571	4350
Chloride	mg/l Cl		1536	-	-	0.04	153
Nitrite	mg/l N		<0.001	-	-	28	328
Ortho-Phosphate	mg/l P		<0.395	-	-	0.053	<0.001
Total Oxidised Nitrogen	mg/l N		<0.1	-	-	0.036	1.4
Chemical Oxygen Demand	mg/l O2		501	-	-	8.4	<0.1
Biochemical Oxygen Demand	mg/l O2		54.3	-	-	34	507
Fluoride	mg/l F		4.19	-	-	2.1	146.0
Sulphate	mg/l SO4		2.5	-	-	nm	10.34
Aluminium	ug/l		456	-	-	nm	20.3
Antimony	ug/l		<10	-	-	<250	435
Arsenic	ug/l		10.4	-	-	<10	<10
Barium	ug/l		133	-	-	<10	15.5
Beryllium	ug/l		<10	-	-	<30	342
Boron	ug/l		845	-	-	<10	<10
Cadmium	ug/l		<10	-	-	204	2326
Calcium	mg/l		137	-	-	<1.0	<10
Chromium	ug/l		27.7	-	-	50.6	212
						13.2	37.5

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		Laboratory Ref:	2802367	2802368
		Type of sample:	Leachate	Leachate
		Location code:	WST W0032-01-L4	WST W0032-01-L5a
		Sampling point:	Black colour	Borehole damaged - no sample
		Sampled by:	Jim McGarry	Jim McGarry
		Time Sampled:	15:10	14:20
		Start/End - Dates of Analysis:		/
		Status of results:	Final Report	Final Report
Parameter	Units	Limits		
Copper	ug/l		12.1	-
Iron	ug/l		2280	-
Lead	ug/l		17.1	-
Magnesium	mg/l		63.9	-
Manganese	ug/l		475	-
Mercury	ug/l		<0.50	-
Molybdenum	ug/l		<10	-
Nickel	ug/l		46.2	-
Potassium	mg/l		312	-
Selenium	ug/l		13.3	-
Silver	ug/l		<10	-
Sodium	mg/l		570	-
Thallium	ug/l		<10	-
Tin	ug/l		<10	
Uranium	ug/l		<10	-
Vanadium	ug/l		19.7	-
Zinc	ug/l		33.6	

Comments:

1) Results highlighted and in bold are outside specified limits
2) All Metals Analysed in the EPA Dublin Laboratory
   Cyanide Analysed in the EPA Cork Laboratory
   Phenols Analysed in the EPA Castlebar Laboratory
3) nm "Not measured"
4) nd "None detected"
5) nt "No time" - Time not recorded
6) tntc "Too numerous to count"
7) F Field measured parameters

Signed: _____ Date: 15/6/09

Michael Neill, Regional Chemist

Environmental Protection Agency
Regional Inspectorate
Seville Lodge, Callan Road,
Kilkenny

eport of: Analysis of landfill site sample(s)
eport to: Waterford County Council
eport date: 18/06/08

icility: **Dungarvan Waste Disposal Site**
Ballynamuck Middle, Dungarvan, Co. Waterford
eference No: W0032-02

te collected: 12/05/2008 Date received: 12/05/2008

			Laboratory Ref:	2802387	2802388	
			Type of sample:	Leachate	Leachate	
			Location code:	WST-W0032-01-L4	WST-W0032-01-L5a	
			Sampling point:	Black colour	Borehole damaged - no sample	
			Sampled by:	Jim McGarry	Jim McGarry	
			Time Sampled:	15 10	14 20	
			Start/End - Dates of Analysis:		/	
			Status of results:	**Final Report**	**Final Report**	
ramater	Units	Limits				
Depth of Borehole	m			11.5	-	
Leachate Level	m			0.9	-	
Temperature	°C			15.0	-	
pH	pH			7.6	-	
Conductivity	µS/cm			6600		
Ammonia	mg/l N			240	-	
Chloride	mg/l Cl			587	-	
Nitrite	mg/l N			<0.001	-	
Ortho-Phosphate	mg/l P			0.042	-	
Total Oxidised Nitrogen	mg/l N			0.4	-	
Chemical Oxygen Demand	mg/l O2			352	-	
Biochemical Oxygen Demand	mg/l O2			36.0		
Fluoride	mg/l F			3.06	-	
Sulphate	mg/l SO4			18.4	-	
Aluminium	ug/l			<250		
Antimony	ug/l			<10	-	
Arsenic	ug/l			<10	-	
Barium	ug/l			221	-	
Beryllium	ug/l			<10	-	
Boron	ug/l			3302	-	
Cadmium	ug/l			<10	-	
Calcium	mg/l			163	-	
Chromium	ug/l			91.5	-	
Cobalt	ug/l			<10	-	

Report number KK2801050/1

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17-APR-2009 12:47 From:WATERFORD CO CO 051 384238 To:058 45506 P.4/19

			Laboratory Ref:	2802423	2802424	2802425	2802426	2802427
			Type of sample:	Leachate	Leachate	Leachate	Leachate	Leachate
			Location code:	WST-W0032-01-L1	WST-W0032-01-L2a	WST-W0032-01-L3	WST-W0032-01-L6	WST-W0032-01-L Interceptor
			Sampling point:	Black colour	Borehole missing	Borehole dry - no sample	Clear sample	Black colour
			Sampled by:	Jim McGarry	Jim McGarry	Jim McGarry	Jim McGarry	Jim McGarry
			Time Sampled:	14:17	14:15	14:15	12:00	12:15
			Start/End - Dates of Analysis:	/	/	/		
			Status of results:	**Final Report**	**Final Report**	**Final Report**	**Final Report**	**Final Report**
arameter	Units	Limits						
Cobalt	ug/l			16.4	-	-	<10	10.9
Copper	ug/l			28.2	-	-	19	26.8
Iron	ug/l			55108	-	-	<500	9838
Lead	ug/l			34.3	-	-	<10	28.8
Magnesium	mg/l			60.9	-	-	<10	43.8
Manganese	ug/l			2436	-	-	<500	5614
Mercury	ug/l			<0.50	-	-	<0.50	<0.50
Molybdenum	ug/l			<10	-		<10	<10
Nickel	ug/l			107	-		<10	37.8
Potassium	mg/l			88	-	-	15.7	194
Selenium	ug/l			16.2	-	-	<10	<10
Silver	ug/l			<10	-	-	<10	<10
Sodium	mg/l			563	-	-	34.7	252
Thallium	ug/l			<10	-	-	<10	<10
Tin	ug/l			<10	-	-	<10	<10
Uranium	ug/l			<10	-	-	<10	<10
Vanadium	ug/l			15.3	-	-	10.7	20.2
Zinc	ug/l			113	-	-	<30	77.8
Suspended Solids	mg/l			-	-	-	53	-

Comments

1) Results highlighted and in bold are outside specified limits.
2) All metals Analysed in the EPA Dublin Laboratory.
Cyanide Analysed in the EPA Cork Laboratory.
Phenols Analysed in the EPA Castlebar Laboratory
3) nm "Not measured"
4) nd "None detected"
5) nt "Not tested" Time not accepted
6) tmtc "Too numerous to count"
7) F "Too many faecal streptococci"

Signed [signature] Date 18/5/09

Michael Neill, Regional Chemist

Report number KK2801076/1

Environmental Protection Agency
Regional Inspectorate
Seville Lodge, Callan Road,
Kilkenny

Report of:	Analysis of landfill site sample(s)
Report to:	Waterford County Council
Report date:	08/12/08

Facility:	**Dungarvan Waste Disposal Site** Ballynamuck Middle, Dungarvan, Co. Waterford
Reference No:	W0032-01

Date collected:	27/08/2008	Date received:	27/08/2008

			Laboratory Ref:	2804332	2804333	2804334	2804335	2804336	2804337	2804338
			Type of sample:	Leachate	Leachate	Leachate	Leachate	Leachate	Leachate	Leachate
			Location code:	WST-W0032-01-L1	WST-W0032-01-L2a	WST-W0032-01-L3	WST-W0032-01-L4	WST-W0032-01-L5a	WST-W0032-01-L6	WST-W0032-01-L Interceptor
			Sampling point:	missing due to site works	missing due to site works	no sample-damaged borehole	lost in site works	no access due to site works	No sample - location replaced by SW lagoon	Light brown colour
			Sampled by:	Jim McGarry	Jim McGarry	Jim McGarry	Jim McGarry	Jim McGarry	Jim McGarry	Jim McGarry
			Time Sampled:	12:00	12:00	12:00	12:00	12:00	12:00	15:00
			Start/End - Dates of Analysis:	/	/	/	/	/	/	
			Status of results:	Final Report	Final Report	Final Report	Final Report	Final Report	Final Report	Final Report
F	Temperature	°C		-	-	-	-	-	-	15.0
	pH	pH		-	-	-	-	-	-	6.3
	Conductivity @25°C	µS/cm		-	-	-	-	-	-	2310
	Ammonia	mg/l N		-	-	-	-	-	-	55
	Chloride	mg/l Cl		-	-	-	-	-	-	145
	Nitrite (as N)	mg/l N		-	-	-	-	-	-	<0.001
	ortho-Phosphate (as P)	mg/l P		-	-	-	-	-	-	9.7
	Total Oxidised Nitrogen (as N)	mg/l N		-	-	-	-	-	-	0.1
	Chemical Oxygen Demand	mg/l O2		-	-	-	-	-	-	2390
	Biochemical Oxygen Demand	mg/l O2		-	-	-	-	-	-	1300.0

Comments:

1) Results highlighted and in bold are outside specified limits.
2) All Metals Analysed in the EPA, Dublin Laboratory.
   Cyanide Analysed in the EPA Cork Laboratory.
   Phenols Analysed in the EPA Castlebar Laboratory.
3) **nm** "Not measured"
4) **nd** "None detected"
5) **nt** "No time" - Time not recorded
6) **tntc** "Too numerous to count"
7) **F** "Field measured parameters"

Signed: Date: 8/12/08

Michael Neill, Regional Chemist

Environmental Protection Agency
Regional Inspectorate
Seville Lodge, Callan Road,
Kilkenny

Report of:	Analysis of landfill site sample(s)
Report to:	Waterford County Council
Report date:	19/12/08

Facility:	**Dungarvan Waste Disposal Site** Ballynamuck Middle, Dungarvan, Co. Waterford
Reference No:	W0032-02

Date collected:	18/11/2008	Date received:	18/11/2008

			Laboratory Ref:	2806085	2806086	2806087	2806088	2806089	2806090	
			Type of sample:	Leachate	Leachate	Leachate	Leachate	Leachate	Leachate	
			Location code:	WST-W0032-01-L1	WST-W0032-01-L2a	WST-W0032-01-L3	WST-W0032-01-L4	WST-W0032-01-L5a	WST-W0032-01-L Interceptor	
			Sampling point:	no sample	No sample	No smple	No sample	No sample	Black colour	
			Sampled by:	Jim McGarry	Jim McGarry	Jim McGarry	Jim McGarry	Jim McGarry	Jim McGarry	
			Time Sampled:	12:00	12:00	12:00	16:00	16:00	16:16	
			Start/End - Dates of Analysis:	/	/	/	/	/		
			Status of results:	**Final Report**	**Final Report**	**Final Report**	**Final Report**	**Final Report**	**Final Report**	
Parameter		**Units**	**Limits**							
F	Temperature	°C		-	-	-	-	-	11.9	
	Chemical Oxygen Demand	mg/l O2		-	-	-	-	-	6265	
	Biochemical Oxygen Demand	mg/l O2		-	-	-	-	-	>3000	
	Conductivity @25°C	µS/cm		-	-	-	-	-	4560	
	pH	pH		-	-	-	-	-	6.1	

Comments:

1) Results highlighted and in bold are outside specified limits.
2) All Metals Analysed in the EPA, Dublin Laboratory
   Cyanide Analysed in the EPA Cork Laboratory.
   Phenols Analysed in the EPA Castlebar Laboratory.
3) nm "Not measured"
4) nd "None detected"
5) nt "No time" - Time not recorded
6) tntc "Too numerous to count"
7) F "Field measured parameters"

Signed: Date: 19/12/08

Michael Neill, Regional Chemist

Appendix F

Meteorological Data

DAILY RAINFALL AND TEMPERATURE AT DUNGARVAN IN 2008

				temperature		
month	day	rain	ind	max	min	grass min
1	1	1.1	0	10.5	8.5	8.8
1	2	0.0	0	9.0	6.0	6.0
1	3	1.9	0	6.5	3.8	3.6
1	4	15.5	0	9.1	-5.0	-8.0
1	5	0.9	0	8.6	-0.7	-2.5
1	6	5.9	0	9.8	-2.1	-4.9
1	7	9.9	0	10.1	-0.5	-0.8
1	8	7.7	0	11.0	4.5	2.5
1	9	40.2	0	11.0	0.1	-2.2
1	10	0.9	0	9.0	2.6	1.0
1	11	0.0	0	7.0	-0.5	-2.0
1	12	24.3	0	11.2	-0.9	-2.0
1	13	1.4	0	9.6	1.3	1.1
1	14	2.8	0	10.2	6.6	5.0
1	15	2.2	0	9.0	6.5	3.8
1	16	6.5	0	10.8	1.8	-0.8
1	17	3.0	0	13.3	2.8	1.5
1	18	11.2	0	14.0	5.1	2.1
1	19	5.6	0	13.0	9.5	9.4
1	20	4.0	0	13.2	10.9	10.9
1	21	6.7	0	12.8	10.4	10.0
1	22	4.0	0	12.4	6.5	5.5
1	23	0.4	0	12.5	10.1	10.1
1	24	0.1	0	10.0	2.9	0.4
1	25	0.0	0	12.6	4.5	2.8
1	26	0.0	0	12.3	8.0	6.6
1	27	0.2	0	13.0	0.6	-0.7
1	28	0.6	0	11.6	4.0	1.8
1	29	4.4	0	11.0	9.5	9.5
1	30	2.9	0	10.0	1.5	-1.2
1	31	1.9	0	7.6	1.9	1.0
2	1	0.0	0	5.6	1.8	0.0
2	2	6.2	0	9.4	-1.5	-4.9
2	3	4.4	0	6.9	1.2	0.0
2	4	9.3	0	9.7	-2.5	-5.0
2	5	0.0	2	11.3	5.5	5.0
2	6	5.6	9	12.4	0.5	-2.0
2	7	0.4	0	12.3	2.6	1.7
2	8	0.0	0	11.5	10.0	10.0
2	9	0.0	0	10.6	9.4	9.0
2	10	0.0	0	9.6	8.1	8.0
2	11	0.0	0	11.4	7.0	5.8
2	12	0.0	0	11.3	2.5	-1.4
2	13	0.0	0	12.5	2.1	-1.9
2	14	0.0	0	7.6	1.0	-2.5
2	15	0.0	0	6.8	4.5	4.0
2	16	0.0	0	6.6	4.5	4.5
2	17	0.0	0	8.0	-3.2	-6.0
2	18	0.0	0	7.7	2.5	0.6
2	19	0.0	0	8.6	1.6	-2.2
2	20	0.5	0	11.5	0.9	-1.3
2	21	0.0	0	12.9	3.0	0.0
2	22	0.0	0	14.4	11.0	10.4
2	23	3.5	0	12.0	3.4	0.6
2	24	0.6	0	10.5	6.5	5.6
2	25	4.1	0	11.0	-1.5	-3.4
2	26	0.0	0	11.1	5.5	3.5
2	27	0.0	0	12.4	0.0	-1.2
2	28	1.9	0	11.0	1.1	-1.5
2	29	1.9	0	11.8	2.2	0.1
3	1	0.0	0	14.0	7.0	5.3
3	2	0.1	0	11.9	6.5	3.5
3	3	5.0	0	7.8	1.1	-1.5
3	4	0.9	0	11.6	2.9	1.1
3	5	0.0	0	10.1	2.5	-0.7
3	6	5.7	0	10.9	7.0	7.0
3	7	0.8	0	12.0	1.1	-0.5
3	8	0.5	0	13.2	6.3	5.4
3	9	26.0	0	10.0	1.3	-1.4
3	10	12.9	0	11.1	2.0	2.0
3	11	1.9	0	12.6	3.0	0.0
3	12	0.0	0	10.3	3.8	2.5

Rainfall in mm.
Temperature in degrees Celsius

Terminal hour of readings shown is 09h to 09h UTC for rainfall and temperature.

Daily Rain Indicator:

0. Satisfactory
1. Estimated
2. Cumulative, no reading
3. Estimated cumulative total
4. Trace
5. Estimated trace.
6. Cumulative trace
7. Estimated cumulative trace
8. Not available
9. Cumulative total

3	13	1.7	0	13.8	1.8	0.1
3	14	3.3	0	10.5	5.0	5.0
3	15	4.9	0	11.0	7.5	7.5
3	16	0.0	0	11.5	7.3	5.9
3	17	0.0	0	9.5	3.6	-1.0
3	18	0.0	0	11.0	0.0	-2.8
3	19	0.0	0	12.1	0.6	-3.9
3	20	0.5	0	11.5	4.2	3.0
3	21	0.0	0	10.5	5.6	5.0
3	22	0.0	0	9.0	1.6	-2.0
3	23	1.4	0	11.0	2.9	0.7
3	24	0.5	0	11.6	5.8	4.5
3	25	0.0	0	12.8	-1.0	-4.0
3	26	1.2	0	11.1	3.2	0.9
3	27	10.1	0	11.5	-1.5	-3.5
3	28	6.0	0	11.0	6.0	5.7
3	29	1.8	0	12.2	2.0	-1.0
3	30	10.9	0	10.4	0.1	-2.0
3	31	1.8	0	12.8	3.5	-0.5
4	1	0.0	0	15.1	7.5	5.1
4	2	0.0	0	17.5	8.1	4.2
4	3	0.0	0	18.5	7.6	4.9
4	4	0.3	0	15.7	7.0	4.0
4	5	0.0	0	10.7	3.4	-1.0
4	6	0.9	0	9.4	0.8	-2.1
4	7	0.4	0	11.0	0.5	-3.1
4	8	0.0	0	11.0	-1.5	-4.0
4	9	0.5	0	11.0	-0.5	-3.3
4	10	3.4	0	11.6	2.7	-0.8
4	11	1.2	0	11.0	3.8	0.5
4	12	3.0	0	13.7	1.6	-0.5
4	13	1.5	0	13.4	3.1	0.0
4	14	0.0	0	14.0	1.1	-1.0
4	15	0.0	0	13.7	-0.3	-2.7
4	16	0.0	0	11.7	0.4	-2.8
4	17	0.0	0	10.5	5.5	4.3
4	18	1.6	0	10.6	3.5	1.9
4	19	0.5	0	9.6	6.3	5.5
4	20	0.0	0	10.4	6.6	6.3
4	21	0.0	0	15.5	7.6	7.6
4	22	6.0	0	13.5	4.9	1.5
4	23	5.6	0	14.9	2.5	-0.3
4	24	3.1	0	15.7	5.5	1.6
4	25	3.5	0	13.0	9.8	7.0
4	26	0.4	0	14.1	11.0	10.5
4	27	2.3	0	14.6	4.6	1.2
4	28	1.2	0	14.0	6.2	4.1
4	29	0.6	0	13.5	4.1	1.9
4	30	0.3	0	13.0	6.1	4.0
5	1	3.2	0	14.0	2.8	-0.4
5	2	1.4	0	15.1	5.0	0.9
5	3	18.5	0	16.8	10.5	9.5
5	4	0.0	0	17.0	11.5	11.0
5	5	0.0	0	15.3	9.1	5.9
5	6	0.0	0	16.5	8.0	3.5
5	7	0.0	0	16.6	6.7	4.0
5	8	4.3	0	17.5	9.5	6.5
5	9	1.6	0	17.0	11.6	11.6
5	10	3.6	0	16.5	12.0	10.8
5	11	0.0	0	20.1	11.5	8.7
5	12	0.0	0	21.1	12.1	11.1
5	13	0.0	0	21.0	11.0	7.6
5	14	0.0	0	20.1	11.6	7.5
5	15	0.0	0	16.2	7.0	4.2
5	16	0.7	0	16.6	10.0	9.5
5	17	1.7	0	16.0	8.0	5.5
5	18	0.7	0	15.6	10.3	9.9
5	19	0.0	0	15.6	8.3	6.1
5	20	0.0	0	14.8	4.6	1.5
5	21	18.9	0	14.0	11.3	10.1
5	22	0.7	0	16.7	11.5	10.9
5	23	0.0	0	16.7	10.0	5.3
5	24	0.0	0	18.5	10.9	7.4
5	25	3.2	0	18.0	8.9	4.3
5	26	5.6	0	17.5	10.1	9.0

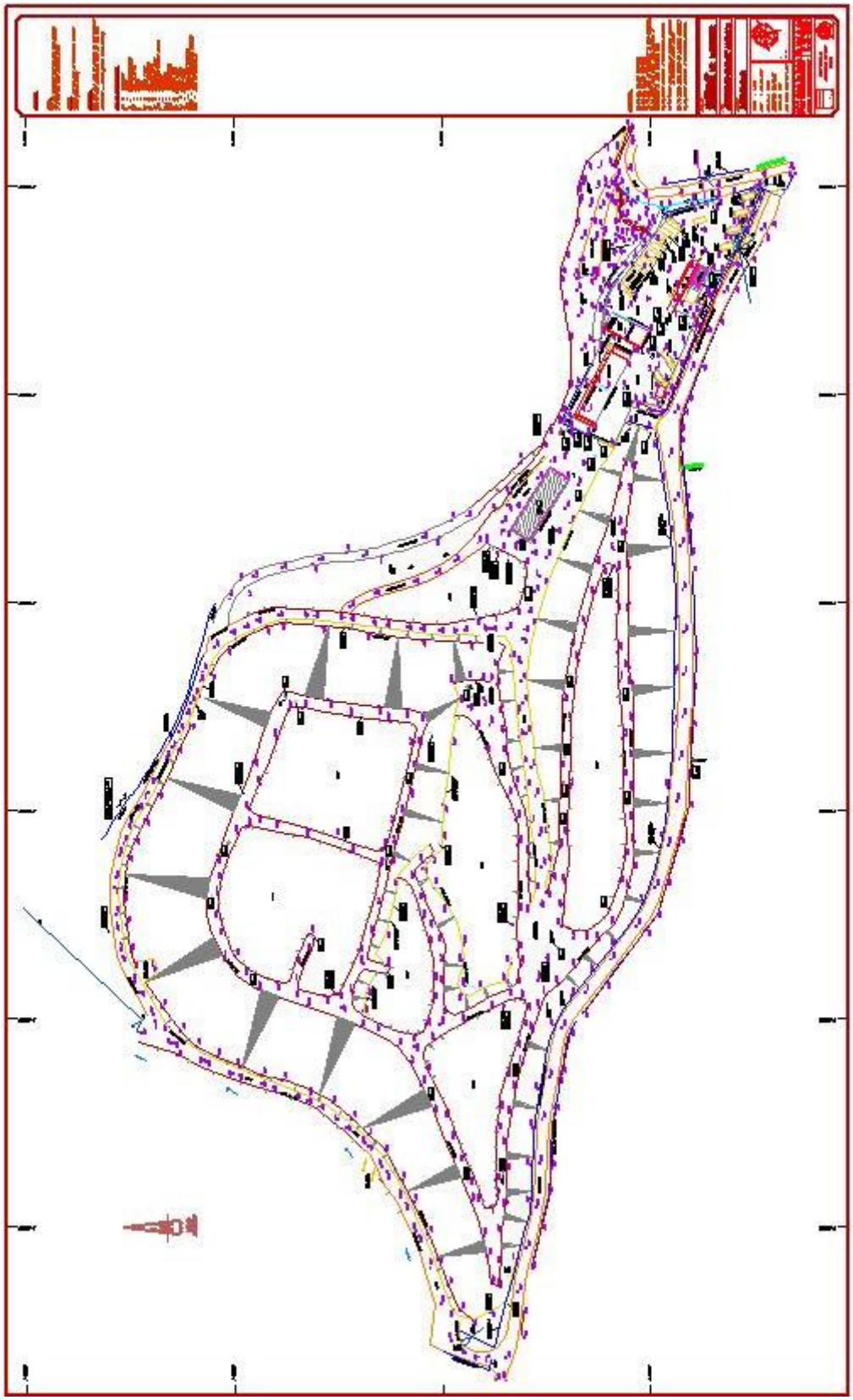
5	27	0.0	0	12.6	9.5	7.7
5	28	0.0	0	16.0	6.3	3.1
5	29	0.0	0	18.4	6.9	3.9
5	30	0.0	0	20.1	11.3	9.1
5	31	0.0	0	21.6	10.0	8.5
6	1	3.5	0	24.6	7.8	6.3
6	2	0.0	0	17.5	12.2	7.1
6	3	3.1	0	19.0	6.2	3.3
6	4	4.8	0	18.1	7.6	4.1
6	5	0.0	0	17.5	6.5	3.5
6	6	0.0	0	18.1	5.8	2.4
6	7	0.0	0	19.5	5.5	2.4
6	8	0.0	0	21.1	7.5	4.0
6	9	0.0	0	24.5	14.4	12.1
6	10	0.0	0	21.9	12.0	8.7
6	11	1.8	0	22.5	13.4	10.0
6	12	0.0	0	17.5	9.5	6.4
6	13	0.0	0	17.5	8.1	4.0
6	14	0.0	0	18.1	7.7	3.5
6	15	0.0	0	16.6	7.0	3.5
6	16	0.0	0	17.2	7.5	3.6
6	17	3.8	0	18.0	9.5	6.0
6	18	27.4	0	15.5	12.0	10.3
6	19	0.1	0	20.1	8.5	5.5
6	20	19.8	0	18.0	8.3	6.0
6	21	9.6	0	16.5	11.0	10.0
6	22	0.0	0	18.0	11.2	9.0
6	23	1.2	0	18.0	7.3	4.1
6	24	6.6	0	16.1	12.6	10.8
6	25	4.9	0	19.5	12.5	11.2
6	26	11.2	0	18.0	11.8	8.3
6	27	0.0	2	22.5	12.1	9.0
6	28	2.0	9	19.9	13.0	10.6
6	29	0.3	0	19.9	12.5	8.4
6	30	12.2	0	18.1	11.0	8.0
7	1	2.7	0	17.5	14.3	12.9
7	2	0.9	0	18.1	13.5	11.6
7	3	11.5	0	18.6	11.2	10.0
7	4	23.6	0	16.1	6.0	3.6
7	5	6.0	0	18.1	12.4	11.4
7	6	7.7	0	19.0	12.5	10.6
7	7	0.5	0	18.3	13.5	11.6
7	8	6.7	0	19.0	10.9	8.5
7	9	0.9	0	19.3	13.3	12.0
7	10	9.4	0	19.5	12.3	11.1
7	11	0.1	0	16.6	12.8	10.1
7	12	0.0	0	17.7	10.0	7.1
7	13	0.0	0	17.9	7.0	6.6
7	14	0.0	0	23.3	15.0	14.0
7	15	0.0	0	22.4	14.5	12.5
7	16	0.0	0	18.0	12.1	10.6
7	17	0.0	4	21.2	12.4	9.6
7	18	0.0	0	22.0	14.6	13.0
7	19	0.0	0	20.5	12.5	10.5
7	20	0.0	0	20.1	7.6	5.0
7	21	0.0	0	21.8	6.5	3.5
7	22	0.0	0	21.6	13.5	10.5
7	23	0.4	0	19.5	11.1	8.6
7	24	2.0	0	21.2	13.6	10.5
7	25	0.0	0	21.5	15.0	13.4
7	26	0.0	0	20.5	9.6	7.0
7	27	0.0	4	22.5	11.8	9.3
7	28	31.4	0	20.8	11.8	10.5
7	29	20.0	0	19.0	14.6	13.5
7	30	4.9	0	19.5	13.5	12.5
7	31	20.5	0	17.9	12.6	10.6
8	1	0.0	2	21.2	12.1	9.6
8	2	0.0	2	21.0	11.0	8.2
8	3	1.0	9	20.5	12.7	10.0
8	4	8.1	0	20.0	13.4	11.0
8	5	6.0	0	20.3	14.0	13.0
8	6	0.0	2	21.0	15.6	14.6
8	7	0.0	2	21.0	12.7	10.9
8	8	9.4	9	19.8	11.0	8.6
8	9	1.6	0	20.8	15.0	14.0

8	10	1.8	0	20.1	13.5	11.3
8	11	11.4	0	18.8	13.1	11.0
8	12	7.3	0	18.5	10.5	8.3
8	13	1.0	0	16.9	12.0	10.0
8	14	0.0	4	19.2	5.4	3.2
8	15	22.0	0	17.8	6.5	5.0
8	16	0.7	0	18.4	13.0	11.7
8	17	20.1	0	17.0	10.0	7.5
8	18	4.9	0	18.1	13.5	12.1
8	19	1.9	0	20.5	14.0	13.0
8	20	15.6	0	19.0	12.5	10.9
8	21	3.8	0	19.6	12.3	10.7
8	22	0.0	0	18.0	9.4	7.6
8	23	6.0	0	16.5	9.5	8.3
8	24	0.0	2	19.5	12.0	10.2
8	25	0.0	2	19.1	15.3	14.6
8	26	0.0	2	20.5	15.6	15.0
8	27	0.0	2	19.0	15.5	15.0
8	28	0.0	2	24.5	14.6	14.0
8	29	0.2	9	21.1	14.0	12.6
8	30	1.5	0	18.0	14.4	14.4
8	31	2.8	0	19.0	12.2	11.7
9	1	1.0	0	18.5	10.1	7.9
9	2	1.0	0	17.6	10.1	8.0
9	3	3.4	0	16.0	6.0	4.2
9	4	17.4	0	17.3	9.0	7.6
9	5	4.1	0	17.2	10.4	8.8
9	6	0.0	0	16.8	12.0	10.4
9	7	0.0	0	18.4	8.0	6.0
9	8	18.3	0	16.4	7.7	5.8
9	9	1.1	0	17.3	12.4	10.2
9	10	12.5	0	15.9	9.0	6.2
9	11	1.2	0	16.6	13.0	11.1
9	12	0.3	0	18.3	7.0	4.6
9	13	6.3	0	16.5	4.6	3.4
9	14	8.9	0	15.5	11.7	12.2
9	15	0.0	0	17.4	12.4	12.0
9	16	0.0	0	16.0	11.1	9.6
9	17	0.0	0	19.6	8.8	7.0
9	18	1.0	0	17.1	7.0	5.7
9	19	0.0	0	18.0	12.0	11.5
9	20	0.0	0	19.5	11.0	9.0
9	21	0.0	0	18.7	7.5	6.0
9	22	0.0	0	16.5	10.4	8.8
9	23	0.0	0	17.7	8.0	6.6
9	24	0.0	0	18.0	4.5	3.1
9	25	0.0	0	18.7	5.4	3.8
9	26	0.0	0	18.9	7.0	5.3
9	27	0.1	0	18.0	4.6	4.1
9	28	0.3	0	15.0	7.5	5.5
9	29	0.2	0	15.5	5.0	2.5
9	30	2.5	0	14.5	10.8	10.3
10	1	1.7	0	14.1	8.8	7.5
10	2	0.8	0	14.0	5.0	3.1
10	3	1.8	0	13.9	5.3	2.0
10	4	20.5	0	16.1	6.5	5.1
10	5	1.1	0	14.0	8.0	6.5
10	6	9.2	0	17.0	3.8	2.6
10	7	2.1	0	13.5	11.5	11.5
10	8	0.0	4	17.6	3.2	2.0
10	9	9.0	0	15.5	8.0	6.6
10	10	3.9	0	16.1	13.6	13.5
10	11	0.3	0	16.5	11.3	10.6
10	12	0.1	0	16.3	4.6	3.0
10	13	3.5	0	18.3	11.4	11.2
10	14	18.0	0	15.1	11.5	10.5
10	15	0.8	0	14.4	7.2	6.5
10	16	0.0	0	14.6	6.3	4.8
10	17	0.0	0	13.6	4.0	2.4
10	18	2.2	0	14.6	4.1	3.1
10	19	8.4	0	14.6	8.0	6.4
10	20	1.5	0	13.3	11.7	9.0
10	21	0.9	0	12.5	3.0	0.5
10	22	3.4	0	14.0	3.5	0.9
10	23	16.8	0	15.0	6.9	6.0

10	24	0.2	0	14.0	3.0	0.8
10	25	10.7	0	14.5	7.0	6.0
10	26	0.2	0	13.8	10.0	8.5
10	27	0.7	0	10.6	3.3	2.0
10	28	0.0	0	10.0	3.0	1.5
10	29	5.1	0	9.7	-1.9	-4.0
10	30	0.2	0	8.0	2.0	1.5
10	31	0.0	0	9.6	2.0	-0.5
11	1	0.0	0	9.6	2.2	-0.4
11	2	0.0	0	11.3	4.1	2.5
11	3	0.0	0	10.9	5.0	2.1
11	4	0.0	0	10.5	3.7	0.9
11	5	1.5	0	12.5	7.5	7.1
11	6	9.5	0	12.5	7.6	7.5
11	7	5.9	0	12.6	7.0	5.3
11	8	18.3	0	13.0	8.3	6.5
11	9	6.4	0	9.5	3.1	0.2
11	10	1.5	0	10.4	4.1	2.5
11	11	0.8	0	12.2	3.5	1.0
11	12	1.5	0	12.1	2.8	0.5
11	13	0.0	0	13.9	4.9	1.5
11	14	0.0	0	13.9	10.4	8.9
11	15	0.0	0	15.0	11.8	10.6
11	16	0.0	0	15.5	11.5	10.8
11	17	1.0	0	12.1	10.0	9.6
11	18	0.0	0	12.0	8.2	7.5
11	19	0.0	0	13.5	7.1	5.5
11	20	0.0	4	13.5	9.6	8.1
11	21	3.6	0	15.0	11.5	10.6
11	22	1.1	0	12.5	8.7	7.0
11	23	2.2	0	9.9	7.7	5.3
11	24	0.0	0	8.9	3.5	2.7
11	25	0.0	4	10.0	1.6	-0.5
11	26	1.8	0	14.1	5.9	4.3
11	27	0.0	0	10.0	8.0	7.0
11	28	0.0	0	7.3	-3.6	-5.3
11	29	0.0	4	5.0	-3.3	-5.5
11	30	0.0	4	5.2	-3.0	-4.5
12	1	0.6	0	6.5	-2.0	-5.4
12	2	5.5	0	6.0	0.3	-2.4
12	3	11.2	0	10.0	0.1	-2.4
12	4	4.6	0	8.0	1.0	0.0
12	5	0.0	0	10.2	3.8	1.5
12	6	0.0	0	10.0	-1.7	-3.5
12	7	0.2	0	8.5	-2.5	-4.4
12	8	3.8	0	9.7	0.6	0.1
12	9	0.0	0	8.1	-0.9	-3.0
12	10	0.4	0	8.5	-1.7	-4.6
12	11	2.4	0	7.6	0.0	-0.5
12	12	19.2	0	11.1	0.1	-0.5
12	13	0.0	0	6.0	1.5	-1.0
12	14	0.0	0	6.0	-0.1	-2.5
12	15	0.2	0	11.0	-1.1	-3.3
12	16	2.4	0	11.3	-0.5	-1.0
12	17	0.1	0	11.1	1.0	-0.5
12	18	1.3	0	12.1	1.6	0.1
12	19	0.4	0	12.2	-0.6	-2.0
12	20	0.6	0	14.0	7.6	7.1
12	21	0.1	0	13.0	10.5	9.5
12	22	0.0	0	10.0	9.6	7.6
12	23	0.0	0	9.8	8.0	8.0
12	24	0.0	0	8.0	2.3	-2.0
12	25	0.0	0	10.0	5.0	5.4
12	26	0.0	0	7.0	5.2	5.2
12	27	0.0	0	7.5	2.5	-1.0
12	28	0.0	0	7.5	2.1	2.0
12	29	0.0	0	7.5	3.0	1.1
12	30	0.0	0	9.3	4.6	4.5
12	31	0.0	0	8.0	7.0	5.5

Appendix G

Topographical Survey



Appendix H

Management Structure

Management Structure of Waterford County Council

County Manager Mr Ray O' Dwyer

⇩

Director of Services

Environment & Planning Mr. Dennis M^{c} Carthy

⇩

Senior Engineer Mr. Gabriel Hynes

⇩

Senior Executive Engineer Mr. Jimmy Mansfield

⇩

Executive Scientific Officer	Executive Engineer (Landfill Manager)	Environmental **Consultants**
Mr. Paul Carroll	Ms. Aoife O Flaherty	MCOS

⇩

Civic Amenity Manager

Mr. David Regan

⇩ ⇩

Caretaker **3 – Site Operatives**

Mr. Bill O Keeffe

Appendix J

Pollutant Release Transfer Register

Environmental Protection Agency

AER Returns Worksheet

Version 1.1.04

REFERENCE YEAR	2008

1. FACILITY IDENTIFICATION

Parent Company Name	Waterford County Council
Facility Name	Dungarvan Waste Disposal Site
PRTR Identification Number	W0032
Licence Number	W0032-02

Waste or IPPC Classes of Activity

No.	class_name
3.13	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.
4.2	Recycling or reclamation of organic substances which are not used as solvents (including composting and other biological transformation processes).
4.11	Use of waste obtained from any activity referred to in a preceding paragraph of this Schedule.
4.13	Storage of waste intended for submission to any activity referred to in a preceding paragraph of this Schedule, other than temporary storage, pending collection, on the premises where such waste is produced.
3.4	Surface impoundment, including placement of liquid or sludge discards into pits, ponds or lagoons.
4.3	Recycling or reclamation of metals and metal compounds.
4.4	Recycling or reclamation of other inorganic materials.
4.9	Use of any waste principally as a fuel or other means to generate energy.

Address 1	Ballynamuck Middle
Address 2	Dungarvan
Address 3	Co. Waterford
Address 4	
Country	Ireland
Coordinates of Location	3193.000
River Basin District	IESE
NACE Code	382
Main Economic Activity	Waste treatment and disposal
AER Returns Contact Name	David Regan
AER Returns Contact Email Address	doregan@waterfordcoco.ie
AER Returns Contact Position	Executive Technician
AER Returns Contact Telephone Number	058 22063
AER Returns Contact Mobile Phone Number	086 8307065
AER Returns Contact Fax Number	058 45606
Production Volume	0.0
Production Volume Units	0
Number of Installations	0
Number of Operating Hours in Year	2145
Number of Employees	2
User Feedback/Comments	
Web Address	www.waterfordcoco.ie

2. PRTR CLASS ACTIVITIES

Activity Number	Activity Name
5c	Installations for the disposal of non-hazardous waste

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

Is it applicable?	No
Have you been granted an exemption ?	Yes
If applicable which activity class applies (as per Schedule 2 of the regulations) ?	
Is the reduction scheme compliance route being used ?	

4.1 RELEASES TO AIR

SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS

RELEASES TO AIR				
POLLUTANT		METHOD		
			Method Used	
No. Annex II	Name	M/C/E	Method Code	Designation or Description
01	Methane (CH4)	C	OTH	USEPA Landgem model version 3.02
03	Carbon dioxide (CO2)	C	OTH	USEPA Landgem model version 3.02
07	Non-methane volatile organic compounds (NMVOC)	C	OTH	USEPA Landgem model version 3.02

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

SECTION B : REMAINING PRTR POLLUTANTS

RELEASES TO AIR				
POLLUTANT		METHOD		
			Method Used	
No. Annex II	Name	M/C/E	Method Code	Designation or Description

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

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

RELEASES TO AIR				
POLLUTANT		METHOD		
			Method Used	
Pollutant No.	Name	M/C/E	Method Code	Designation or Description

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

Additional Data Requested from Landfill operators

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

Landfill: Dungarvan Waste Disposal Site

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

	T (Total) kg/Year	M/C/E	Method Used	
			Method Code	Designation or Description
Total estimated methane generation (as per site model)	0.0			
Methane flared	0.0			
Methane utilised in engine/s	0.0			
Net methane emission (as reported in Section A above)	0.0			

4.2 RELEASES TO WATERS

SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS

Data on ambient monitoring of storm/surface water or groundwat

RELEASES TO WATERS				
POLLUTANT				
			Method Used	
No. Annex II	Name	M/C/E	Method Code	Designation or Description
17	Arsenic and compounds (as As)	E	Estimate	Product of measured average leachate concentration and calculated leachate flow
18	Cadmium and compounds (as Cd)	E	Estimate	Product of measured average leachate concentration and calculated leachate flow
79	Chlorides (as Cl)	E	Estimate	Product of measured average leachate concentration and calculated leachate flow
19	Chromium and compounds (as Cr)	E	Estimate	Product of measured average leachate concentration and calculated leachate flow
20	Copper and compounds (as Cu)	E	Estimate	Product of measured average leachate concentration and calculated leachate flow
35	Dichloromethane (DCM)	E	Estimate	Product of measured average leachate concentration and calculated leachate flow
83	Fluorides (as total F)	E	Estimate	Product of measured average leachate concentration and calculated leachate flow
23	Lead and compounds (as Pb)	E	Estimate	Product of measured average leachate concentration and calculated leachate flow
21	Mercury and compounds (as Hg)	E	Estimate	Product of measured average leachate concentration and calculated leachate flow
22	Nickel and compounds (as Ni)	E	Estimate	Product of measured average leachate concentration and calculated leachate flow
69	Organotin compounds (as total Sn)	E	Estimate	Product of measured average leachate concentration and calculated leachate flow
54	Trichlorobenzenes (TCBs)(all isomers)	E	Estimate	Product of measured average leachate concentration and calculated leachate flow
24	Zinc and compounds (as Zn)	E	Estimate	Product of measured average leachate concentration and calculated leachate flow
12	Total nitrogen	E	Estimate	product of measured average leachate concentration (as AMMONIA) and calculated leachate flow
76	Total organic carbon (TOC) (as total C or COD/3)	E	Estimate	Product of measured average leachate concentration (1/3 COD) and calculated leachate flow

ter, conducted as part of your licence requirements, should NOT be submitted under AER / PRTR Reporting as this on

	QUANTITY		
Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
0.05	0.05	0.0	0.0
0.0	0.0	0.0	0.0
3620.0	3620.0	0.0	0.0
0.56	0.56	0.0	0.0
0.19	0.19	0.0	0.0
0.0	0.0	0.0	0.0
38.8	38.8	0.0	0.0
0.24	0.24	0.0	0.0
0.0	0.0	0.0	0.0
0.45	0.45	0.0	0.0
0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0
0.74	0.74	0.0	0.0
0.0	0.0	0.0	0.0
2338.0	2338.0	0.0	0.0
3482.0	3482.0	0.0	0.0

SECTION B : REMAINING PRTR POLLUTANTS

RELEASES TO WATERS				
POLLUTANT				
No. Annex II	Name	M/C/E	Method Used	
			Method Code	Designation or Description
62	Benzene	E	Estimate	Product of measured average leachate concentration and calculated leachate flow
68	Naphthalene	E	Estimate	Product of measured average leachate concentration and calculated leachate flow
73	Toluene	E	Estimate	Product of measured average leachate concentration and calculated leachate flow
78	Xylenes	E	Estimate	Product of measured average leachate concentration and calculated leachate flow

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

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

RELEASES TO WATERS				
POLLUTANT				
Pollutant No.	Name	M/C/E	Method Used	
			Method Code	Designation or Description

QUANTITY			
Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0
0.009	0.009	0.0	0.0
0.005	0.005	0.0	0.0

QUANTITY			
Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
0.0	0.0	0.0	0.0

4.3 RELEASES TO WASTEWATER OR SEWER

SECTION A : PRTR POLLUTANTS

OFFSITE TRANSFER OF POLLUTANTS DESTINED FOR WASTE-WATER TREATMENT OR SEWER					
POLLUTANT		METHOD			
			Method Used		
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1
					0.0

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

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

OFFSITE TRANSFER OF POLLUTANTS DESTINED FOR WASTE-WATER TREATMENT OR SEWER					
POLLUTANT		METHOD			
			Method Used		
Pollutant No.	Name	M/C/E	Method Code	Designation or Description	Emission Point 1
					0.0

QUANTITY		
T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
0.0	0.0	0.0

QUANTITY		
T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
0.0	0.0	0.0

4.4 RELEASES TO LAND

SECTION A : PRTR POLLUTANTS

RELEASES TO LAND					
POLLUTANT		METHOD			
			Method Used		
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1
					0.0

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

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

RELEASES TO LAND					
POLLUTANT		METHOD			
			Method Used		
Pollutant No.	Name	M/C/E	Method Code	Designation or Description	Emission Point 1
					0.0

	QUANTITY	
	T (Total) KG/Year	A (Accidental) KG/Year
	0.0	0.0

	QUANTITY	
	T (Total) KG/Year	A (Accidental) KG/Year
	0.0	0.0

5. ONSITE TREATMENT & OFFSITE TRANSFERS OF WASTE

Transfer Destination	European Waste Code	Hazardous	Quantity T/Year	Description of Waste	Waste Treatment Operation	Method Used		Location of Treatment
						M/C/E	Method Used	
Within the Country	20 03 99	No	4409.0	Domestic Residual Waste	D1	M	Weighed	Offsite in Ireland
Within the Country	02 01 07	No	666.78	Garden and Organic Waste	R3	M	Weighed	Offsite in Ireland
Within the Country	17 02 02	No	3.68	Flat Glass	R5	M	Weighed	Offsite in Ireland
Within the Country	17 04 07	No	38.56	Scrap/Mixed Metals	R5	M	Weighed	Offsite in Ireland
Within the Country	17 01 07	No	50.82	Construction Rubble	R5	M	Weighed	Offsite in Ireland
Within the Country	20 03 01	No	514.98	Large Household Items such as carpets, linoleum, mattresses etc	D1	M	Weighed	Offsite in Ireland
To Other Countries	16 02 11	Yes	27.66	Fridges	R4	M	Weighed	Abroad
To Other Countries	16 02 13	Yes	106.22	Washing Machines, Dryers etc	R4	M	Weighed	Abroad
To Other Countries	16 02 09	Yes	68.9	Televisions, monitors etc	R4	M	Weighed	Abroad
To Other Countries	16 02 11	Yes	0.48	Flourescent Lamps	R5	M	Weighed	Abroad
Within the Country	15 01 01	No	93.02	Mixed Dry Recyclables	R3	M	Weighed	Offsite in Ireland
Within the Country	04 02 22	No	2.24	Textiles	R5	M	Weighed	Offsite in Ireland
Within the Country	13 02 06	Yes	1.0	Waste Engine Oil	R9	M	Weighed	Offsite in Ireland
Within the Country	16 06 01	Yes	0.7	Batteries	R6	M	Weighed	Offsite in Ireland
Within the Country	08 01 21	Yes	2.82	Waste Paint and Varnish	D5	M	Weighed	Offsite in Ireland
Within the Country	16 05 04	Yes	0.15	Aerosols	D5	M	Weighed	Offsite in Ireland
Within the Country	02 03 99	No	1.0	Waste Cooking Oil	R9	M	Weighed	Offsite in Ireland

Name and Licence / Permit No. of Recoverer / Disposer / Broker	Address of Recoverer / Disposer / Broker	Name and Address of Final Destination i.e. Final Recovery / Disposal Site (HAZARDOUS WASTE ONLY)	Licence / Permit No. of Final Destination i.e. Final Recovery / Disposal Site (HAZARDOUS WASTE ONLY)
Waterford County Council, EPA License W-032	Ballynamuck Middle, Dungarvan, Co. Waterford		
CTO Greenclean	Fethard, Co. Tipperary		
Mr. Binman WCP/KK/022(A)/05	Suir Island, Clonmel, Co. Tipperary		
Mr. Binman WCP/KK/022(A)/05	Suir Island, Clonmel, Co. Tipperary		
Mr. Binman WCP/KK/022(A)/05	Suir Island, Clonmel, Co. Tipperary		
Mr. Binman WCP/KK/022(A)/05	Suir Island, Clonmel, Co. Tipperary		
KMK Metals Recycling	Cappincur Industrial Estate, Daingean Road, Tullamore, Co. Offaly - WCP/KK/069(A)/06	Various International Locations	Not available from carrier
KMK Metals Recycling	Cappincur Industrial Estate, Daingean Road, Tullamore, Co. Offaly - WCP/KK/069(A)/06	Various International Locations	Not available from carrier
KMK Metals Recycling	Cappincur Industrial Estate, Daingean Road, Tullamore, Co. Offaly - WCP/KK/069(A)/06	Various International Locations	Not available from carrier
KMK Metals Recycling	Cappincur Industrial Estate, Daingean Road, Tullamore, Co. Offaly - WCP/KK/069(A)/06	Various International Locations	Not available from carrier
Waterford County Council, EPA Licence 189-1	Shandon, Dungarvan, co. Waterford		
Cookstown Textile Recyclers ROC 1929 Carrier/Broker	Magherlane Road, Randalstown, Co. Antrim		
ENVA Ireland	Clonminam Industrial Estate, Portlaoise, Co. Laois	Clonminam Industrial Estate, Portlaoise, Co. Laois	WCp/KK/059(A)07
ENVA Ireland	Clonminam Industrial Estate, Portlaoise, Co. Laois	Clonminam Industrial Estate, Portlaoise, Co. Laois	WCp/KK/059(A)07
ENVA Ireland	Clonminam Industrial Estate, Portlaoise, Co. Laois	Clonminam Industrial Estate, Portlaoise, Co. Laois	WCp/KK/059(A)07
ENVA Ireland	Clonminam Industrial Estate, Portlaoise, Co. Laois	Clonminam Industrial Estate, Portlaoise, Co. Laois	WCp/KK/059(A)07
ECO Ola	GMIT	Main Campus, Dublin Road, Galway	

Appendix K

Energy Efficiency Audit

Dungarvan Landfill & Civic Amenity Site
Energy Audit Report

08 June 2009

Client: Waterford County Council,
Civic Offices,
Dungarvan

Carried Out by Waterford Energy Bureau
Civic Offices,
Tankfield,
Tramore,
Co. Waterford

WATERFORD ENERGY BUREAU
Biúro Fuinnimh Phort Láirge

Déisi oc Declán co Bráth

Energy Audit Contents

1. Summary
2. Electrical Tariff Analysis
3. Break Down in Electrical Consumption
4. Land Fill Gas Potential
5. Wind Turbine Installation & upgrade to installation
6. Recommendations

1. Summary

Waterford Energy Bureau as part of its role for Waterford County Council Environment Dept. has carried out an energy audit of the Civic Amenity site / landfill in Dungarvan. The purpose of the energy Audit is to meet requirements set out in "Annual Environmental Report" (AER) by the Environmental Protection Agency & meet the Climate Change Strategy of Waterford County Council.

Areas examined during the audit includes;

- To assess the current energy consumption trends of the Civic Amenity Site.
- To examine alternative's energy efficiency technology that could be used to reduce
- energy consumption.
- To examine better means of operation to reduce energy consumption at the Civic Amenity Site.
- To assess the feasibility of installing alternative renewable technology.
- To examine the feasibility of utalising the land fill gas resource.

Items highlighted within the energy audit noted that energy cost savings can be made through improving the operational efficiency of the Civic Amenity Site which includes change in tariff structure & improved operational efficiency. The changing of the tariff will proceed following the installation of lechate pumping equipment. Further savings can be made through the installation of a large wind 3-phase 9 KW wind turbine. The current wind turbine which was installed as part of a display project requires maintenance to ensure that it returns to full operation.

Mechanisms are currently not available to facilitate the utilisation of the landfill gas, the methane volumes / concentrations and grid access issues has inhibited the installation of a large scale CHP Plant where by electricity would be sold to the grid & excess heat would be dumped. Other areas that were examined which turned out not to be feasible included the upgrading of methane for inclusion in converted vehicles or for pressurisation & export to the gas grid.

Waste Cooking oil is collected at the Civic Amenity site for conversion into biodiesel etc. This item requires further promotion among hotels / restaurants & school in order to maximise the collection of the oil. Eco-Ola collects the waste cooking oil periodically for processing into biodiesel.

The installation of a three phase wind turbine & improved operational efficiency are the most feasible option to saving energy at the Civic Amenity Site.

2. Electrical Tariff Analysis

The Dungarvan Landfill is supplied with a General Purpose Night Saver Tariff, which meets the electrical demand of the whole site, electrical demand of flare, public lighting & Porto cabin electrical demand. The current General Purpose Account Tariff is more than sufficient to meet electrical requirements of the site. However the installation of leachate pumping systems & permanent gas flare will result in the upgrading of tariff from general purpose night saver to low voltage maximum demand.

The purchasing of electricity in the deregulated electrical market has resulted in significant cost savings to Waterford County Council. Currently Waterford County Councils contracted price with Energia has an average unit cost of € 0.20 per KWh which includes standing charges etc. Electrical consumption is expected to double upon installation of lechate pumps & gas flare.

Dungarvan Landfill Electrical Consumption Analysis Bord Gais Old Rate

	Jan - Feb 09	Mar-April 09	May-June 08	July-August 08	Sept-Oct 09	Nov-dec 09	Total
Day Units Consumed High Rate	4000	2251	3100	771	2300	4600	17022
Day Units Consumed Low Rate				0			
Night Units	1200	3600	1150	514	750	1400	8614
Total Units	5200	5851	4250	1285	3050	6000	25636
Day Unit Cost	€716	€403	€555	€138	€412	€823	€3,047
Night Unit Cost	€101	€304	€97	€43	€63	€118	€727
Section 58 Tax	€15	€0	€0	€0	€0	€0	€15
Standing Charge	€195	€195	€195	€195	€195	€195	€1,170
VAT 13.5%	€139	€122	€114	€51	€90	€153	€669
Total	€1,166	€1,024	€961	€427	€760	€1,290	€5,628
	The average cost per KWH= €5628 / 25636 = € 0.22						

Dungarvan Landfill Electrical Consumption Analysis Bord Gais Revised Rate

	Jan - Feb 09	Mar-April 09	May-June 08	July-August 08	Sept-Oct 09	Nov-dec 09	Total
Day Units Consumed High Rate	4000	2251	3100	771	2300	4600	17022
Day Units Consumed Low Rate				0			
Night Units	1200	3600	1150	514	750	1400	8614
Total Units	5200	5851	4250	1285	3050	6000	25636
Day Unit Cost	€650	€366	€504	€125	€374	€748	€2,766
Night Unit Cost	€97	€304	€97	€43	€63	€118	€723
Section 58 Tax	€15	€0	€0	€0	€0	€0	€15
Standing Charge	€195	€195	€195	€195	€195	€195	€1,170
VAT 13.5%	€129	€117	€107	€49	€85	€143	€631
Total	€1,086	€981	€903	€413	€717	€1,204	€5,305

	The average cost per KWH= €5305 / 25636 = € 0.20

Dungarvan Landfill Electrical Consumption Analysis Energia Rate							
	Jan - Feb 09	Mar-April 09	May-June 08	July-August 08	Sept-Oct 09	Nov-dec 09	Total
Day Units Consumed High Rate	4000	2251	3100	771	2300	4600	17022
Day Units Consumed Low Rate				0			
Night Units	1200	3600	1150	514	750	1400	8614
Total Units	5200	5851	4250	1285	3050	6000	25636
Day Unit Cost	€646	€363	€500	€124	€371	€742	€2,815
Night Unit Cost	€105	€314	€100	€45	€65	€122	€751
Section 58 Tax	€15	€0	€0	€0	€0	€0	€15
Standing Charge	€195	€195	€195	€195	€195	€195	€1,170
VAT 13.5%	€130	€118	€107	€49	€85	€143	€641
Total	€1,089	€990	€903	€413	€717	€1,203	€5,393
	The average cost per KWH= €5393 / 25636 = € 0.20						

Dungarvan Landfill Electrical Consumption Analysis ESB Rate Pre MAY 2009							
	Jan - Feb 09	Mar-April 09	May-June 08	July-August 08	Sept-Oct 09	Nov-dec 09	Total
Day Units Consumed High Rate	4000	2251	3100	771	2300	4600	17022
Day Units Consumed Low Rate				0			
Night Units	1200	3600	1150	514	750	1400	8614
Total Units	5200	5851	4250	1285	3050	6000	25636
Day Unit Cost	€778	€438	€603	€150	€448	€895	€3,312
Night Unit Cost	€105	€314	€100	€45	€65	€122	€751
Section 58 Tax	€15	€0	€0	€0	€0	€0	€15
Standing Charge	€195	€195	€195	€195	€195	€195	€1,170
VAT 13.5%	€148	€128	€121	€53	€96	€164	€709
Total	€1,240	€1,075	€1,020	€442	€804	€1,376	€5,957
	The average cost per KWH= €5957 / 25636 = € 0.23						

Dungarvan Landfill Electrical Consumption Analysis ESB Rate MAY 2009							
	Jan - Feb 09	Mar-April 09	May-June 08	July-August 08	Sept-Oct 09	Nov-dec 09	Total
Day Units Consumed High Rate	4000	2251	3100	771	2300	4600	17022
Day Units Consumed Low Rate				0			
Night Units	1200	3600	1150	514	750	1400	8614
Total Units	5200	5851	4250	1285	3050	6000	25636
Day Unit Cost	€684	€385	€530	€132	€394	€787	€2,912
Night Unit Cost	€92	€276	€88	€39	€58	€107	€661
Section 58 Tax	€15	€0	€0	€0	€0	€0	€15
Standing Charge	€195	€195	€195	€195	€195	€195	€1,170
VAT 13.5%	€133	€116	€110	€49	€87	€147	€642
Total	€1,119	€972	€923	€416	€733	€1,237	€5,400
	The average cost per KWH= €5400 / 25636 = € 0.22						

3. *Break Down in Electrical Consumption*

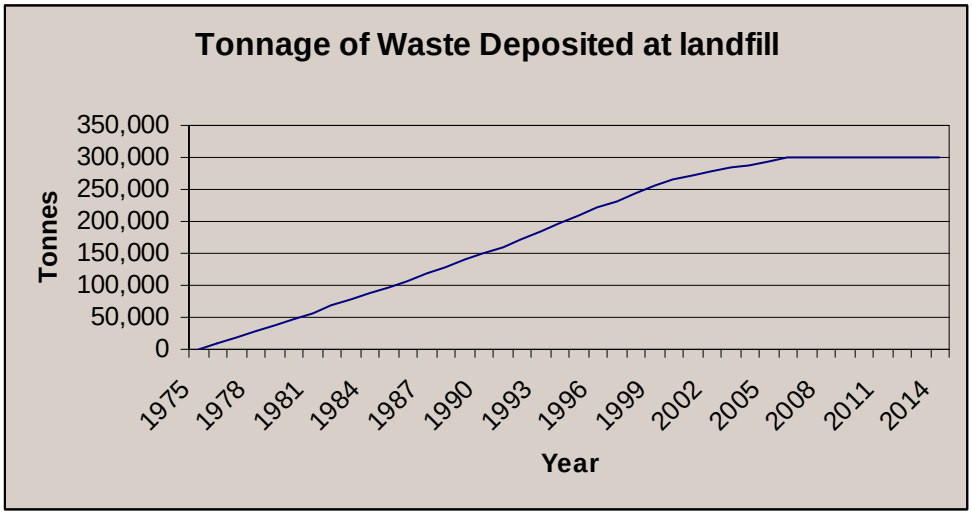
Dungarvan Landfill Electrical Consumption Breakdown for Office Area						
	Number of Items	***Hours per year***	***Electrical Loading in Watts***	***Total electrical Load KWh.Y***	***% of Total***	***Note***
External Site Lighting	11	1800	400	7920	***30.89***	metal halide lights
Computers	1	3000	270	810	***3.16***	
Compost Facility Fan	1	8769	800	7015.2	***27.36***	
Compaction Building	3	1000	350	1050	***4.10***	
Storage Heaters	2	1665	2000	6660	***25.98***	
Immersion Heaters	1	400	1500	600	***2.34***	
Lighting Internal	3	1250	57	213.75	***0.83***	
Gas Flare	1	8760	200	1752	***6.83***	
Fax Machine	1	8760	60	525.6	***2.05***	
				26546.55		

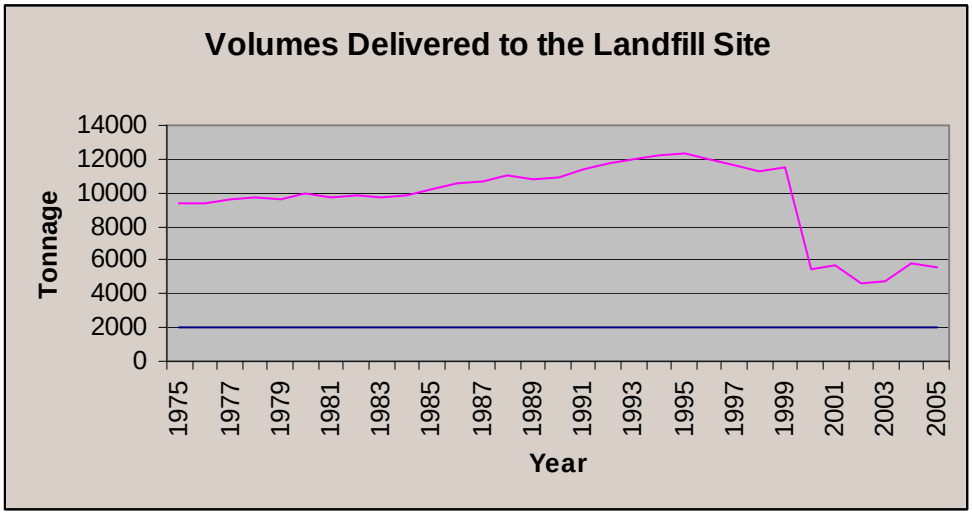
The installation of high pressure sodium bulbs to replace the current site light bulbs within the site lighting can have significant cost savings & a payback of 2/3 yrs.

4. *Land Fill Gas Potential*

The volume of waste that was disposed at the Dungarvan Landfill since 1975 is estimate at approximately 300,000 tonnes. A pumping trial has yet to take place however gas will be recorded for purposes of purchasing permanent gas flaring equipment. The percentage of the methane within the land fill gas will be clarified by pumping trial results.

Dungarvan landfill is located in County Waterford approximately 2km north west of Dungarvan off the N25 road on the southern edge of the Colligan River. The total area of the landfill site is approximately 6.5 hectares, and has been in operation since 1968. The landfill closed on 30th June 2003, but still acts as a transfer station for recyclable material.





Landfill Gas Energy utilisation Options

- The installation of a CHP Plant for the exporting of generated electricity to the grid is not known at this time however the expected methane content low gas flowrate may not be a viable option for utilisation in the generate electricity using reciprocating engines. The feasibility of increasing the low methane content by CO2 washing and limiting the O2 mix in the engine combustion (allowing for the high O2 content already present in the landfill gas), will be examined however this may not be feasible. Typical percentages of methane and flow rates to the minimum levels required (50% and 200kW/hour respectively) to support gas engine power generation.

- The capital cost of investing in infrastructure to up grade the land fill gas from its current level of 30%-50% methane to 95% methane for inclusion in specially converted vehicles is not economically feasible as the cost of the kit to up grade the gas including dryers etc. is approximately € 700,000 – € 1,000,000.

- The capital cost of investing in infrastructure to up grade the land fill gas from its current level of 30%-50% methane to 100% methane, which is then pressurised & upgraded for exported into the gas network at an alternative location is economically prohibitive. The approximate cost of such equipment including pressurisation cylinder system is approximately € 900,000 – € 1,200,000.

- The technology that supports the installation of a Micro-CHP unit that would power the land fill site & dump excess capacity onto the grid via the micro renewable program is not feasible as such technology is not available in Ireland.

5. Wind Turbine Installation & upgrade to installation

The installation of a 3-phase wind turbine to power the requirements of the landfill & export any excess electricity generated to the grid represents a credible option as the site location is significantly exposed.

The first 4,000 installations of small-scale wind turbines, photovoltaic, hydro and combined heat and power, will be offered 19 cent per kilowatt hour for the first 3,000 kWh generated per annum, and 9 cent above 3, 000 kWh. For any surplus energy sold back into the grid over the next three years under a five years contract.

Traditionally, the electricity network was designed to accommodate the flow of electricity from large centralised plants to costumers dispersed throughout the country. Micro-generation at local level now introduces two-way flows to the electricity system. Local generators will have the ability to be paid by the ESB for electricity that is surplus to their own requirements and exported. This Government measures includes grant assistance for 40% of the cost of 50 trial units (of up to 50 kW) countrywide. Applications are being accepted by SEI.

It is estimated that setting-up a micro-generated unit costs between € 15,000 and €30,000 for a single-phase unit. A pay-back is estimated on 5 to 10 years period. The initiative could change the nature of electricity generation in Ireland and help reduce the State's €6 billion a year spend on fossil fuels. For a three-phase unit, typical costs for setting-up range from € 40,000-€ 60,000. A pay-back is estimated on 5 to 10 years period. The maximum limit for the three-phase generator is 11kW, while the maximum limit for the single-phase generator is 5.75 kW. The ESB will not charge connection a micro-generator to the ESB network provided that turbine complies with EN50438.

Three Phase Turbine Installation at Civic Amenity Site

Turbine Type	Output per year KWh	Cost	Unit Cost of Electricity displaced	Unit Cost of Electricity exported	Electric Cost Savings	Payback on installation Yrs
Aircon 10 S 9.8 KW	42048	65,000	0.23	0.19	9671.04	7

Note: The unit cost of electricity also includes a factor for vat, & savings made for reduced maximum import capacity & maximum demand.

Recommendations

Dungarvan Landfill Energy Audit			
Item	Cost	Payback	Note
Install wind turbine	€65,000	€ 9671 annual cost saving, will have a resulting payback of 6/7 years	Note: significant wind speed at site however site exposed to sea conditions
Purchase Electricity in deregulated electrical market	7-10 % electrical cost savings	immediate	Item Currently being implemented
Replace light bulbs with high pressure sodium bulbs which use 50% of electrical demand of the site	€ 500	1-2 yrs	
Examine feasibility of utilising land fill gas			Item to be further examined
Further maximise the collection of waste cooking oil			Item to be further advertised among restaurants / hotels etc.