

WATERFORD COUNTY COUNCIL

COMHAIRLE CHONTAE PHORTLAIRGE



ANNUAL ENVIRONMENTAL REPORT 2010

BALLYNAMUCK WASTE DISPOSAL SITE

BALLYNAMUCK MIDDLE

DUNGARVAN CO. WATERFORD

Waste Licence Register No. W0032-2

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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. A further licence application is currently being assessed by the Agency. This is the eighth Annual Environmental Report for the Facility and includes the monitoring period 1st January 2010 – 31st December 2010. The report has been prepared in accordance with Condition 11.7 and Schedule G of the Waste Licence.

1. Reporting Period

This is the eighth Annual Environmental Report for the Dungarvan Waste Disposal Site, which covers the period 1st January 2010 to 31st December 2010.

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 runoff 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 2010 – 31st December 2010 is attached in **Appendix A.**

4. Methods of deposition of inert waste for restoration

All capping and restoration works have now been completed.

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 32-2. EPA and Waterford County Council staff carried out sampling and field measurements. Analysis was carried out at EPA and Waterford County Council Laboratories. The ecological survey was carried out by Waterford County Council Heritage Officer.

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 2010 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.

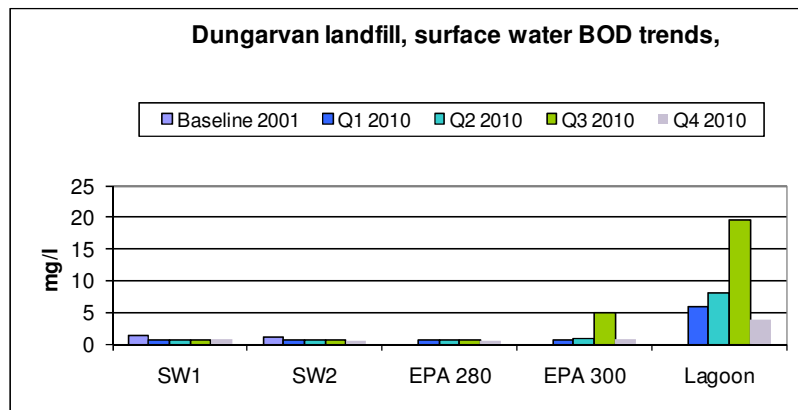
Sampling site EPA 300, at Ballyneety Bridge downstream of the landfill site, is subject to saline intrusion from Dungarvan Estuary. There are difficulties involved in monitoring surface water pollution from landfills adjacent to estuaries, as the salinity of the samples can interfere with many of the 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. This is not unusual for such a small confined waterbody. The river site SW3 had elevated suspended solids at times, possibly due to tidal effects. Other water quality tests were satisfactory.

Table 5.1.1 Dungarvan landfill surface water monitoring Q1 2010

| | SW1 | SW2 | SW280 | SW300 | Lagoon | Drinking Water | Bathing Water | Estuarine Water | Comments | Environmental significance |
|-----------------------|------|------|-------|-------|--------|----------------|-----------------|------------------------|---|----------------------------|
| Temperature deg C | 7.6 | 7.4 | 7.5 | 7.4 | 5.3 | | | | | |
| Dissolved Oxygen % | 103 | 103 | 103 | 105 | 73 | | 70 - 120 95% | 70 - 130 (Brackish) | DO satisfactory | None |
| COD mg/l | <20 | <20 | <20 | <20 | 26 | | | | | |
| BOD mg/l | <0.5 | <0.5 | <0.5 | <0.5 | 6 | | | | BOD slightly elevated in lagoon. Satisfactory in receiving waters | None |
| Suspended solids mg/l | <5 | <5 | <5 | <5 | <5 | | | | SS satisfactory. | None |
| Sampled 28/1/2010 | | | | | | | | | | |

Table 5.1.2 Surface water quality Dungarvan landfill Q2 2010

| | SW1 | SW2 | SW280 | SW300 | Lagoon | Drinking Water | Bathing Water | Estuarine Water | Comments | Environmental significance |
|-----------------------|------|------|-------|-------|--------|----------------|-----------------|------------------------|---|----------------------------|
| Temperature deg C | 11.5 | 11.8 | 11.7 | 13.6 | 15.1 | | | | | |
| Dissolved Oxygen % | 109 | 108 | 108 | 118 | 108 | | 70 - 120 95% | 70 - 130 (Brackish) | DO satisfactory | None |
| COD mg/l | <20 | <20 | <20 | <20 | 33 | | | | | |
| BOD mg/l | 0.7 | 0.7 | 0.6 | 0.9 | >8 | | | | BOD slightly elevated in lagoon. Satisfactory in receiving waters | None |
| Suspended solids mg/l | <5 | <5 | <5 | 8 | 26 | | | | SS slightly elevated in lagoon. Satisfactory in receiving waters | None |

Sampled 28/4/2010

Table 5.1.3 Surface water quality Dungarvan landfill Q3 2010

| | SW1 | SW2 | SW280 | SW300 | Lagoon | Drinking Water | Bathing Water | Estuarine Water | Comments | Environmental significance |
|-----------------------|------|------|-------|-------|--------|----------------|-----------------|------------------------|--|---|
| Temperature deg C | 14.2 | 14.1 | 14.1 | 16.2 | 17 | | | | | |
| Dissolved Oxygen % | 108 | 107 | 107 | 127 | 84 | | 70 - 120 95% | 70 - 130 (Brackish) | DO satisfactory | None |
| COD mg/l | <20 | <20 | <20 | 111 | 106 | | | | | |
| BOD mg/l | <0.5 | 0.5 | 0.5 | 5 | 19.7 | | | | BOD slightly elevated in lagoon. Satisfactory in receiving waters | None |
| Suspended solids mg/l | <7.6 | <5 | <5 | 505 | 106 | | | | SS slightly elevated in lagoon, possibly due to algal activity. SS also elevated at SW300, unknown cause. Otherwise receiving waters satisfactory. | High SS in river not beneficial long-term. Cause is not known, long-term monitoring will provide information on trends. |

Sampled 6/7/10

Table 5.1.4 Dungarvan landfill surface water monitoring Q4 2010

| | SW1 | SW2 | SW280 | SW300 | Lagoon | Drinking Water Standards (SI 278 2007) | Bathing Water Standards (SI 155 1992) | Estuarine Water Standards (DOELG 2001) | Comments | Environmental significance |
|-----------------------|-----|-----|-------|-------|--------|--|---------------------------------------|--|---|---|
| Temperature deg C | 7.3 | 7.3 | 7.2 | 7 | 6.3 | | | | | |
| Dissolved Oxygen % | 104 | 104 | 103 | 106 | 66 | | 70 - 120 95% compliance | 70 - 130 (Brackish) 80-120 (Saline) | DO satisfactory | None |
| COD mg/l | <20 | <20 | <20 | <20 | 30 | | | | | |
| BOD mg/l | 0.7 | 0.6 | <0.5 | 0.7 | 3.9 | | | | BOD slightly elevated in lagoon. Satisfactory in receiving waters | None |
| Suspended solids mg/l | <5 | <5 | <5 | 29 | 6 | | | | SS slightly elevated at SW300, possibly due to tidal activity. | High SS in river not beneficial long-term. Cause is not known, possibly tidal influence at this station, long-term monitoring will provide information on trends. |
| Sampled 15/11/2010 | | | | | | | | | | |

5.2 Groundwater

5.2.1 INTRODUCTION

Sites GW1, GW2a, RC3a, RC4, RC6a, RC7 and RC8 were sampled during 2010. RC1 is no longer in place.

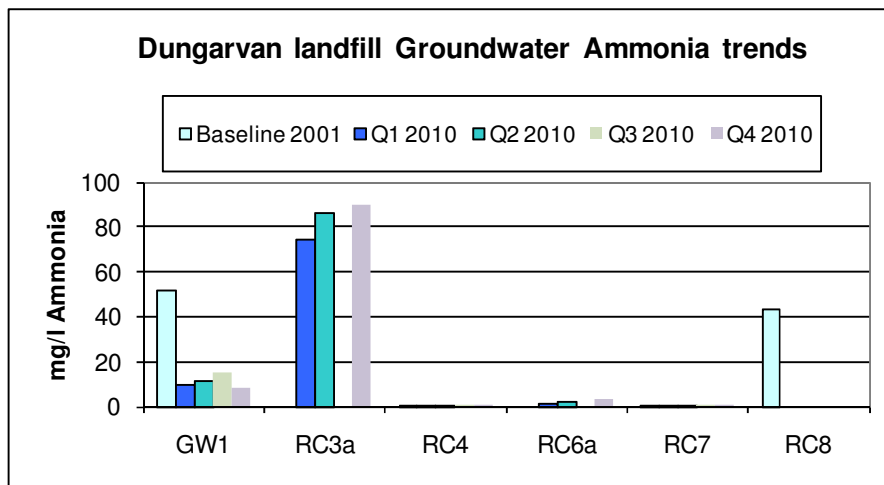
RC4 (south west of site) and RC7 (east of site) are outside the waste deposit area.

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 2010 are presented on tables 5.2.1 to 5.2.4 below, and appendices. High ammonia levels were detected at sites GW1, RC3a, and RC8, within the landfill site. Metals levels were generally low, although high iron levels were detected at GW1. 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



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 Q1 2010

| | RC4 | RC3a | GW1 | RC6a | RC7 | Drinking Water Standards (SI 278 2007) | Comments | Environmental significance |
|--------------------|-------------------------|------|-------|------|------|--|---|---|
| Depth of borehole | 23.3 | 23 | 10.3 | 11.6 | 11.8 | | | |
| Water level | 16.5 | 13.9 | 5.2 | 7.9 | 10.8 | | | |
| Temp deg C | 10.7 | 11.8 | 10.9 | 11 | 11.2 | | | |
| DO % | 54 | 24 | 23 | 19 | 34 | | Quite low, reflecting reducing conditions in most boreholes | None |
| pH | 7.3 | 7.1 | 6.7 | 7.2 | 7.3 | 7 to 9 | normal | None |
| Conductivity us/cm | 653 | 1987 | 1313 | 841 | 2010 | 1500 | Elevated conductivity at GW1, GW3a and RC7. May be influenced by tidal infiltration at RC7. | None |
| Ammonia mg/l N | 0.01 | 74 | 9.5 | 1 | 0.02 | 0.23 | Ammonia elevated at GW3a | Depends on flow rate and path and available dilution. May contribute at times to ammonia at SW300 |
| Chloride mg/l | 27 | 160 | 21 | 62 | 383 | 250 | Elevated chloride at RC7. May be influenced by tidal infiltration. | None, as receiving environment is estuarine. |
| TON mg/l | 12 | <0.5 | <0.5 | 13 | 11 | | Relatively low nitrogen present | None, given distance from receiving surface waters and available dilution. |
| Iron ug/l | 170 | 450 | 14000 | 100 | 270 | 200 | Elevated at GW1. Likely source is landfill leachate. | None, given distance from receiving surface waters and available dilution. |
| Sampled 28/1/2010 | RC8 no tubing, GW2a dry | | | | | | | |

Table 5.2.2. Groundwater quality Dungarvan landfill Q2 2010

| | RC4 | RC 3a | GW1 | RC6a | RC7 | Drinking Water Standards (SI 278 2007) | Comments | Environmental significance |
|--------------------|-------------------------|-------|-------|------|------|--|---|---|
| Depth of borehole | 23 | 23 | 10.3 | 11.7 | 11.8 | | | |
| Water level | 15.8 | 15.7 | 2.6 | 7.8 | 10.4 | | | |
| Temp deg C | 11.3 | 12.4 | 11.3 | 11.8 | 10.7 | | | |
| DO % | 57 | 21 | 28 | 29 | 49 | | Quite low, reflecting reducing conditions in most boreholes | None |
| pH | 7.2 | 7.1 | 6.5 | 7.1 | 7.5 | 7 to 9 | normal | None |
| Conductivity us/cm | 651 | 2270 | 1278 | 950 | 4290 | 1500 | Elevated conductivity at GW1, GW3a and RC7. May be influenced by tidal infiltration at RC7. | None |
| Ammonia mg/l N | 0.01 | 86 | 11 | 1.7 | 0.05 | 0.23 | Ammonia elevated at GW3a | Depends on flow rate and path and available dilution. May contribute at times to ammonia at SW300 |
| Chloride mg/l | 26 | 200 | 22 | 88 | 1181 | 250 | Elevated chloride at RC7. May be influenced by tidal infiltration. | None, as receiving environment is estuarine. |
| TON mg/l | 11 | <0.5 | <0.5 | 12 | 2.2 | | Relatively low nitrogen present | None, given distance from receiving surface waters and available dilution. |
| Iron ug/l | <25 | 9200 | 57000 | <25 | 570 | 200 | Elevated at GW1. Likely source is landfill leachate. | None, given distance from receiving surface waters and available dilution. |
| Sampled 28/4/2010 | RC8 no tubing, GW2a dry | | | | | | | |

Table 5.2.3. Groundwater quality Dungarvan landfill Q3 2010

| | RC4 | GW1 | RC7 | Drinking Water Standards (SI 278 2007) | Comments | Environmental significance |
|--------------------|-------|-------|-------|--|--|---|
| Depth of borehole | 22.3 | 10.2 | 11.8 | | | |
| Water level | 14.6 | 1 | 9.1 | | | |
| Temp deg C | 11.5 | 12.1 | 11.3 | | | |
| DO % | 55 | 7 | 21 | | Quite low, reflecting reducing conditions in most boreholes | None |
| pH | 7.1 | 6.8 | 7.4 | 7 to 9 | normal | None |
| Conductivity us/cm | 651 | 1334 | 12920 | 1500 | Elevated conductivity at GW1, and RC7. May be influenced by tidal infiltration at RC7. | None |
| Ammonia mg/l N | 0.03 | 15 | 0.03 | 0.23 | Ammonia elevated at GW3a | Depends on flow rate and path and available dilution. May contribute at times to ammonia at SW300 |
| Chloride mg/l | 26 | 28 | >1130 | 250 | Elevated chloride at RC7. May be influenced by tidal infiltration. | None, as receiving environment is estuarine. |
| TON mg/l | 10.97 | <0.5 | nm | | Relatively low nitrogen present | None, given distance from receiving surface waters and available dilution. |
| Iron ug/l | 110 | 25000 | 310 | 200 | Elevated at GW1. Likely source is landfill leachate. | None, given distance from receiving surface waters and available dilution. |

Sampled 6/7/2010 RC3a, RC6a unable to mount pump RC8 no tubing, GW2a dry

Table 5.2.4 Dungarvan landfill groundwater monitoring Q4 2010

| | RC4 | RC3a | GW1 | RC6a | RC7 | Drinking Water Standards (SI 278 2007) | Comments | Environmental significance |
|--|------|------|------|-------|------|--|--|---|
| Depth of borehole | 22.3 | 17.2 | 10.3 | NT | 11.9 | | | |
| Water level | 15 | 7.3 | 3.2 | NT | 10.6 | | | |
| Temp deg C | NT | 11.6 | 11.5 | 10.6 | 11.9 | | | |
| Alkalinity mg/l as CaCO ₃ | 215 | 1002 | 443 | 287 | 170 | | Moderate levels | None |
| Ammonia mg/l N | 0.02 | 90 | 8 | 3 | 0.04 | 0.23 | Ammonia elevated at RC3a | Depends on flow rate and path and available dilution. May contribute at times to ammonia at SW300 |
| Chloride mg/l | 26 | 165 | 27 | 126 | 1195 | 250 | Elevated chloride at RC7. May be influenced by tidal infiltration. | None, as receiving environment is estuarine. |
| Conductivity us/cm | 646 | 2200 | 1050 | 1130 | 4290 | 1500 | Elevated conductivity at RC7. May be influenced by tidal infiltration. | None |
| DO % | 49 | 23 | 24 | 35 | 28 | | Quite low, reflecting reducing conditions in most boreholes | None |
| Orthophosphate mg/l P | 0.03 | 0.05 | 0.06 | 0.04 | 0.06 | | LOW | None |
| pH | 7.2 | 7.1 | 7.2 | 7.1 | 7.6 | 7 to 9 | Normal range | None |
| TON mg/l | 10.5 | <0.5 | <0.5 | 11.04 | 1 | | Relatively low nitrogen present | None, given distance from receiving surface waters and available dilution. |
| Sampled 15/11/2010 RC8 no tubing, GW2a dry | | | | | | | | |

5.3 LEACHATE

5.3.1 INTRODUCTION

The leachate holding tank was sampled during 2010. No sampling was possible from individual leachate boreholes due to access difficulties due to capping and landfill remediation works. The leachate tank was dry at times and no sample was taken in the third quarter of 2010.

A series of constructed wetland ponds occurs on the landfill cap and are designed to collect and treat residual leachate from the landfill. The wetlands installed in autumn 2008 have been planted with a mix of wetland vegetation such as reeds and sedges.

Results of analysis of leachate prior to wetland treatment are presented in table 5.3.1 to 5.3.3, 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.

Results for Ammonium and COD for the leachate treatment constructed wetland ponds 1 (inlet pond) and pond 5 (outlet pond) are presented in figures 5.3.2 and 5.3.3 below.

5.3.2 RESULTS

COD was high (12775 mg/l) in the leachate interception tank in the first quarter of 2010 but decreased thereafter.

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.

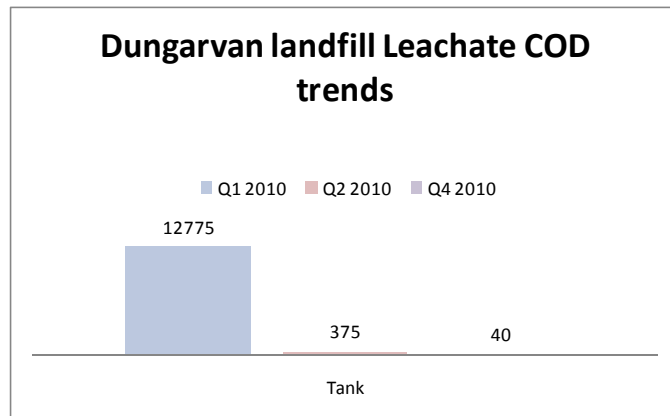


Figure 5.3.1 Leachate COD trends

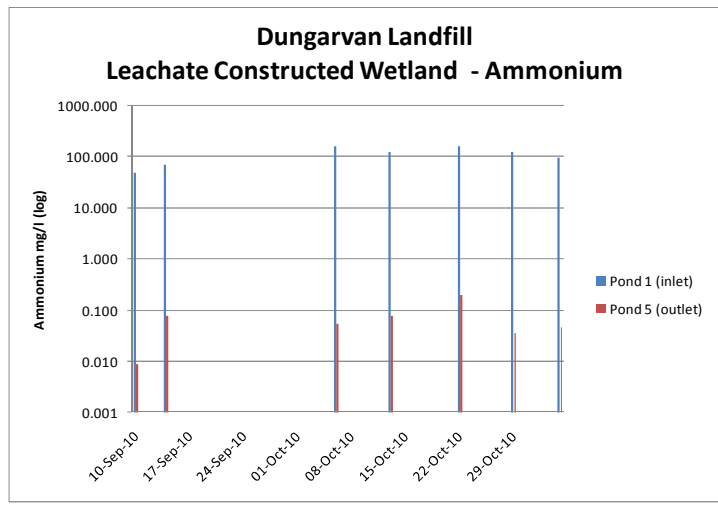


Figure 5.3.2 Constructed wetland inlet/outlet Ammonium (log)

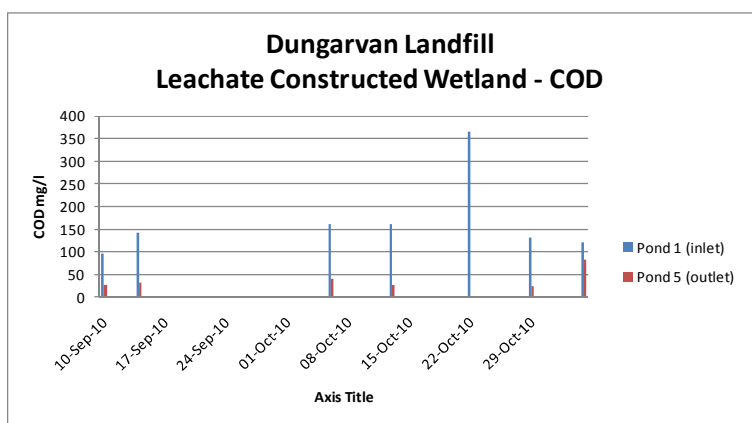


Figure 5.3.3 Constructed wetland inlet/outlet Chemical Oxygen Demand COD

DISCUSSION

A sharp decrease in COD occurred in the raw leachate manhole sample between the 1st and 4th quarters of 2010. The decrease in measured COD may be due to effects of capping. Continued monitoring will indicate any trends in leachate quality. The contents of this tank are treated subsequently treated in the on-site constructed wetland. There was a 99% decrease in ammonium and an 80% decrease in COD between pond 1 (inlet) and pond 5 (outlet). There was no flow out of the constructed wetland during the sampling period.

Table 5.3.1 Leachate quality Dungarvan landfill, Q1 2010

| Test | L1 | L2A | L3 | L4 | L5a | Leachate Tank Intceptor | GW2a | Typical Leachate Analysis (EPA, 1997) | Comment | Environmental significance |
|---|----|-----|----|----|-----|-------------------------|------|---------------------------------------|--------------------------------------|---|
| BOD mg/l O ₂ | | | | | | >=4800 | | 270 | result in line with typical leachate | none, given expected dilution in receiving waters |
| COD mg/l O ₂ | | | | | | 12775 | | 954 | result in line with typical leachate | none, given expected dilution in receiving waters |
| Temperature °C | | | | | | 6.2 | | | result normal | none |
| Sampled 28/1/2010. L1, L2a, L3 damaged unable to sample, L4 dry, L5a borehole in reedbed, unable to sample. | | | | | | | | | | |

Table 5.3.2 Leachate Quality Dungarvan landfill, Q2 2010

| Test | L1 | L2A | L3 | L4 | L5a | Leachate Tank Inteceptor | GW2a | Typical Leachate Analysis (EPA, 1997) | Comment | Environmental significance |
|-------------------------|----|-----|----|----|-----|--------------------------|------|---------------------------------------|---|---|
| BOD mg/l O ₂ | | | | | | >120 | | 270 | result in line with typical leachate | none, given expected dilution in receiving waters |
| COD mg/l O ₂ | | | | | | 375 | | 954 | result low compared with typical leachate | none, given expected dilution in receiving waters |
| Iron mg/l | | | | | | 4400 | | | result low compared with typical leachate | none, given expected dilution in receiving waters |
| Temperature °C | | | | | | 15.5 | | | result normal | none |

Sampled 28/4/2010. L1, L2a, L3 damaged unable to sample, L4 dry, L5a borehole in reedbed, unable to sample.

Table 5.3.3 Leachate Quality Dungarvan landfill, Q4 2010

| Test | Leachate Tank Inteceptor | Typical Leachate Analysis (EPA, 1997) | Comment | Environmental significance |
|--|--------------------------|---------------------------------------|---|----------------------------|
| Ammonia mg/l N | 24 | | | |
| BOD mg/l O ₂ | 14.9 | 270 | Result low. | None |
| Chloride mg/l | 71 | | | |
| COD mg/l O ₂ | 40 | 954 | Result low compared with typical leachate | None |
| Conductivity us/cm | 1324 | | Result low compared with typical leachate | None |
| Orthophosphate mg/l | 0.27 | | Result low compared with typical leachate | None |
| pH | 7.7 | | Normal range | None |
| Temperature °C | 11.5 | | Result normal | none |
| Total Oxidised Nitrogen mg/l as N | 3.14 | | Result low compared with typical leachate | None |
| Sampled 15/11/10. L1, L2a, L3, L5a damaged unable to sample, L4 dry. | | | | |

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 2010

| Date | Operator | GW 1 | GW 2A | RC 3A | RC 4 | RC 6A | L1 | LT 2A | L4 | L5A | RC 7 | RC 8 |
|------------|----------|------|-------|-------|------|-------|----|-------|-----|-----|------|------|
| 25/01/2010 | DR | 4.1 | 1.9 | 13.1 | 16 | 8.1 | D | D | 3.3 | D | 11.1 | 11.5 |
| 25/02/2010 | DR | 2.6 | 1.7 | 12.5 | 15.5 | 8 | D | D | 1.2 | D | 11 | 11.5 |
| 30/03/2010 | DR | 3.7 | 1.9 | 12.8 | 15.6 | 7.9 | D | D | 1.2 | D | 11.1 | 11.5 |
| 15/04/2010 | DR | 2.7 | 1.7 | 12.8 | 15.4 | 7.8 | D | D | 0.9 | D | 11 | 11.2 |
| 12/05/2010 | DR | 2.2 | 1.6 | 12.4 | 15.4 | 7.6 | D | D | 1.1 | D | 10.5 | 11.2 |
| 20/06/2010 | DR | 2 | 1.5 | 12.4 | 15.2 | 7.8 | D | D | 1.1 | D | 10.4 | 12.1 |
| 19/07/2010 | DR | 3.6 | 1.9 | 12 | 15.9 | 8 | D | D | 1 | D | 10.6 | 12.1 |
| 31/08/2010 | DR | 2.2 | 1.7 | 12.4 | 15.1 | 7.6 | D | D | 1 | D | 10.6 | 11.4 |
| 28/09/2010 | DR | 2.1 | 1.8 | 12.4 | 15.2 | 7.9 | D | D | 1 | D | 10.6 | 11.6 |
| 29/10/2010 | DR | 4 | 2 | 12.7 | 15.5 | 8.1 | D | 6.4 | 0.5 | 8.2 | 10.7 | 12.4 |
| 29/11/2010 | DR | 3.7 | 1.8 | 12.5 | 15.4 | 8 | D | 6.4 | 0.5 | D | 10.7 | 12 |
| 30/12/2010 | DR | 2.8 | 2 | 12.1 | 15.2 | 8 | D | 6 | 0.6 | D | 10.7 | 11.6 |
| D=Damaged | | | | | | | | | | | | |

5.4.3 Discussion

There was no significant 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.

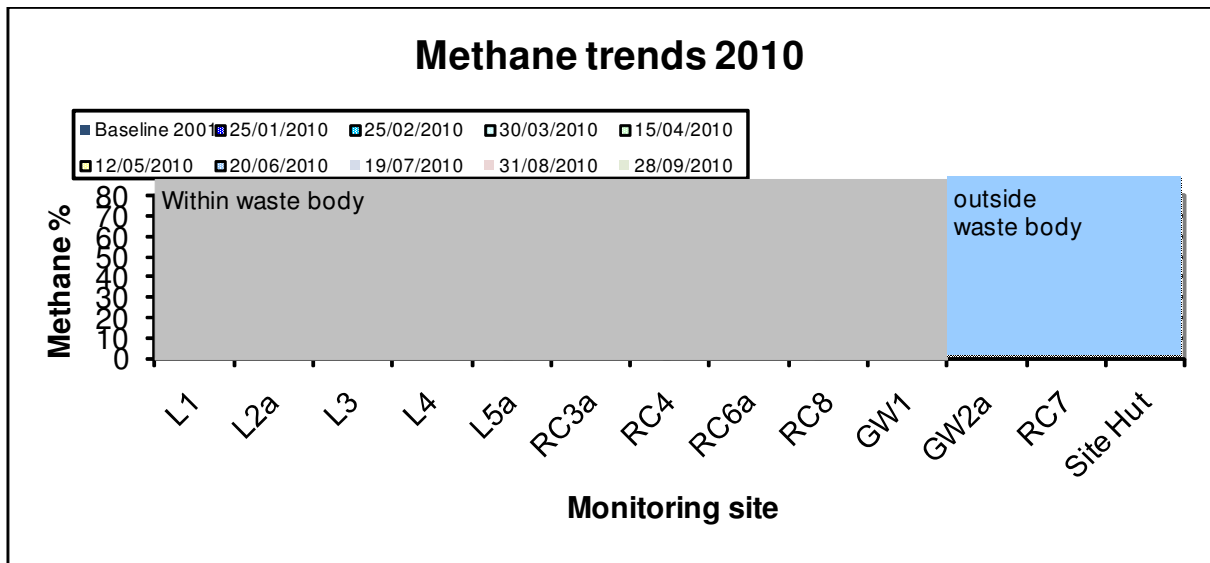


Figure 5.5.1 Methane trends 2010

Relatively low levels of methane were detected at most boreholes within the waste deposit area, and were lower compared to baseline levels in 2001.

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

Table 5.5.1: Dungarvan Landfill Gas monitoring Q1 2010

| 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 | 04/01/2010 | DR | CH ₄ , CO ₂ , O ₂ Air Pressure | 0 0 21.4 1018 | | | | | | | | | | | | |
| 2 | 11/01/2010 | DR | CH ₄ , CO ₂ , O ₂ Air Pressure | 0 0 21.2 1014 | | | | | | | | | | | | |
| 3 | 20/01/2010 | DR | CH ₄ , CO ₂ , O ₂ Air Pressure | 0 0 20.9 1008 | | | | | | | | | | | | |
| 4 | 25/01/2010 | DR | CH ₄ , CO ₂ , O ₂ Air Pressure | 0 0 21.0 1032 | 0 0 21.5 1032 | 0 0 21.3 1032 | 0 0 21.3 1032 | 0 0 21.0 1032 | 0 0 21.2 1032 | Dama ged | Dama ged | Dama ged | 0 0 21.2 1032 | Damaged | 0 0 20.3 1032 | 3.2 1.2 19.8 1032 |
| 5 | 03/02/2010 | DR | CH ₄ , CO ₂ , O ₂ Air Pressure | 0 0 21.3 1000 | | | | | | | | | | | | |
| 6 | 09/02/2010 | DR | CH ₄ , CO ₂ , O ₂ Air Pressure | 0 0 21.5 1011 | | | | | | | | | | | | |
| 7 | 16/02/2010 | DR | CH ₄ , CO ₂ , O ₂ Air Pressure | 0 0 21.0 987 | | | | | | | | | | | | |
| 8 | 25/02/2010 | DR | CH ₄ , CO ₂ , O ₂ Air Pressure | 0 0 21.0 989 | 0 0 21.1 989 | 0 0 21.2 989 | 0 0 21.0 989 | 0 0 20.9 989 | 0 0 21.0 989 | Dama ged | Dama ged | Dama ged | 0 0 21.0 989 | Damaged | 0 0 20.5 989 | 0 0 20.7 989 |
| 9 | 02/03/2010 | DR | CH ₄ , CO ₂ , O ₂ Air Pressure | 0 0 21.3 1014 | | | | | | | | | | | | |
| 10 | 09/03/2010 | DR | CH ₄ , CO ₂ , O ₂ Air Pressure | 0 0 21.1 1030 | | | | | | | | | | | | |
| 11 | 15/03/2010 | DR | CH ₄ , CO ₂ , O ₂ Air Pressure | 0 0 20.9 1025 | | | | | | | | | | | | |
| 12 | 22/03/2010 | DR | CH ₄ , CO ₂ , O ₂ Air Pressure | 0 0 21.4 1006 | | | | | | | | | | | | |
| 13 | 30/03/2010 | DR | CH ₄ , CO ₂ , O ₂ Air Pressure | 0 0 21.1 982 | 0 0 21.4 982 | 0 0 21.4 982 | 0 0 21.3 982 | 0.3 0.2 20.5 982 | 0 0 21.5 982 | Dama ged | Dama ged | Dama ged | 0 0 21.1 982 | Damaged | 0 0 20.7 982 | 8.4 2.4 15.4 982 |
| 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 5.5.2: Dungarvan Landfill Gas monitoring Q2 2010

| Week No | Date | Operator | Gas | Site Hut | GW1 | GW2A | RC3A | RC4 | RC6A | LT1 | LT2A | LT3 | LT4 | LT5A | RC7 | RC8 |
|---------|------------|----------|--|------------------------|------------------------|------------------------|------------------------|----------------------------|------------------------|---------|---------|---------|------------------------|----------------------------|------------------------|----------------------------|
| 14 | 08/04/2010 | DR | CH ₄ CO ₂ O ₂ Air Pressure | 0 0 20.2 1027 | | | | | | | | | | | | |
| 15 | 15/04/2010 | DR | CH ₄ CO ₂ O ₂ Air Pressure | 0 0 20.8 1020 | 0 0 20.6 1020 | 0 0 20.7 1020 | 0 0 21.3 1020 | 0.1 0.2 20.6 1020 | 0 0 20.7 1020 | Damaged | Damaged | Damaged | 0 0 20.6 1020 | 2.7 1.2 20.6 1020 | 0 0 20.3 1020 | 5.3 1.5 19.6 1020 |
| 16 | 21/04/2010 | DR | CH ₄ CO ₂ O ₂ Air Pressure | 0 0 20.6 1020 | | | | | | | | | | | | 5.3 1.5 19.6 1020 |
| 17 | 23/04/2010 | DR | CH ₄ CO ₂ O ₂ Air Pressure | 0 0 20.9 1009 | | | | | | | | | | | | |
| 18 | 06/05/2010 | DR | CH ₄ CO ₂ O ₂ Air Pressure | 0 0 20.9 1004 | | | | | | | | | | | | |
| 19 | 12/05/2010 | DR | CH ₄ CO ₂ O ₂ Air Pressure | 0 0 20.9 1011 | 0 0 20.9 1011 | 0 0 20.8 1011 | 0 0 20.9 1011 | 0 0 20.8 1011 | 0 0 20.8 1011 | Damaged | Damaged | Damaged | 0 0 20.8 1011 | Damaged | 0 0 20.3 1020 | 0 0 20.9 1011 |
| 20 | 18/05/2010 | DR | CH ₄ CO ₂ O ₂ Air Pressure | 0 0 20.9 1021 | | | | | | | | | | | | |
| 21 | 21/05/2010 | DR | CH ₄ CO ₂ O ₂ Air Pressure | 0 0 20.9 1009 | | | | | | | | | | | | |
| 22 | 31/05/2010 | DR | CH ₄ CO ₂ O ₂ Air Pressure | 0 0 20.9 1013 | | | | | | | | | | | | |
| 23 | 08/06/2010 | DR | CH ₄ CO ₂ O ₂ Air Pressure | 0 0 20.9 1019 | | | | | | | | | | | | |
| 24 | 16/06/2010 | DR | CH ₄ CO ₂ O ₂ Air Pressure | 0 0 20.9 1021 | | | | | | | | | | | | |
| 25 | 20/06/2010 | DR | CH ₄ CO ₂ O ₂ Air Pressure | 0 0 20.9 984 | 0 0 20.9 984 | 0 0 20.9 984 | 0 0 20.9 984 | 0 0 20.9 984 | 0 0 20.9 984 | Damaged | Damaged | Damaged | 0 0 20.9 984 | Damaged | 0 0 20.9 984 | 0 0 20.9 984 |
| 26 | 29/06/2010 | DR | CH ₄ CO ₂ O ₂ Air Pressure | 0 0 20.9 1011 | | | | | | | | | | | | |
| Week No | Date | Operator | Gas | Site Hut | GW1 | GW2A | RC3A | RC4 | RC6A | LT1 | LT2A | LT3 | LT4 | LT5A | RC7 | RC8 |

Table 5.5.3: Dungarvan Landfill Gas monitoring Q3 2010

| Week No | Date | Operator | Gas | Site Hut | GW1 | GW2A | RC3A | RC4 | RC6A | LT1 | LT2A | LT3 | LT4 | LT5A | RC7 | RC8 |
|---------|------------|----------|--|------------------------|------------------------|------------------------|------------------------|--------------------------|------------------------|---------|---------|---------|----------------------------|---------|------------------------|----------------------------|
| 27 | 08/07/2010 | DR | CH ₄ CO ₂ O ₂ Air Pressure | 0 0 20.9 1021 | | | | | | | | | | | | |
| 28 | 13/07/2010 | DR | CH ₄ CO ₂ O ₂ Air Pressure | 0 0 20.9 1000 | | | | | | | | | | | | |
| 29 | 19/07/2010 | DR | CH ₄ CO ₂ O ₂ Air Pressure | 0 0 20.9 1012 | 0 0 20.9 1012 | 0 0 20.9 1012 | 0 0 20.9 1012 | 0 0 20.9 1012 | 0 0 20.9 1012 | Damaged | Damaged | Damaged | 0 0 20.9 1012 | Damaged | 0 0 20.9 1012 | 0 0 20.9 1012 |
| 30 | 27/07/2010 | DR | CH ₄ CO ₂ O ₂ Air Pressure | 0 0 20.9 1012 | | | | | | | | | | | | |
| 31 | 05/08/2010 | DR | CH ₄ CO ₂ O ₂ Air Pressure | 0 0 20.9 1008 | | | | | | | | | | | | |
| 32 | 12/08/2010 | DR | CH ₄ CO ₂ O ₂ Air Pressure | 0 0 20.9 1021 | | | | | | | | | | | | |
| 33 | 17/08/2010 | DR | CH ₄ CO ₂ O ₂ Air Pressure | 0 0 20.2 1012 | | | | | | | | | | | | |
| 34 | 26/08/2010 | DR | CH ₄ CO ₂ O ₂ Air Pressure | 0 0 20.9 1018 | | | | | | | | | | | | |
| 35 | 31/08/2010 | DR | CH ₄ CO ₂ O ₂ Air Pressure | 0 0 20.9 1023 | 0 0 20.9 1023 | 0 0 20.9 1023 | 0 0 20.6 1023 | 0 0 20.5 1023 | 0 0 21.1 1023 | Damaged | Damaged | Damaged | 0 0 20.6 1023 | Damaged | 0 0 20.9 1023 | 0 1.1 18.9 1023 |
| 36 | 09/09/2010 | DR | CH ₄ CO ₂ O ₂ Air Pressure | 0 0 20.6 1013 | | | | | | | | | | | | |
| 37 | 16/09/2010 | DR | CH ₄ CO ₂ O ₂ Air Pressure | 0 0 20.6 1016 | | | | | | | | | | | | |
| 38 | 22/09/2010 | DR | CH ₄ CO ₂ O ₂ Air Pressure | 0 0 20.2 1008 | | | | | | | | | | | | |
| 39 | 28/09/2010 | DR | CH ₄ CO ₂ O ₂ Air Pressure | 0 0 20.5 1011 | 0 0 20.5 1011 | 0 0 20.3 1011 | 0 0 20.5 1011 | 0.1 0 20.4 1011 | 0 0 20.5 1011 | Damaged | Damaged | Damaged | 1.0 0.5 20.1 1011 | Damaged | 0 0 20.6 1011 | 2.6 0.8 19.7 1011 |
| Week No | Date | Operator | Gas | Site Hut | GW1 | GW2A | RC3A | RC4 | RC6A | LT1 | LT2A | LT3 | LT4 | LT5A | RC7 | RC8 |

Table 5.5.4: Dungarvan Landfill Gas monitoring Q4 2010

| 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 | 05/10/2009 | DR | CH ₄ , CO ₂ , O ₂ Air Pressure | 0 0 20.4 993 | | | | | | | | | | | | |
| 41 | 11/10/2010 | DR | CH ₄ , CO ₂ , O ₂ Air Pressure | 0 0 20.8 1017 | | | | | | | | | | | | |
| 42 | 20/10/2010 | DR | CH ₄ , CO ₂ , O ₂ Air Pressure | 0 0 20.9 1023 | | | | | | | | | | | | |
| 43 | 29/10/2010 | DR | CH ₄ , CO ₂ , O ₂ Air Pressure | 0 0 21.0 983 | 0 0 21.0 983 | 0 0 20.9 983 | 0 0 20.9 983 | 0.1 0.1 20.7 983 | 0 0 21.1 983 | Dama ged | 0 0 21.1 983 | Damage d | 0.2 0.1 20.8 983 | 0 0 21.0 983 | 0 0 20.6 983 | 6.8 2.3 19.0 983 |
| 44 | 02/11/2010 | DR | CH ₄ , CO ₂ , O ₂ Air Pressure | 0 0 20.9 1006 | | | | | | | | | | | | |
| 45 | 08/11/2010 | DR | CH ₄ , CO ₂ , O ₂ Air Pressure | 0 0 20.9 1006 | | | | | | | | | | | | |
| 46 | 17/11/2010 | DR | CH ₄ , CO ₂ , O ₂ Air Pressure | 0 0 20.9 993 | | | | | | | | | | | | |
| 47 | 22/11/2010 | DR | CH ₄ , CO ₂ , O ₂ Air Pressure | 0 0 21.2 1013 | | | | | | | | | | | | |
| 48 | 29/11/2010 | DR | CH ₄ , CO ₂ , O ₂ Air Pressure | 0 0 20.9 1017 | 0 0 20.6 1017 | 0 0 20.9 1017 | 0 0 20.5 1017 | 0.2 0.2 20.6 1017 | 0 0 20.9 1017 | Dama ged | 17.5 15.0 5.7 1017 | Damage d | 0.2 0.2 20.4 1017 | 0.4 0.4 20.3 1017 | 0 0 20.9 1017 | 1.6 0.7 20.1 1017 |
| 49 | 08/12/2010 | DR | CH ₄ , CO ₂ , O ₂ Air Pressure | 0 0 20.0 1026 | | | | | | | | | | | | |
| 50 | 16/12/2010 | DR | CH ₄ , CO ₂ , O ₂ Air Pressure | 0 0 20.6 1016 | | | | | | | | | | | | |
| 51 | 21/12/2010 | DR | CH ₄ , CO ₂ , O ₂ Air Pressure | 0 0 20.8 1010 | | | | | | | | | | | | |
| 52 | 30/12/2010 | DR | CH ₄ , CO ₂ , O ₂ Air Pressure | 0 0 20.5 1002 | 0 0 20.5 1002 | 0 0 20.3 1002 | 0 0 20.5 1002 | 0.2 0.1 20.1 1002 | 0 0 20.5 1002 | Dama ged | 0 0 20.3 1002 | Damage d | 0 0 20.4 1002 | 0 0 20.2 1002 | 0 0 20.5 1002 | 0 0.1 20.4 1002 |

5.6 NOISE

5.6.1 Introduction

Daytime noise levels were recorded in July 2010 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 - 2009 Noise levels

1998 "Baseline" noise levels

| <i>Site</i> | <i>Date of Monitoring</i> | <i>L(A)eq[30mins] dB</i> |
|-------------|---------------------------------|------------------------------|
| B1 | 16/7/10 <i>Baseline 1998</i> | 45.2 56 |
| B2 | 16/7/10 <i>Baseline 1998</i> | 46.8 50 |
| B3 | 16/7/10 <i>Baseline 1998</i> | 45.8 46 |
| B4 | 16/7/10 <i>Baseline 1998</i> | 45.8 47 |
| NSL1 | 16/7/10 <i>Baseline 1998</i> | 43.4 54 |

5.6.3 Discussion

Noise levels were compliant at all locations with the noise emission requirement of 55 dB(A) LAeq (30 mins). Noise levels recorded in July 2010 were generally lower than baseline levels of 1998.

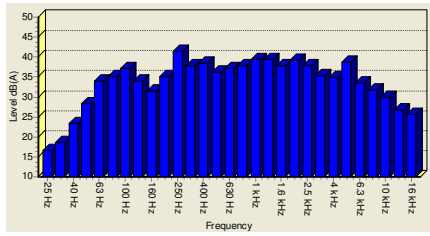


Fig 5.6.1 Dungarvan landfill noise monitoring 16/7/10, location B1, octave band analysis, A weighting

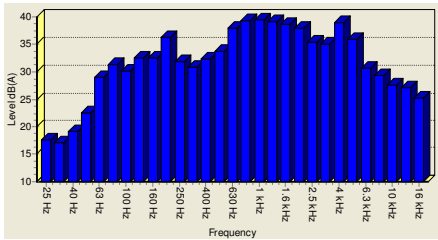


Fig 5.6.2 Dungarvan landfill noise monitoring 16/7/10, location B2, octave band analysis, A weighting

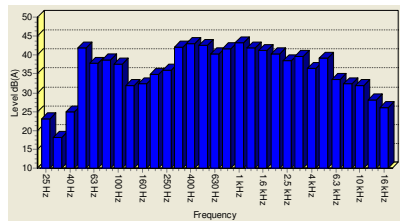


Fig 5.6.3 Dungarvan landfill noise monitoring 16/7/10, location B3, octave band analysis, A weighting

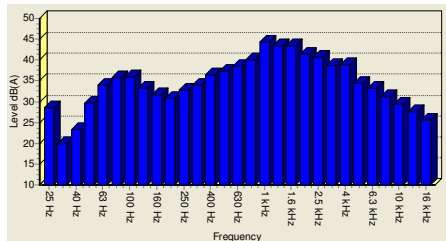


Fig 5.6.4 Dungarvan landfill noise monitoring 15/7/10, location B4, octave band analysis, A weighting

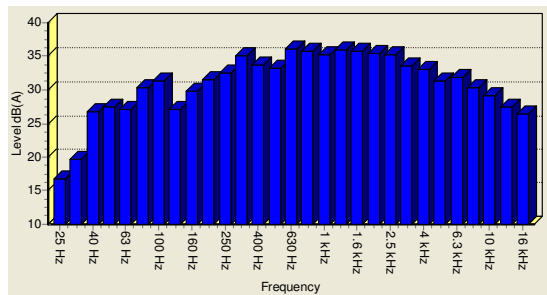


Fig 5.6.5 Dungarvan landfill noise monitoring 16/7/10, location NSL1, octave band analysis, A weighting

5.7 DUST

5.7.1 Introduction / Methodology

Dust deposition rates were measured between 16/6/10 and 15/7/10 over a period of 29 days at five locations (B1, B2, B3, B4, and D1) at Dungarvan Landfill. The measurement method was the Bergerhoff deposition method.

5.7.2 Results

Dust Monitoring Dungarvan Landfill

| | |
|----------------------|-----------------------|
| Monitoring interval. | 16/06/2010-15/07/2010 |
| No Of Days | 29 |

| Location | Weight 1 | Weight 2 | No of Days | Deposition Rate mg/sq. m/day |
|----------|----------|----------|------------|---------------------------------|
| B1 | 0.3301 | 0.3334 | 29 | 51.7 |
| B2 | 0.3326 | 0.3376 | 29 | 78.4 |
| B3 | 0.3342 | 0.3451 | 29 | 170.8 |
| B4 | 0.3219 | 0.3306 | 29 | 136.4 |
| D1 | 0.3289 | 0.3365 | 29 | 119.1 |

Table 5.7.1 - Dust Deposition at Dungarvan Landfill 2010

5.7.3 Discussion

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

5.8 ECOLOGICAL SURVEY

5.8.1 INTRODUCTION

The results of the 2010 ecological surveys are the subject of a separate report and a summary is presented in the following sections of this report, separated into the various subject areas as required by the scope of works. Section 2 gives a general site overview, describes areas designated for nature conservation that occur in close proximity to the landfill site and reports on the habitat study undertaken in June 2010. Section 3 presents the results of a freshwater biological (freshwater macroinvertebrate) survey along the River Colligan and at a constructed wetland pond on the landfill site carried out in October 2009 by Limosa Environmental Ltd. Section 4 discusses the bird communities recorded at the landfill and reviews data for Dungarvan Harbour from the Irish Wetland Bird Survey (I-WeBS).

5.8.2 Summary Report of 2010 Habitat Survey

Habitats occurring in the Dungarvan landfill site can be categorised as either semi-natural (e.g. scrub, WS1; wet grassland, GS4; reed and large sedge swamps, FS1) or artificial and modified (e.g. recolonising bare ground, ED3, spoil and bare ground, ED2; artificial lakes and ponds Fl8; buildings and artificial surfaces, BL3). These habitats have relatively low ecological value, particularly as they are subject to intermittent disturbance. However, with succession of habitats including establishment of wetland vegetation and increasing scrub cover they may provide good feeding grounds for a variety of birds and some mammal and invertebrate species.

The natural habitats surrounding the landfill are more valuable in terms of their flora and fauna and those recorded in association with the River Colligan are of special interest. These range from freshwater to brackishwater to estuarine habitats. The diversity and ecological interest is reflected in the designation of Dungarvan Harbour as a pNHA and SPA.

The majority of plant species recorded on the site is considered abundant and widespread throughout Ireland. None of the recorded plant species are listed in the Irish Red Data Book (Curtis &Mc Gough 1988) or appear in the protected list (Flora (Protection) Order, 1999).

Comparison of 2010 survey with 2008 survey

- The lagoons are now well established in terms of wetland vegetation cover and are now in operation treating the leachate. Margins of the lagoons show full vegetation cover with mosses, grasses and vascular plant species.

- Japanese Knotweed has encroached onto the landfill cap itself and will need to be monitored and controlled as it has the potential to spread quickly where unmanaged.
- The increasing presence of Gorse on the landfill cap area was noted in the 2010 survey indicating a likely succession to scrub cover over time. The presence of Gorse provides for increasing biodiversity being an important nectar source in early spring and early winter, when little else is in flower. A number of invertebrates are dependent on it.
- Comparison of plant species recorded in 2008 and 2010 is within a context of different survey timing (22nd October 2008 vs 14th June 2010) and by different recorders. Notwithstanding, there is an increase in botanical diversity on the site which is to be expected with stabilisation of soil, colonising vegetation and the establishment of the constructed wetland vegetation.
- A wild flower and grass seed mix was sown in the south-eastern corner of the site in 2010. Future botanical surveys will indicate the success of the seed mix in contributing to the floral diversity of the site.

5.8.3 Summary Report of the Aquatic Biological Survey

Limosa Environmental was commissioned by Waterford County Council to conduct a biological monitoring survey at selected sites. The licence requirements for ecological / biological monitoring were amended in 2009 from the former broader monitoring requirements to that of aquatic biological quality Q rating at three locations, two on the River Colligan and one in a drainage ditch which runs along the southern boundary of the site.

The results of the 2009 biological assessment of the River Colligan sites indicated good water quality status at both river sampling sites following analysis of the surface water quality and biological water quality data recorded. As in previous years the diversity of invertebrates decreased moving downstream in the brackish water reaches of the river from sites SW2 to SW1. An increase in the macroinvertebrate diversity was noted at site SW2 compared with 2008, whereas a slight decrease in the species diversity was recorded at site SW1 compared to 2008. However, this decrease is due to the absence of two species found in 2008, that of eels and stickleback. Other than this the macro-invertebrates recorded in the current survey remained very similar to those recorded in 2008 and thus it is considered that there has been no change in water quality.

These findings coupled with the review of water quality measurements taken on site and EPA chemical water quality data between 2008 and 2009, show continued good water quality indicating that Dungarvan Landfill site is not negatively impacting the River Colligan.

Although the European Eel was not recorded within in the current survey it as been recorded previously and it is likely that they are still present in the river in the tidal reaches of the River Colligan.

Site SW4 (pond site) is a new sampling location that has been added in 2009. The pond had an average diversity of invertebrates and contained both mayfly and damselflies that are indicators of better water quality.

5.8.4 Summary Report of Birdlife Surveys

A bird survey of Dungarvan landfill and environs was undertaken in January 2011 mid way between high tide and low tide. The survey involved a survey of wetland birds of the river corridor adjacent to the Dungarvan landfill and extending downstream to approximately 500m below Ballyneety Bridge (undertaken midway between low tide and high tide high-tide).

A species list was compiled for all birds seen during a walk over survey at Dungarvan landfill.

A review was undertaken of annual count data for Dungarvan Harbour, from the Irish Wetland Bird Survey (I-Webs, Birdwatch Ireland). I-WeBS data (2002/03- 2008/09) shows that Dungarvan Harbour continues to support 10 species in nationally important numbers (based on average numbers over the past five available count years). Great-crested Grebe, Golden Plover, Grey Plover, Knot, Sanderling, Dunlin, Bar-tailed Godwit, Redshank, Greenshank and Turnstone. Average numbers of Red-breasted Merganser, Oystercatcher, Ringed Plover, Lapwing and Curlew are close to the national threshold.

During the winter months, Dungarvan Harbour supports four species that are listed on Annex 1 of the EU Birds Directive; Great Northern Diver, Little Egret, Golden Plover and Bar-tailed Godwit.

The average number of total waterbirds found at Dungarvan Harbour (based on the six most recent winter counts) is 19,103. Dungarvan Harbour is currently considered the 14th most important wetland site in Ireland and the second most important wetland site in the south-east after Wexford Harbour.

While the 2008 Ecological Survey Report noted lower than average numbers for both wildfowl and waders in the winter of 2006/07 data for 2008/09 show that this trend continued for waders but numbers of wildfowl showed an increase.

The most recent I-WeBS data (2002/03-2008/09) show a possible trend for decrease in Curlew and potentially for Bar-tailed Godwits. The data also shows a trend for increase in Redshank and Little Egret, the latter having naturally colonised the south coast of Ireland and been steadily increasing in terms of both breeding and wintering numbers ever since. Similarly, Light-bellied Brent Geese have appeared to increase steadily in numbers in recent years having shown a decline in previous years.

5.11 CONCLUSIONS

Water quality at the River Colligan surface water sites in the vicinity of the landfill were satisfactory throughout 2010.

The results of groundwater monitoring are in line with results from previous rounds of testing carried out since 1999. As indicated in previous reports, some of the boreholes within the current working area appear 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 leachate management, treatment in the on-site constructed wetlands, attenuation and dilution, no environmental effect from landfill leachate is expected.

No noise nuisance was indicated during the annual noise survey.

Dust deposition levels were below nuisance levels.

The ecological survey of the landfill and estuarine area carried out recorded a diversity of species in both terrestrial and aquatic habitats and concluded that the increase in the diversity of species at downstream sites, coupled with the review of water quality measurements taken on site and EPA chemical water quality, 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. Capping was completed in 2008.

b) Landfill Gas & Leachate Management

Tank and pipeline testing and inspection report

As part of the leachate and gas systems required under the licence, 1549m of leachate pipework (315mm, 225mm, 160mm, 90mm, 63mm), 3334m of gas pipework (250mm, 90mm), and 3 No. gas manifolds, were installed in 2009. All pipework was pressure tested in accordance with the contract and passed.

Two No. 25m³ Glass lined steel leachate storage tanks were erected onsite in 2009, however works onsite were suspended before final testing and commissioning. In May 2010, one of these tanks was brought into use as a leachate storage tank, and was (water) tested prior to usage. The tank on the western side of the site is now fully operational and forms part of the leachate abstraction system.

Report on progress made and proposals being developed to minimise generation of leachate for disposal

As per the information in the waste licence review submission (Dec-08), capping works were completed in mid 2008. The final capping system generally comprises of a gas collection layer, LLDPE liner, drainage layer, subsoil layer and topsoil layer as follows:

- 150-300mm layer of topsoil; underlain by
- Subsoil such that thickness of topsoil and subsoil is at least 1m thick; underlain by
- A surface water geocomposite layer; underlain by

- 1mm LLDPE liner (a low permeability geomembrane material).
- Geocomposite gas collection layer.

The capping layers will provide protection from the ingress of rain into the site and thus minimise leachate generation.

Wetland ponds were constructed in 2008 for the purpose of treating leachate. Leachate extraction wells are located strategically across the site in order to maximise collection efficiency. Furthermore, rainwater will assist in the dilution of leachate within the constructed wetlands.

The leachate and gas collection pipework and ancillary items was completed in 2009.

Work on the completion of the Landfill Gas and Leachate Management system were hindered by financial restrictions encountered by the licensee during the previous reporting period, however a temporary leachate extraction system is now operational, with initial results proving to be successful.

A report on the operation of the leachate extraction system, along with a layout drawing and laboratory analysis results of treated leachate to date are included in [Appendix K](#)

Development / Infrastructural works summary (completed in previous year or prepared for current year)

In 2009, as part of the leachate and gas systems required under the licence, 1549m of leachate pipework (315mm, 225mm, 160mm, 90mm, 63mm), 3334m of gas pipework (250mm, 90mm), and 3 No. gas manifolds, were installed. Two No. 25m³ Glass lined steel leachate storage tanks were erected.

A flare trial was carried out in 2009 to confirm the size of permanent flare required. A closed permanent flare of 100 m³/hr capacity was assessed as required, and was installed.

Following the tender and recommendations in the Gas Flare Tender Assessment Report (May 2008), AFS was awarded the tender for the flare and associated works. The gas collection system was completed in June 2009, but the project was then put on hold due to funding issues. The

permanent flare was installed and commissioned by AFS in July 2010, and intensive field balancing over a three month period was completed.

The telemetry system associated with the flare is fully operational and monitoring data referred to in Schedule C.1.2 of the licence can be furnished to the Agency as required. However no data was downloaded during the reporting period. The first set of results will be forwarded to the Agency as part of the Landfill Gas Survey. The licensee will agree a period for residence time also in accordance with Schedule C.1.2

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 ongoing 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 ongoing basis in such a way that final works have a minimal impact on the surrounding environment.

Objective 7 – To carry out regular maintenance of the Gas Management System including gas field balancing, telemetry maintenance and temperature control .

Objective 8 – To complete Leachate Management System (permanent system)

Objective 9 – To complete Landscaping and Seeding of Landfill Cap (wildflower planting)

Objective 10 – Finalise tenders for SCADA dilution system

Objective 11 - Install leachate dilution tanks by direct labour and bring tanks into use as part of permanent leachate extraction system.

Objective 12 – 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

This documentation will also be maintained as part of compliance requirements with Waterford County Council Environment Section's EMAS (Environmental Management and Audit Scheme) Certificate which was obtained in 2009.

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. A number of school visits to the facility took place during the reporting period
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 and 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. All staff have received manual handling training, Waste Facility Operative Course, Fire Fighting and fire extinguisher training and a refresher First Aid Course. All staff have also undertaken EMAS Certification training during the reporting period.

14. Statement on the costs of Landfill

The project budget as submitted to the Department of the Environment and Local Government (but not yet approved) as at the end of 2010 was €4,048,195 including VAT. The spend to end of year 2010 was €3,471,415

15. Reports on Financial Charges and Provisions

Waterford County Council is responsible for providing annual fees to the Agency for monitoring and inspection of the site. The annual fee for 2010 for monitoring was €20,954 and €15,571 for the licence. With regard to the details of financial provisions required under Condition 12.1.1 and 12.1.2 which are to be set aside in relation to the prevention of environmental damage and in order to underwrite the costs for remedial actions following anticipated events or incidents the following information is relevant.

Final closure Phase

Regarding capital works, the only remaining item is the expansion of the leachate abstraction and treatment system in 2011, at an estimated cost of between €150,000 and €300,000 excl. VAT (€170,000 and €360,000 incl. VAT), depending on the option chosen and tender return.

At the end of 2010, the total project spend was €3,471,415 (incl. VAT), and €447,411 is due for payments outstanding and various committed costs in 2011 (contract payments due, pond flowmeters, consulting fees, RE fees, etc.). Therefore a total of €3,918,826 is committed to date compared to a budget of €4,048,195, leaving a remaining budget of €129,369 (incl. VAT).

Aftercare Phase (30yrs)

The original estimates for long term liabilities were contained in the CRAMP and detail €80,000, €70,000, and €20,000 for general management, leachate, and gas systems, respectively (as per extracted Table 7.3 below). The Environmental Liabilities Risk Assessment is included in

Appendix L

Costs of aftercare management proposals

| Environmental Liability | Description | Cost Estimate |
|--|--|--------------------|
| General Management and maintenance of site during aftercare phase (30 yrs – includes for 20 years of aftercare). | € 80,000 per annum– monitoring contract with Laboratory, small maintenance works. | € 2,400,000 |
| Management and maintenance of Leachate Abstraction & Treatment Process and pumping system during aftercare phase (30 yrs – includes for 20 years of aftercare) | € 70,000 per annum- maintain Leachate Abstraction & treatment Process and SCADA system and replace pumps, lines etc. where required; Power supply; Testing | € 2,100,000 |
| Management and maintenance of Gas Management System during aftercare phase (30 yrs – includes for 20 years of aftercare) | € 20,000 per annum – Maintain & operate landfill gas extraction system | € 600,000 |
| | Total for 30 year period | € 5,100,000 |
| | Contingency set at 15% for increased scope on last three items. | € 765,000 |
| | Total for 30 years with contingency | € 5,865,000 |

Dungarvan landfill Maintenance costs

| Item | Description | Details | Cost |
|------|-----------------------------|--|----------------|
| 1 | Flare maintenance | As per contract | €3,400 |
| 2 | Flare maintenance | Allow for 4 days callouts at contract rate | €3,000 |
| 3 | Flare maintenance | Allow for parts replacement | €3,000 |
| 4 | Leachate system maintenance | Current contract (to Oct-11, new contract needed thereafter) | €3,600 |
| 5 | Leachate system maintenance | Allow for 4 days callouts at contract rate | €3,000 |
| 6 | Leachate system maintenance | Allow for parts replacement | €1,500 |
| 7 | Subtotal | | €17,500 |
| 8 | Contingencies at 15% | | €2,625 |
| 9 | Subtotal | | €20,125 |
| 10 | VAT | | €2,717 |
| 11 | Total | | €22,842 |

16. Slope Stability Assessment

A Slope Stability Assessment is included in **Appendix M**

APPENDIX A

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

Dungarvan Civic Amenity Site – Waste Accepted between January 1st 2010 – December 31st 2010

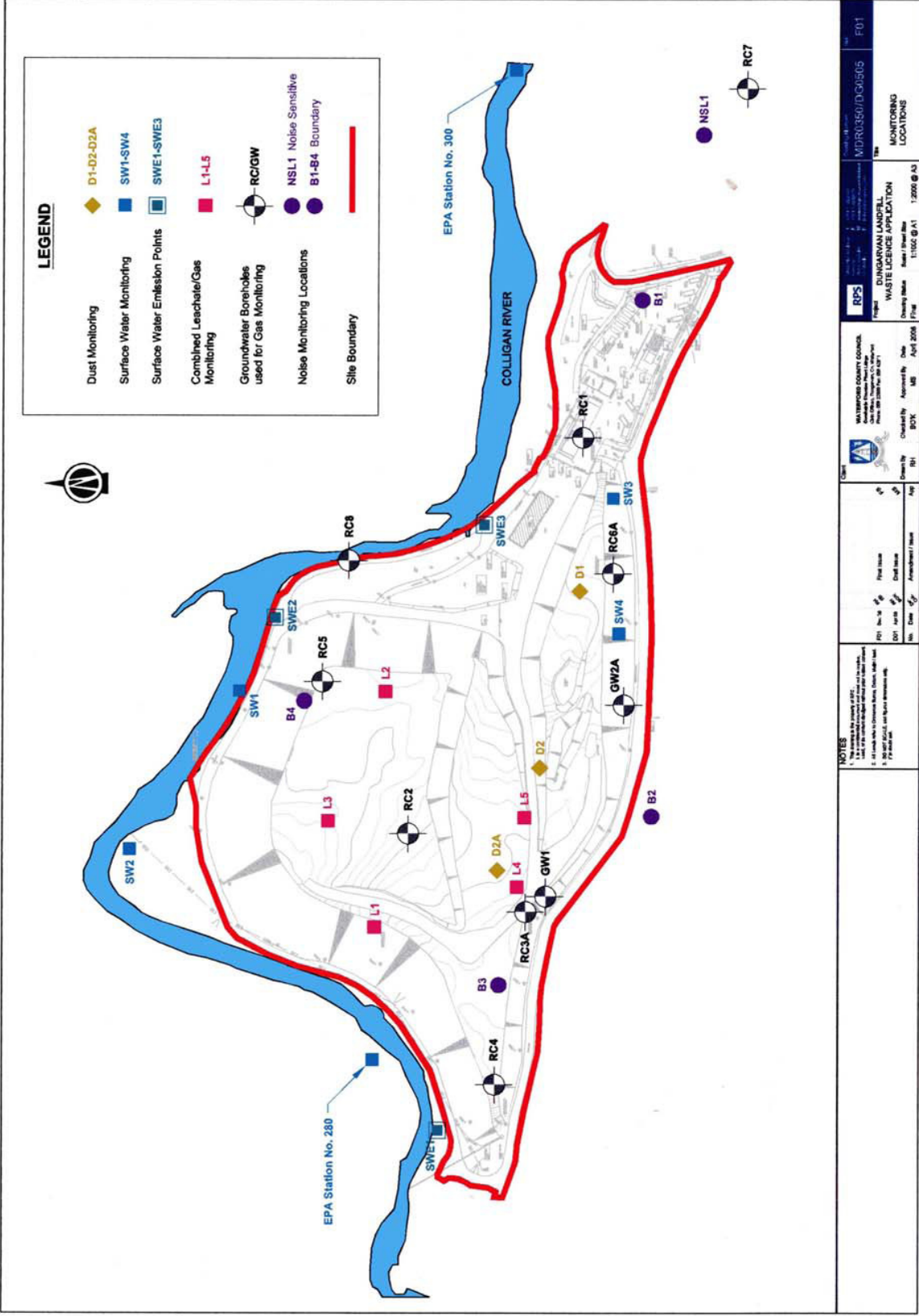
| Waste Disposed | Type | EWC Code | Jan-10 | Feb-10 | Mar-10 | Apr-10 | May-10 | Jun-10 | Jul-10 | Aug-10 | Sep-10 | Oct-10 | Nov-10 | Dec-10 | Total |
|-----------------------|----------------------|----------|---------------|---------------|---------------|---------------|--------------|---------------|---------------|---------------|------------|---------------|---------------|---------------|----------------|
| Domestic | Domestic Bulky CoCo | 20 03 01 | 4.92 | 6.48 | 5.92 | 4.64 | 3.32 | 5.12 | 4.58 | 7.18 | 5.1 | 2.18 | 3.76 | 1.84 | 55.04 |
| | Bulky CoCo | 20 03 01 | 3.5 | 0 | 8.9 | 0.24 | 1.22 | 0 | 0 | 5.68 | 8.56 | 0 | 0 | 2.56 | 30.66 |
| | Domestic Bulky UDC | 20 03 01 | 61.98 | 12.64 | 3.44 | 13.24 | 0 | 18.78 | 18.36 | 9.46 | 5.66 | 9.1 | 9.86 | 20.26 | 182.78 |
| | Civic Skip | 20 03 99 | 8.72 | 7.3 | 9.16 | 9.68 | 10.42 | 9.98 | 10.44 | 6.4 | 11.26 | 8.22 | 8.32 | 10.82 | 110.72 |
| | WCC Housing | 20 03 99 | 1.54 | 0.28 | 0.82 | 1.30 | 1.46 | 0.96 | 0.78 | 0.86 | 1.34 | 0.6 | 1.18 | 0 | 11.12 |
| | Clean Up | 20 03 99 | 0 | 0 | 0 | 16.72 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 18.72 |
| | Domestic CoCo | 20 03 99 | 143.08 | 104.14 | 202.12 | 134.42 | 191.96 | 93.28 | 178.4 | 92.62 | 208.86 | 106.22 | 138.52 | 285.1 | 1878.72 |
| | Dom CoCo by DTC | 20 03 99 | 17.38 | 13.28 | 27.94 | 13.04 | 22.84 | 11.54 | 20.26 | 11.06 | 11.44 | 14.02 | 11.62 | 15 | 189.42 |
| | Film Farm Plastics | 02 01 04 | 0 | 0 | 0 | 0 | 0 | 0 | 29.32 | 0 | 0 | 0 | 0 | 0 | 29.32 |
| | UDC Domestic | 20 03 99 | 56.14 | 41.78 | 78.3 | 44.86 | 80.3 | 39.8 | 71.54 | 33.38 | 43.84 | 40.66 | 51.7 | 59.08 | 641.38 |
| MRF Plant | MRF Plant | 20 03 99 | 0 | 3.52 | 1.36 | 0.00 | 0 | 0 | 5.86 | 0 | 0 | 0 | 0 | 0 | 10.74 |
| Litter | Roadsweeper | 20 03 99 | 33.4 | 32.56 | 34.3 | 37.28 | 33.42 | 25.84 | 38.06 | 51.58 | 48.02 | 62.14 | 55.78 | 40.12 | 492.5 |
| | RoadsweeperUDC | 20 03 99 | 0 | 0 | 0 | 0.00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Litterbins | 20 03 99 | 13.68 | 17.68 | 23.74 | 29.28 | 23.2 | 22.64 | 26.46 | 23.5 | 23.6 | 21.4 | 17.26 | 16.06 | 258.5 |
| | LitterbinsUDC | 20 03 99 | 23.74 | 18.68 | 21.48 | 18.52 | 11.46 | 19.5 | 13.86 | 16.24 | 17.32 | 12.88 | 18.1 | 19.28 | 211.06 |
| Total Disposed | | | 368.08 | 258.34 | 417.48 | 323.22 | 381.6 | 247.44 | 417.92 | 257.96 | 385 | 277.42 | 316.1 | 470.12 | 4120.68 |
| Recycling | Dry Material | 15 01 01 | 9.92 | 9.26 | 10.66 | 8.64 | 7.1 | 7.76 | 14.96 | 7.56 | 10.08 | 6.06 | 7.5 | 10.4 | 109.9 |
| | Textiles | 04 02 22 | 0.14 | 0.58 | 1 | 0.44 | 0.26 | 0.28 | 0.84 | 0.74 | 0.46 | 0.36 | 0.32 | 0.34 | 5.76 |
| | Fridges | 16 02 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 30.26 | 30.26 |
| | Large Household | 16 02 13 | | | | | | | | | | | | 99.58 | 99.58 |
| | Small Household | 16 02 13 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 101.6 | 101.6 |
| | TV's Monitors | 16 02 13 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 36.47 | 36.47 |
| Scrapmetal | Scrap metal | 17 04 07 | 0 | 2.26 | 3.64 | 3.62 | 4.48 | 3 | 2.14 | 1.7 | 1.9 | 1.5 | 0 | 1.72 | 25.96 |
| Recovery | Clay | 17 05 04 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9.58 | 0 | 0 | 9.58 |
| | Rubble | 17 01 07 | 0 | 8.06 | 0 | 9.42 | 0 | 8.7 | 0 | 7.88 | 7.72 | 0 | 7.32 | 0 | 49.1 |
| | Cooking Oil | 02 02 99 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.66 | 0 | 0 |
| Glass | Flat Glass | 17 02 02 | 0 | 0 | 0 | 0 | 2.1 | 0 | 0 | 1.38 | 0 | 2.46 | 0 | 0 | 5.94 |
| Compost | Compost | 02 01 07 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Brown Bin | 02 01 07 | 97.56 | 189.8 | 79.12 | 207.44 | 88.12 | 168.9 | 152.28 | 150.57 | 148.32 | 99.16 | 180.5 | 48.52 | 1610.29 |
| | WCC Brown by DTC | 02 01 07 | 8.48 | 13.94 | 4.7 | 18.5 | 8.16 | 13.06 | 12.34 | 9.3 | 13.7 | 7.66 | 14.12 | 7.44 | 131.4 |
| | Brown Bin UDC | 02 01 07 | 26.56 | 43.36 | 17.98 | 52.1 | 39.82 | 42.92 | 38.38 | 33.24 | 42.2 | 24.78 | 44.02 | 20.64 | 426 |
| | Brown Bin Commercial | 02 01 07 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Garden CoCo | 02 01 07 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Garden UDC | 02 01 07 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Garden Private | 02 01 07 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Garden waste Lismore | 02 01 07 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Garden waste Tramore | 02 01 07 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Timber | Timber | 17 02 01 | 4.18 | 1.54 | 6.02 | 6.72 | 3.16 | 5.48 | 5.48 | 1.54 | 3.22 | 4.5 | 1.28 | 1.76 | 44.88 |
| Hazardous | Aerosols | 16 05 04 | 0 | 0 | 0 | 0 | 0 | 0.14 | 0 | 0.04 | 0 | 0 | 0 | 0 | 0.18 |
| | Flourescent Lamps | 16 02 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.93 | 0.93 |
| | Engine Oil | 13 02 06 | 0 | 0 | 0 | 0 | 0 | 1.06 | 0 | 0 | 0 | 0 | 0 | 0 | 1.06 |
| | Paint | 08 01 21 | 0 | 0.56 | 0 | 0.64 | 0 | 0.38 | 0 | 0.42 | 0.4 | 0 | 0.1 | 0 | 2.5 |
| Total Accepted | | | 146.84 | 269.36 | 123.12 | 307.52 | 153.2 | 251.68 | 226.42 | 214.37 | 228 | 156.06 | 255.82 | 359.66 | 2691.39 |

Dungarvan Civic Amenity Site – Waste Transferred between January 1st 2010 and Decemebr 31st 2010

| Waste Transferred | | EWC Code | | | | | | | | | | | | | | |
|-------------------|--------------------|----------|---------------|---------------|---------------|---------------|---------------|------------|---------------|---------------|---------------|---------------|---------------|---------------|----------------|---|
| Compost | Compost | 02 01 07 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | CompostUDC | 02 01 07 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Brown Bins | 02 01 07 | 89.52 | 216.7 | 107.62 | 196.52 | 181.44 | 182.3 | 180.96 | 157.68 | 182.7 | 107.16 | 198.9 | 55.6 | 1857.1 | |
| | Fridges | 16 02 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 30.26 | 30.26 | |
| | Large Household | 16 02 13 | | | | | | | | | | | | 99.58 | 99.58 | |
| | Small Household | 16 02 13 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 101.6 | 101.6 | |
| | TV's Monitors | 16 02 13 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 36.47 | 36.47 | |
| Recycling* | Dry Materials | 15 01 01 | 11.8 | 9.32 | 10.66 | 8.76 | 7.18 | 7.9 | 12.8 | 7.6 | 9.98 | 6.16 | 7.54 | 10.62 | 110.32 | |
| | Textiles | 04 02 22 | 0.14 | 0.54 | 1.04 | 0.46 | 0.54 | 0.28 | 0.78 | 0.74 | 0 | 0.36 | 0.34 | 0.24 | 5.46 | |
| | Timber | 17 02 01 | 4.22 | 1.56 | 6.04 | 6.72 | 3.18 | 5.54 | 5.52 | 1.54 | 3.14 | 4.58 | 1.32 | 1.84 | 45.2 | |
| Scrapmetal | Scrapmetal | 17 04 07 | 0 | 2.36 | 3.52 | 3.62 | 4.5 | 3 | 2.14 | 1.7 | 0 | 1.5 | 0 | 1.64 | 23.98 | |
| Recovery | Clay | 17 05 04 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9.58 | 0 | 0 | 9.58 | |
| | Rubble | 17 01 07 | 0 | 8.08 | 0 | 9.44 | 0 | 8.7 | 0 | 7.9 | 0 | 0 | 7.32 | 0 | 41.44 | |
| | Dom CoCo | 20 03 99 | 417.88 | 285.24 | 457.76 | 321.42 | 398.38 | 334.7 | 367.52 | 311.36 | 396.26 | 300.32 | 285.26 | 518.04 | 4394.14 | |
| | Garden CoCo | 02 01 07 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | Cooking Oil | 02 02 99 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.68 | 0 | 0.68 | |
| | Film Farm Plastics | 02 01 04 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Glass | Flat Glass | 17 02 02 | 0 | 0 | 0 | 0 | 2.1 | 0 | 0 | 1.4 | 0 | 2.46 | 0 | 0 | 5.96 | |
| Hazardous | Aerosols | 16 05 04 | 0 | 0 | 0 | 0 | 0 | 0.14 | 0 | 0.04 | 0 | 0 | 0 | 0 | 0.18 | |
| | Flourescent Lamps | 16 02 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | Engine Oil | 13 02 06 | 0 | 0 | 0 | 0 | 0 | 1.06 | 0 | 0 | 0 | 0 | 0 | 0 | 1.06 | |
| | Paint | 08 01 21 | 0 | 0.58 | 0 | 0.64 | 0 | 0.38 | 0 | 0.3 | 0.34 | 0 | 0.1 | 0 | 2.34 | |
| Total | | | 523.56 | 524.38 | 586.64 | 547.58 | 597.32 | 544 | 569.72 | 490.26 | 592.42 | 432.12 | 501.46 | 855.89 | 6765.35 | |

Appendix B

Monitoring Locations



Appendix C

Surface Water Results

DUNGARVAN SW



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: 16/03/10

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

Date collected: 28/01/2010 Date received: 28/01/2010

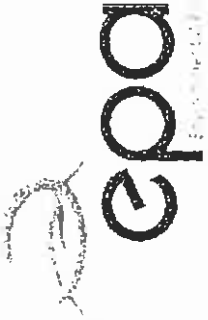
| Parameter | Units | Limits | Sampling points | | 1000322 | 1000323 | 1000324 | 1000325 |
|--------------------------------|----------------------------|--------------|-----------------|---------------|--------------------|--------------|--------------------|--------------|
| | | | Sampled by: | Time Sampled: | | | | |
| Start/End - Dates of Analysis: | | | Sample | | WST-W0032-01-SW280 | | WST-W0032-01-SW300 | |
| Status of results: | | | 13:55 | 14:16 | 14:25 | 15:45 | 16:30 | |
| | | | Final Report | Final Report | Final Report | Final Report | Final Report | Final Report |
| F | Temperature | °C | 7.6 | 7.4 | 7.5 | 5.3 | 7.4 | |
| F | Dissolved Oxygen (as %Sat) | % Saturation | 103.0 | 103.0 | 103.0 | 73.0 | 105.0 | |
| | Chemical Oxygen Demand | mg/l O2 | <20 | <20 | <20 | 26 | <20 | |
| | Biochemical Oxygen Demand | mg/l O2 | <0.5 | <0.5 | <0.5 | 6.0 | <0.5 | |
| | Suspended Solids | mg/l | <5 | <5 | <5 | <5 | <5 | |

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) ntc "Too numerous to count"
- 7) F "Field measured parameters"

Signed:  Date: 14/7/10

 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: 24/08/10

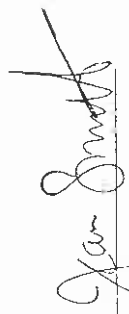
Facility: **Dungarvan Waste Disposal Site**
Ballynamuck Middle, Dungarvan, Co. Waterford
Reference No: W0032-01

Date collected: 28/04/2010 Date received: 28/04/2010

| Parameter | Units | | Limits | Laboratory Ref: | 1001672 | 1001673 | 1001674 | 1001675 | 1001676 |
|-----------|----------------------------|--------------|--------|--------------------------------------|--------------------------------------|--------------------------------------|--|--------------------------------------|---------|
| | Temperature | °C | | | | | | | |
| F | Dissolved Oxygen (as %Sat) | % Saturation | | Surface Water WST-W0032-01-SW280 | Surface Water WST-W0032-01-SW2 | Surface Water WST-W0032-01-SW1 | Surface Water WST-W0032-01-SW lagoon | Surface Water WST-W0032-01-SW300 | |
| | Chemical Oxygen Demand | mg/l O2 | | Clear sample Jim McGarry 14:00 | Clear sample Jim McGarry 14:15 | Clear sample Jim McGarry 14:20 | Light brown colour Jim McGarry 15:05 | Clear sample Jim McGarry 16:30 | |
| | Biochemical Oxygen Demand | mg/l O2 | | | 108.0 | 109.0 | 108.0 | 118.0 | |
| | Suspended Solids | mg/l | | <20 | <20 | <20 | 33 | <20 | |
| | | | | 0.6 | 0.7 | 0.7 | >8 | 0.9 | |
| | | | | <5 | <5 | <5 | 26 | 8 | |
| | | | | 11.7 | 11.8 | 11.5 | 15.1 | 13.6 | |
| | | | | Final Report | Final Report | Final Report | Final Report | Final Report | |
| | | | | Start/End - Dates of Analysis: | | | | | |
| | | | | Status of results: | | | | | |
| | | | | Time Sampled: | | | | | |
| | | | | Sampled by: | | | | | |
| | | | | Sampling point: | | | | | |
| | | | | Location code: | | | | | |
| | | | | Type of sample: | | | | | |

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 Caslebar Laboratory.
- 3) nm "Not measured"
- 4) nd "None detected"
- 5) nt "No time" - Time not recorded
- 6) tnc "Too numerous to count"
- 7) F "Field measured parameters"

Signed:  Date: 20/1/17
Michael Neill, Regional
Chemist

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) tnc "Too numerous to count"
- 7) F "Field measured parameters"

Signed: 
Michael Neill, Regional
Chemist

Date: 24/8/10



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

Environmental Protection Agency
 An tSúilínneamhach agus Ceimiceach, Coimisiún

Report of: Analysis of landfill site sample(s)
 Report to: Waterford County Council
 Report date: 21/10/10

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

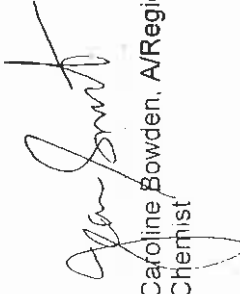
Date collected: 06/07/2010 Date received: 06/07/2010

574258 051

| Laboratory Results | | 1003021 | 1003022 | J03023 | 1003024 | 1003025 |
|--------------------------------|--------------|--------------------|--------------------|-------------------|-------------------|------------------------|
| Type of sample: | | Surface Water | Surface Water | Surface Water | Surface Water | Surface Water |
| Location code: | | WST-W0032-01-SW300 | WST-W0032-01-SW280 | WST-W0032-01-SW2 | WST-W0032-01-SW1 | WST-W0032-01-SW lagoon |
| Sampling point: | | Light brown colour | Clear sample | Clear sample | Clear sample | Brown colour |
| Sampled by: | | Jim McGarry | Jim McGarry | Jim McGarry | Jim McGarry | Jim McGarry |
| Time Sampled: | | 13:15 | 14:40 | 15:00 | 15:10 | 15:30 |
| Start/End - Dates of Analysis: | | 07-07-10/12-07-10 | 07-07-10/12-07-10 | 07-07-10/12-07-10 | 07-07-10/12-07-10 | 07-07-10/12-07-10 |
| Status of results: | | Final Report | Final Report | Final Report | Final Report | Final Report |
| Parameter | Units | Limits | | | | |
| F Temperature | °C | | 16.2 | 14.1 | 14.2 | 17.0 |
| F Dissolved Oxygen (as %Sat) | % Saturation | | 127.0 | 107.0 | 108.0 | 84.0 |
| Chemical Oxygen Demand | mg/l O2 | | 111 | <20 | <20 | 106 |
| Biochemical Oxygen Demand | mg/l O2 | | 5.0 | 0.5 | <0.5 | 19.7 |
| Suspended Solids | mg/l | | 505 | <5 | <7.5 | 106 |

Comments: Tide is in at time of sample SW300 and SW280. Water at SW300 has scum floating on the top.

- 1) Results highlighted and in bold are outside specified limits
- 2) nm "Not measured"
- 3) nd "None detected"
- 4) nt "No time" - Time not recorded
- 5) tntc "Too numerous to count"
- 6) F "Field measured parameters"

Signed:  Date: 21/10/10
 Caroline Bowden, A/Regional Chemist



Environmental Protection Agency
Regional Inspectorate

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: 15/03/11

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

Date collected: 15/11/2010 **Date received:** 15/11/2010

| Parameter | Units | Limits | Laboratory Ref: | | Type of sample: | | Location code: | | Sampling point: | | Sampled by: | | Time Sampled: | | Start/End - Dates of Analysis: | | Status of results: | | | |
|-----------|----------------------------|--------------|-----------------|---------|-----------------|---------|----------------|--------------------|------------------------|------------------|------------------|--------------------|---------------|---------------|--------------------------------|---------------|--------------------|-------------------|-------------------|-------------------|
| | | | 1005626 | 1005627 | 1005628 | 1005629 | 1005630 | Surface Water | Surface Water | Surface Water | Surface Water | Surface Water | Surface Water | Surface Water | Surface Water | Surface Water | Surface Water | Surface Water | Surface Water | Surface Water |
| F | Temperature | °C | 7.0 | 6.3 | 7.3 | 7.3 | 7.2 | WST-W0032-01-SW300 | WST-W0032-01-SW lagoon | WST-W0032-01-SW1 | WST-W0032-01-SW2 | WST-W0032-01-SW280 | Clear Sample | Clear Sample | Clear Sample | Clear Sample | Clear Sample | Clear Sample | Clear Sample | Clear Sample |
| F | Dissolved Oxygen (as %Sat) | % Saturation | 106.0 | 66.0 | 104.0 | 104.0 | 103.0 | Jim McGarry | Jim McGarry | Jim McGarry | Jim McGarry | Jim McGarry | 13:40 | 14:00 | 14:20 | 14:30 | 13-11-10/22-11-10 | 13-11-10/22-11-10 | 13-11-10/22-11-10 | 13-11-10/22-11-10 |
| | Chemical Oxygen Demand | mg/l O2 | <20 | 30 | <20 | <20 | <20 | | | | | | | | | | | | | |
| | Biochemical Oxygen Demand | mg/l O2 | 0.7 | 3.9 | 0.7 | 0.6 | <0.5 | | | | | | | | | | | | | |
| | Suspended Solids | mg/l | 29 | 6 | <5 | <5 | <5 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |

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) trtc "Too numerous to count"
- 7) F "Field measured parameters"

Signed: _____

Date: _____

Caroline Bowden, Regional
Chemist

Appendix D

Ground Water Results



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

DUNGARVAN GU

Report of: Analysis of landfill site sample(s)
Report to: Waterford County Council
Report date: 16/03/10

Facility: **Dungarvan Waste Disposal Site**
Ballynamuck Middle, Dungarvan, Co. Waterford

Reference No: W0032-01


Date collected: 28/01/2010 Date received: 28/01/2010

| Parameter | Units | Limits | Laboratory Ref: | | Type of sample: | | Location code: | | Sampling point: | | Sampled by: | | Time Sampled: | | Start/End - Dates of Analysis: | | Status of results: | | | | | | |
|-----------|--------------------------------|--------------|-----------------|---------|-----------------|---------|----------------|---------|-----------------|---------|-------------|---------|---------------|---------|--------------------------------|---------|--------------------|---------|---------|---------|---------|---------|---------|
| | | | 1000326 | 1000327 | 1000328 | 1000329 | 1000330 | 1000331 | 1000332 | 1000326 | 1000327 | 1000328 | 1000329 | 1000330 | 1000331 | 1000332 | 1000326 | 1000327 | 1000328 | 1000329 | 1000330 | 1000331 | 1000332 |
| F | Depth of Borehole | m | 11.6 | 11.8 | - | 23.3 | 10.3 | 23 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| F | Water Level | m | 7.9 | 10.8 | - | 16.5 | 5.2 | 13.9 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| F | Temperature | °C | 11.0 | 11.2 | - | 10.7 | 10.9 | 11.8 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| F | Dissolved Oxygen (as %Sat) | % Saturation | 19.0 | 34.0 | - | 54.0 | 23.0 | 24.0 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | pH | pH | 7.2 | 7.3 | - | 7.3 | 6.7 | 7.1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Conductivity @25°C | µS/cm | 841 | 2010 | - | 553 | 1313 | 1987 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Ammonia | mg/l N | 1 | 0.02 | - | 0.01 | 9.5 | 74 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Chloride | mg/l Cl | 62 | 383 | - | 27 | 21 | 160 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Total Oxidised Nitrogen (as N) | mg/l N | 13 | 11 | - | 12 | <0.5 | <0.5 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Iron | ug/l | 100 | 270 | - | 170 | 14000 | 450 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

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:


Michael Neill, Regional
Chemist

Date:

14/3/12



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: 24/08/10

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

Date collected: 28/04/2010 Date received: 28/04/2010

| Laboratory Ref: | | 1001677 | 1001678 | 1001679 | 1001680 | 1001681 | 1001682 | 1001683 |
|--------------------------------|--------------------------------|---------------------------------|---|---------------------------------|--------------------------------|--------------------|-------------------|---------------------|
| Type of sample: | | Groundwater | Groundwater | Groundwater | Groundwater | Groundwater | Groundwater | Groundwater |
| Location code: | | WST-W0032-01-RC4 | WST-W0032-01-RC3a | WST-W0032-01-GW1 | WST-W0032-01-RC6a | WST-W0032-01-RC7 | WST-W0032-01-GW2a | WST-W0032-01-RC8 |
| Sampling point: | | Clear sample - no label on well | Clear sample - no signage- dangerous access | Muddy sample - dangerous access | Light brown colour- no signage | Light brown colour | Dry - no sample | Damaged - no sample |
| Sampled by: | | Jim McGarry | Jim McGarry | Jim McGarry | Jim McGarry | Jim McGarry | Jim McGarry | Jim McGarry |
| Time Sampled: | | 13:05 | 13:27 | 13:40 | 15:46 | 16:15 | 12:00 | 13:50 |
| Start/End - Dates of Analysis: | | | | | | | | |
| Status of results: | | Final Report | Final Report | Final Report | Final Report | Final Report | Final Report | Final Report |
| F | Depth of Borehole | m | 23 | 10.3 | 11.7 | 11.8 | - | - |
| F | Water Level | m | 15.8 | 2.6 | 7.8 | 10.4 | - | - |
| F | Temperature | °C | 11.3 | 11.3 | 11.8 | 10.7 | - | - |
| F | Dissolved Oxygen (as %Sal) | % Saturation | 57.0 | 28.0 | 29.0 | 49.0 | - | - |
| F | Salinity | ‰ | - | - | - | 2.2 | - | - |
| | pH | pH | 7.2 | 6.6 | 7.1 | 7.5 | - | - |
| | Conductivity @25°C | µS/cm | 651 | 1278 | 950 | 4290 | - | - |
| | Ammonia | mg/l N | 0.01 | 11 | 1.7 | 0.05 | - | - |
| | Chloride | mg/l Cl | 26 | 22 | 88 | 1181 | - | - |
| | Total Oxidised Nitrogen (as N) | mg/l N | 11 | <0.5 | 12 | 2.2 | - | - |
| | Iron | ug/l | <25 | 57000 | <25 | 570 | - | - |



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

Environmental Protection Agency
An tAonachas um an tSionnachán

Report of: Analysis of landfill site sample(s)
Report to: Waterford County Council
Report date: 21/10/10

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

Date collected: 06/07/2010 Date received: 06/07/2010

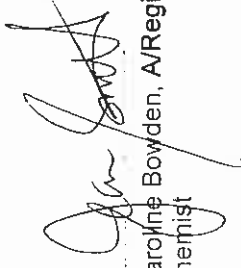
| Laboratory Ref: | | ,003026 | | 1003027 | | 1003028 | | 1003029 | | 1003030 | | 1003031 | |
|--------------------------------|--------------------------------|--------------------|-------|-------------------|---|----------------------------------|---|------------------|---|-----------------------|---|----------------------------------|---|
| Type of sample: | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | |
| Location code: | | WST-W0032-01-RC7 | | WST-W0032-01-GW1 | | WST-W0032-01-RC3a | | WST-W0032-01-RC4 | | WST-W0032-01-RC8 | | WST-W0032-01-RC6a | |
| Sampling point: | | Light brown colour | | Dark brown colour | | No sample - unable to mount pump | | Clear sample | | No sample - no tubing | | No sample - unable to mount pump | |
| Sampled by: | | Jim McGarry | | Jim McGarry | | Jim McGarry | | Jim McGarry | | Jim McGarry | | Jim McGarry | |
| Time Sampled: | | 13.20 | | 14.10 | | 13.55 | | 14.26 | | 15.15 | | 15.35 | |
| Start/End - Dates of Analysis: | | | | | | | | | | | | | |
| Status of results: | | Final Report | | Final Report | | Final Report | | Final Report | | Final Report | | Final Report | |
| F | Depth of Borehole | m | 11.8 | 10.2 | - | - | - | 22.3 | - | - | - | - | - |
| F | Water Level | m | 9.1 | 1 | - | - | - | 14.6 | - | - | - | - | - |
| F | Temperature | °C | 11.3 | 12.1 | - | - | - | 11.5 | - | - | - | - | - |
| F | Dissolved Oxygen (as %Sat) | % Saturation | 21.0 | 7.0 | - | - | - | 55.0 | - | - | - | - | - |
| | pH | pH | 7.4 | 6.8 | - | - | - | 7.1 | - | - | - | - | - |
| | Conductivity @25°C | µS/cm | 12920 | 1334 | - | - | - | 651 | - | - | - | - | - |
| | Ammonia | mg/l N | 0.03 | 15 | - | - | - | 0.03 | - | - | - | - | - |
| | Chloride | mg/l Cl | >1130 | 28 | - | - | - | 26 | - | - | - | - | - |
| | Total Oxidised Nitrogen (as N) | mg/l N | nm | <0.50 | - | - | - | 10.97 | - | - | - | - | - |
| | Aluminium | ug/l | 150 | 36 | - | - | - | <25 | - | - | - | - | - |
| | Antimony | ug/l | <0.5 | <0.5 | - | - | - | <0.5 | - | - | - | - | - |
| | Arsenic | ug/l | 14 | 3.9 | - | - | - | <0.5 | - | - | - | - | - |
| | Barium | ug/l | 38 | 120 | - | - | - | 9 | - | - | - | - | - |
| | Beryllium | ug/l | <0.5 | <0.5 | - | - | - | <0.5 | - | - | - | - | - |
| | Boron | ug/l | 740 | 45 | - | - | - | 19 | - | - | - | - | - |
| | Cadmium | ug/l | <0.5 | <0.5 | - | - | - | <0.5 | - | - | - | - | - |
| | Calcium | mg/l | 140 | 200 | - | - | - | 84 | - | - | - | - | - |
| | Chromium | ug/l | 4.1 | 11 | - | - | - | 1 | - | - | - | - | - |
| | Cobalt | ug/l | 0.5 | 4.8 | - | - | - | <0.5 | - | - | - | - | - |
| | Copper | ug/l | 22 | 0.7 | - | - | - | <0.5 | - | - | - | - | - |
| | Iron | ug/l | 310 | 25000 | - | - | - | 110 | - | - | - | - | - |
| | Lead | ug/l | <0.5 | <0.5 | - | - | - | <0.5 | - | - | - | - | - |
| | Magnesium | mg/l | 220 | 15 | - | - | - | 8.9 | - | - | - | - | - |

| Laboratory Ref: | | 1003026 | 1003027 | 1003028 | 1003029 | 1003030 | 1003031 |
|--------------------------------|--------------------|-------------------|----------------------------------|------------------|-----------------------|-----------------------|----------------------------------|
| Type of sample: | Groundwater | Groundwater | Groundwater | Groundwater | Groundwater | Groundwater | Groundwater |
| Location code: | WST-W0032-01-RC7 | WST-W0032-01-GW1 | WST-W0032-01-RC3a | WST-W0032-01-RC4 | WST-W0032-01-RC8 | WST-W0032-01-RC6a | WST-W0032-01-RC6a |
| Sampling point: | Light brown colour | Dark brown colour | No sample - unable to mount pump | Clear sample | No sample - no tubing | No sample - no tubing | No sample - unable to mount pump |
| Sampled by: | Jim McGarry | Jim McGarry | Jim McGarry | Jim McGarry | Jim McGarry | Jim McGarry | Jim McGarry |
| Time Sampled: | 13:20 | 14:10 | 13:55 | 14:26 | 15:15 | 15:35 | 15:35 |
| Start/End - Dates of Analysis: | | | | | | | |
| Status of results: | Final Report | Final Report | Final Report | Final Report | Final Report | Final Report | Final Report |
| Manganese | ug/l | 78 | 14000 | - | <25 | - | - |
| Mercury | ug/l | <0.5 | <0.5 | - | <0.5 | - | - |
| Molybdenum | ug/l | 1.3 | <0.5 | - | <0.5 | - | - |
| Nickel | ug/l | 1.5 | 1.4 | - | 0.7 | - | - |
| Potassium | mg/l | 62 | 6.3 | - | 1 | - | - |
| Selenium | ug/l | 44 | 3.3 | - | 1.4 | - | - |
| Sodium | mg/l | 2100 | 17 | - | 10 | - | - |
| Thallium | ug/l | <0.5 | <0.5 | - | <0.5 | - | - |
| Tin | ug/l | <1 | <1 | - | <1 | - | - |
| Uranium | ug/l | 0.6 | <0.5 | - | 0.5 | - | - |
| Vanadium | ug/l | 11 | 0.7 | - | <0.5 | - | - |
| Zinc | ug/l | 18 | 18 | - | 20 | - | - |

Comments:

- 1) Results highlighted and in bold are outside specified limits
- 2) nm "Not measured"
- 3) nd "None detected"
- 4) nt "No time" - Time not recorded
- 5) lntc "Too numerous to count"
- 6) F "Field measured parameters"

Signed:



Caroline Bowden, A/Regional
Chemist

Date:

21/10/12



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: 15/03/11

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

Date collected: 15/11/2010 Date received: 15/11/2010

| Parameter | Units | Limits | 1005631 | | 1005632 | | 1005633 | | 1005634 | | 1005635 | | 1005636 | | 1005637 | |
|--------------------------------|--------------------------------|--------------|--------------------|------------------|-------------------------------|------------------|-------------------|------------------|-------------------|-------------------|--------------------|------------------|-------------------|-------------------|-------------------|-------------------|
| | | | Groundwater | WST-W0032-01-RC7 | Groundwater | WST-W0032-01-RC8 | Groundwater | WST-W0032-01-RC4 | Groundwater | WST-W0032-01-GW2a | Groundwater | WST-W0032-01-GW1 | Groundwater | WST-W0032-01-RC3a | Groundwater | WST-W0032-01-RC6a |
| Laboratory Ref: | | | 1005631 | | 1005632 | | 1005633 | | 1005634 | | 1005635 | | 1005636 | | 1005637 | |
| Type of sample: | | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | | Groundwater | |
| Location code: | | | WST-W0032-01-RC7 | | WST-W0032-01-RC8 | | WST-W0032-01-RC4 | | WST-W0032-01-GW2a | | WST-W0032-01-GW1 | | WST-W0032-01-RC3a | | WST-W0032-01-RC6a | |
| Sampling point: | | | Muddy Brown sample | | No sample, no tubing in place | | cloudy sample | | No Sample, dry | | Rusty brown colour | | Brown sample | | | |
| Sampled by: | | | Jim McGarry | | Jim McGarry | | Jim McGarry | | Jim McGarry | | Jim McGarry | | Jim McGarry | | Jim McGarry | |
| Time Sampled: | | | 13:35 | | 14:15 | | 15:00 | | 15:20 | | 15:55 | | 16:20 | | 16:45 | |
| Start/End - Dates of Analysis: | | | 15-11-10/29-11-10 | | 15-11-10/28-11-10 | | 15-11-10/29-11-10 | | 15-11-10/15-11-10 | | 15-11-10/29-11-10 | | 15-11-10/29-11-10 | | 15-11-10/29-11-10 | |
| Status of results: | | | Final Report | | Final Report | | Final Report | | Final Report | | Final Report | | Final Report | | Final Report | |
| F | Depth of Borehole | m | 11.9 | 15.7 | 22.3 | - | - | - | - | 10.3 | 17.2 | - | - | - | - | - |
| F | Water Level | m | 10.6 | 12 | 15 | - | - | - | - | 3.2 | 7.3 | - | - | - | - | - |
| F | Temperature | °C | 11.9 | - | - | - | - | - | - | 11.5 | 11.6 | - | - | - | - | 10.6 |
| F | Dissolved Oxygen (as %Sat) | % Saturation | 28.0 | - | 49.0 | - | - | - | - | 24.0 | 23.0 | - | - | - | - | 35.0 |
| | Ammonia | mg/l N | 0.04 | - | 0.02 | - | - | - | - | 8 | 90 | - | - | - | - | 3 |
| | Chloride | mg/l Cl | 1195 | - | 26 | - | - | - | - | 27 | 165 | - | - | - | - | 126 |
| | ortho-Phosphate (as P) | mg/l P | 0.06 | - | 0.03 | - | - | - | - | 0.06 | 0.05 | - | - | - | - | 0.04 |
| | Total Oxidised Nitrogen (as N) | mg/l N | 1 | - | 10.5 | - | - | - | - | <0.50 | <0.50 | - | - | - | - | 11.04 |
| | Alkalinity-total (as CaCO3) | mg/l CaCO3 | 170 | - | 215 | - | - | - | - | 443 | 1002 | - | - | - | - | 287 |
| | 1,1,1,2-Tetrachloroethane | µg/l | <0.5 | - | <0.5 | - | - | - | - | <0.5 | <0.5 | - | - | - | - | <0.5 |
| | 1,1,1-Trichloroethane | µg/l | <0.5 | - | <0.5 | - | - | - | - | <0.5 | <0.5 | - | - | - | - | <0.5 |
| | 1,1,2,2-Tetrachloroethane | µg/l | <1 | - | <1 | - | - | - | - | <1 | <1 | - | - | - | - | <1 |
| | 1,1,2-Trichloroethane | µg/l | <0.5 | - | <0.5 | - | - | - | - | <0.5 | <0.5 | - | - | - | - | <0.5 |
| | 1,1-Dichloroethane | µg/l | <0.5 | - | <0.5 | - | - | - | - | <0.5 | <0.5 | - | - | - | - | <0.5 |
| | 1,1-Dichloroethene | µg/l | <0.5 | - | <0.5 | - | - | - | - | <0.5 | <0.5 | - | - | - | - | <0.5 |
| | 1,1-Dichloropropene | µg/l | <0.5 | - | <0.5 | - | - | - | - | <0.5 | <0.5 | - | - | - | - | <0.5 |
| | 1,2,3-Trichlorobenzene | µg/l | <0.4 | - | <0.4 | - | - | - | - | <0.4 | <0.4 | - | - | - | - | <0.4 |
| | 1,2,3-Trichloropropane | µg/l | <0.6 | - | <0.6 | - | - | - | - | <0.6 | <0.6 | - | - | - | - | <0.6 |
| | 1,2,4-Trichlorobenzene | µg/l | <0.4 | - | <0.4 | - | - | - | - | <0.4 | <0.4 | - | - | - | - | <0.4 |
| | 1,2,4-Trimethylbenzene | µg/l | <0.5 | - | <0.5 | - | - | - | - | <0.5 | <0.5 | - | - | - | - | <0.5 |
| | 1,2-Dibromo-3-Chloropropane | µg/l | <1.3 | - | <1.3 | - | - | - | - | <1.3 | <1.3 | - | - | - | - | <1.3 |
| | 1,2-Dibromoethane | µg/l | <0.5 | - | <0.5 | - | - | - | - | <0.5 | <0.5 | - | - | - | - | <0.5 |
| | 1,2-Dichlorobenzene | µg/l | <0.5 | - | <0.5 | - | - | - | - | <0.5 | <0.5 | - | - | - | - | <0.5 |

| Parameter | Units | Limits | Laboratory Ref: | | | | | | |
|-------------------------|-------|--------|---|--|---------------------------------------|---|---|---|---|
| | | | 1005631 | 1005632 | 1005633 | 1005634 | 1005635 | 1005636 | 1005637 |
| Dichlorodifluoromethane | µg/l | | Groundwater WST-W0032-01-RC7 | Groundwater WST-W0032-01-RC8 | Groundwater WST-W0032-01-RC4 | Groundwater WST-W0032-01-GW2a | Groundwater WST-W0032-01-GW1 | Groundwater WST-W0032-01-RC3a | Groundwater WST-W0032-01-RC6a |
| Dichloromethane | µg/l | <0.5 | Muddy Brown sample Jim McGarry 13:35 15-11-10/29-11-10 | No sample, no lubing in place Jim McGarry 14:15 15-11-10/28-11-10 | cloudy sample Jim McGarry 15:00 | No Sample, dry Jim McGarry 15:20 15-11-10/15-11-10 | Rusty brown colour Jim McGarry 15:55 15-11-10/29-11-10 | Brown sample Jim McGarry 16:20 15-11-10/29-11-10 | Jim McGarry 16:45 15-11-10/29-11-10 |
| Ethylbenzene | µg/l | <0.5 | | | | | | | |
| Hexachlorobutadiene | µg/l | <0.1 | | | | | | | |
| Isopropylbenzene | µg/l | <0.5 | | | | | | | |
| m,p-Xylene | µg/l | <0.5 | | | | | | | |
| Naphthalene | µg/l | <0.5 | | | | | | | |
| n-Butylbenzene | µg/l | <0.5 | | | | | | | |
| n-Propylbenzene | µg/l | <0.5 | | | | | | | |
| o-Xylene | µg/l | <0.5 | | | | | | | |
| pH | pH | 7.6 | | | 7.2 | | 7.2 | 7.1 | 7.1 |
| sec-Butylbenzene | µg/l | <0.5 | | | <0.5 | | <0.5 | <0.5 | <0.5 |
| Styrene | µg/l | <0.5 | | | <0.5 | | <0.5 | <0.5 | <0.5 |
| 1-1,2-Dichloroethene | µg/l | <0.5 | | | <0.5 | | <0.5 | <0.5 | <0.5 |
| 1-1,3-Dichloropropene | µg/l | <0.5 | | | <0.5 | | <0.5 | <0.5 | <0.5 |
| tert-Butylbenzene | µg/l | <0.5 | | | <0.5 | | <0.5 | <0.5 | <0.5 |
| Tetrachloroethene | µg/l | <0.5 | | | <0.5 | | <0.5 | <0.5 | <0.5 |
| Toluene | µg/l | <0.5 | | | <0.5 | | <0.5 | <0.5 | 0.6 |
| Trichloroethene | µg/l | <0.5 | | | <0.5 | | <0.5 | <0.5 | <0.5 |
| Trichlorofluoromethane | µg/l | <0.6 | | | <0.6 | | <0.6 | <0.6 | <0.6 |
| Vinyl Chloride | µg/l | <0.5 | | | <0.5 | | <0.5 | <0.5 | <0.5 |
| Conductivity @25°C | µS/cm | 4290 | | | 646 | | 1050 | 2200 | 1130 |
| Salinity | ‰ | 2.1 | | | - | | 0.3 | 0.8 | 0.3 |
| | | | | | | | | | |

Appendix E

Leachate Results



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

DUNGARVAN LEACHATE

Report of: Analysis of landfill site sample(s)
Report to: Waterford County Council
Report date: 16/03/10

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

Date collected: 28/01/2010 Date received: 28/01/2010

| Laboratory Ref: | | 1000333 | 1000334 | 1000335 | 1000336 | 1000337 | 1000338 |
|--------------------------------|---------------------------|---------------------|----------------------------------|--------------------------------|--------------------------------|---------------------|--------------------------------------|
| Type of sample: | | Leachate | Leachate | Leachate | Leachate | Leachate | Leachate |
| Location code: | | WST-W0032-01-L4 | WST-W0032-01-L Interceptor | WST-W0032-01-L1 | WST-W0032-01- L2a | WST-W0032-01-L3 | WST-W0032-01- L5a |
| Sampling point: | | no sample - Dry | Manhole sample - brown colour | no sample - lost in capping | no sample - lost in capping | no sample - dry | Unable to sample - in reed bed |
| Sampled by: | | Jim McGarry | Jim McGarry | Jim McGarry | Jim McGarry | Jim McGarry | Jim McGarry |
| Time Sampled: | | 15:40 | 16:00 | 12:00 | 12:00 | 12:00 | 12:00 |
| Start/End - Dates of Analysis: | | 28-01-10/28-01-10 | | 28-01-10/28-01-10 | 28-01-10/28-01-10 | 28-01-10/28-01-10 | 28-01-10/28-01-10 |
| Status of results: | | Final Report | Final Report | Final Report | Final Report | Final Report | Final Report |
| F | Temperature | - | 6.2 | - | - | - | - |
| | Chemical Oxygen Demand | - | 12775 | - | - | - | - |
| | Biochemical Oxygen Demand | - | >=4800 | - | - | - | - |
| | | | | | | | |
| | | | | | | | |

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:

Michael Neill
Michael Neill, Regional
Chemist

Date:

16/3/10



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

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: 24/08/10

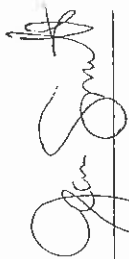
Facility: **Dungarvan Waste Disposal Site**
Ballynamuck Middle, Dungarvan, Co. Waterford
Reference No: W0032-01


Date collected: 28/04/2010 Date received: 28/04/2010

| Laboratory Ref: | 1001684 | 1001685 | 1001686 | 1001687 | 1001688 | 1001689 |
|--------------------------------|--|--------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-------------------------|
| Type of sample: | Leachate | Leachate | Leachate | Leachate | Leachate | Leachate |
| Location code: | WST-W0032-01-L4 | WST-W0032-01-L | WST-W0032-01-L1 | WST-W0032-01-L2a | WST-W0032-01-L3a | WST-W0032-01-L5a |
| Sampling point: | No sample - possibly foam - no signage | Black colour Interceptor | No sample - Borehole damaged/lost | No sample - Borehole damaged/lost | No sample - Borehole damaged/lost | No access - in reed bed |
| Sampled by: | Jim McGarry | Jim McGarry | Jim McGarry | Jim McGarry | Jim McGarry | Jim McGarry |
| Time Sampled: | 13.10 | 15.25 | 12.00 | 12.00 | 12.00 | 12.00 |
| Start/End - Dates of Analysis: | / | / | / | / | / | / |
| Status of results: | Final Report | Final Report | Final Report | Final Report | Final Report | Final Report |
| F | Temperature | °C | 15.5 | - | - | - |
| | Chemical Oxygen Demand | mg/l O2 | 375 | - | - | - |
| | Biochemical Oxygen Demand | mg/l O2 | >120 | - | - | - |
| | Iron | ug/l | 4400 | - | - | - |
| | | | | | | |
| | | | | | | |

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) Intc "Too numerous to count"
- 7) F "Field measured parameters"

Signed:  Date: 24/8/10

 Michael Neill, Regional Chemist



Environmental Protection Agency
An tAidmearannacht um Chaomhu (Gníomhaíocht)

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: 21/10/10


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

Date collected: 06/07/2010 Date received: 06/07/2010

| Laboratory Ref: J03032 | | 1003033 | | 1003034 | | 1003035 | | 1003036 | | 1003037 | |
|---|-------|----------------|--|-----------------|--|------------------|--|-----------------|--|------------------|--|
| Type of sample: Leachate | | Leachate | | Leachate | | Leachate | | Leachate | | Leachate | |
| Location code: WST-W0032-01-L4 | | WST-W0032-01-L | | WST-W0032-01-L1 | | WST-W0032-01-L2a | | WST-W0032-01-L3 | | WST-W0032-01-L5a | |
| Sampling point: Unsufficient volume to pump | | Interceptor | | No sample | | No sample | | No sample | | No sample | |
| Sampled by: Jim McGarry | | Jim McGarry | | Jim McGarry | | Jim McGarry | | Jim McGarry | | Jim McGarry | |
| Time Sampled: 14:10 | | 15:20 | | 12:00 | | 12:00 | | 12:00 | | 12:00 | |
| Start/End - Dates of Analysis: / | | / | | / | | / | | / | | / | |
| Status of results: Final Report | | Final Report | | Final Report | | Final Report | | Final Report | | Final Report | |
| Parameter | Units | Limits | | | | | | | | | |
| F Depth of Borehole | m | 10.6 | | | | | | | | | |
| F Leachate Level | m | 0.9 | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

Comments: No samples from boreholes L1, L2a, L3 or L5a as the boreholes are damaged, lost or inaccessible.

- 1) Results highlighted and in bold are outside specified limits
- 2) nm "Not measured"
- 3) nd "None detected"
- 4) nl "No lime" - Time not recorded
- 5) Intc "Too numerous to count"
- 6) F "Field measured parameters"

Signed:  Date: 2/10/10
 Carpline Bowden, A/Regional Chemist



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

Environmental Protection Agency
Environmental Protection Agency

Report of: Analysis of landfill site sample(s)
Report to: Waterford County Council
Report date: 15/03/11

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

Date collected: 15/11/2010 **Date received:** 15/11/2010

| Laboratory Ref: | | 1005638 | 1005639 | 1005640 | 1005641 | 1005642 | 1005643 |
|--------------------------------|--------------------------------|----------------------------|--------------------------|----------------------|--------------------------------------|-------------------|--|
| Type of sample: | | Leachate | Leachate | Leachate | Leachate | Leachate | Leachate |
| Location code: | | WST-W0032-01-L Interceptor | WST-W0032-01-L3 | WST-W0032-01-L2a | WST-W0032-01-L5a | WST-W0032-01-L4 | WST-W0032-01-L1 |
| Sampling point: | | Clear Sample | No sample, not available | No sample, no tubing | No sample, tubing stuck fast in well | No sample, dry | No sample, borehole damaged, tubing inadequate |
| Sampled by: | | Jim McGarry | Jim McGarry | Jim McGarry | Jim McGarry | Jim McGarry | Jim McGarry |
| Time Sampled: | | 14:10 | 15:10 | 15:15 | 15:25 | 15:40 | 15:45 |
| Start/End - Dates of Analysis: | | 13-11-10/28-11-10 | 15-11-10/15-11-10 | 15-11-10/15-11-10 | 15-11-10/15-11-10 | 15-11-10/15-11-10 | 15-11-10/15-11-10 |
| Status of results: | | Final Report | Final Report | Final Report | Final Report | Final Report | Final Report |
| | | | | | | | |
| F | Depth of Borehole | m | - | - | - | 10.2 | - |
| F | Leachate Level | m | - | - | - | 0.3 | - |
| F | Temperature | °C | 11.5 | - | - | - | - |
| | pH | | 7.7 | - | - | - | - |
| | Conductivity @25°C | µS/cm | 1324 | - | - | - | - |
| | Ammonia | mg/l N | 24 | - | - | - | - |
| | Chloride | mg/l Cl | 71 | - | - | - | - |
| | ortho-Phosphate (as P) | mg/l P | 0.27 | - | - | - | - |
| | Total Oxidised Nitrogen (as N) | mg/l N | 3.14 | - | - | - | - |
| | Chemical Oxygen Demand | mg/l O2 | 40 | - | - | - | - |
| | Biochemical Oxygen Demand | mg/l O2 | 14.9 | - | - | - | - |
| | | | | | | | |

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) rt "No time" - Time not recorded
- 6) tntc "Too numerous to count"
- 7) F "Field measured parameters"

Signed: _____

Date: _____

Caroline Bowden, Regional
Chemist

Appendix F

Meteorological Data

| Johnstown Castle | | | | | | |
|------------------|-------|-----|---------------------------------------|---------------------------------------|--------------------------|------------------|
| Year | Month | Day | Max. Temp. (Degrees Celsius) | Min. Temp. (Degrees Celsius) | Wind Speed (Knots) | Rainfall (mm) |
| 2010 | 1 | 1 | 2.5 | -1.5 | 5.7 | 3.4 |
| 2010 | 1 | 2 | 4.1 | -3.3 | 4.4 | 0.0 |
| 2010 | 1 | 3 | 3.9 | 1.5 | 9.1 | 0.1 |
| 2010 | 1 | 4 | 2.5 | -1.5 | 4.9 | 0.0 |
| 2010 | 1 | 5 | 1.5 | -1.2 | 9.8 | 0.0 |
| 2010 | 1 | 6 | 0.3 | -2.5 | 10.2 | 4.6 |
| 2010 | 1 | 7 | 1.3 | -3.7 | 6.6 | 0.1 |
| 2010 | 1 | 8 | 3.6 | -3.2 | 5.9 | 0.4 |
| 2010 | 1 | 9 | 2.8 | -3.2 | 8.3 | 0.1 |
| 2010 | 1 | 10 | 3.7 | 1.1 | 9.8 | 4.4 |
| 2010 | 1 | 11 | 5.0 | 1.5 | 6.4 | 2.6 |
| 2010 | 1 | 12 | 5.6 | 2.3 | 16.2 | 23.5 |
| 2010 | 1 | 13 | 5.9 | 2.8 | n/a | 5.3 |
| 2010 | 1 | 14 | 8.0 | -1.3 | n/a | 0.2 |
| 2010 | 1 | 15 | 10.6 | 7.0 | 15.4 | 24.9 |
| 2010 | 1 | 16 | 10.0 | 3.0 | 7.3 | 8.3 |
| 2010 | 1 | 17 | 9.0 | 3.0 | 6.3 | 0.2 |
| 2010 | 1 | 18 | 8.5 | 5.9 | 5.6 | 0.4 |
| 2010 | 1 | 19 | 7.5 | 6.2 | 11.5 | 3.9 |
| 2010 | 1 | 20 | 9.4 | 1.4 | 3.9 | 3.7 |
| 2010 | 1 | 21 | 10.1 | 3.2 | 10.7 | 18.5 |
| 2010 | 1 | 22 | 10.6 | 3.3 | 3.1 | 0.2 |
| 2010 | 1 | 23 | 6.4 | -0.7 | 5.3 | 0.3 |
| 2010 | 1 | 24 | 6.5 | -2.9 | 2.7 | 0.0 |
| 2010 | 1 | 25 | 6.8 | 0.6 | 4.7 | 0.0 |
| 2010 | 1 | 26 | 6.1 | 2.4 | 2.7 | 0.0 |
| 2010 | 1 | 27 | 9.9 | 3.3 | 6.0 | 0.0 |
| 2010 | 1 | 28 | 8.9 | 4.5 | 6.1 | 0.0 |
| 2010 | 1 | 29 | 8.2 | 2.0 | 10.1 | 0.7 |
| 2010 | 1 | 30 | 4.5 | -1.6 | 4.5 | 0.0 |
| 2010 | 1 | 31 | 5.0 | -2.4 | 5.5 | 0.0 |

| Johnstown Castle | | | | | | |
|------------------|-------|-----|------------------------------|------------------------------|--------------------|---------------|
| Year | Month | Day | Max. Temp. (Degrees Celsius) | Min. Temp. (Degrees Celsius) | Wind Speed (Knots) | Rainfall (mm) |
| 2010 | 2 | 1 | 7.0 | 0.9 | 5.2 | 0.0 |
| 2010 | 2 | 2 | 9.0 | 5.2 | 7.0 | 2.3 |
| 2010 | 2 | 3 | 9.5 | 2.5 | 3.8 | 10.6 |
| 2010 | 2 | 4 | 9.1 | 3.4 | 8.9 | 25.1 |
| 2010 | 2 | 5 | 9.7 | 5.1 | 7.9 | 0.9 |
| 2010 | 2 | 6 | 9.0 | 3.8 | 5.1 | 0.1 |
| 2010 | 2 | 7 | 6.5 | 3.8 | 6.2 | 0.0 |
| 2010 | 2 | 8 | 4.9 | 3.2 | 9.1 | 0.6 |
| 2010 | 2 | 9 | 6.0 | 0.9 | 7.2 | 0.6 |
| 2010 | 2 | 10 | 6.1 | 0.3 | 6.5 | 0.0 |
| 2010 | 2 | 11 | 5.5 | -0.4 | 5.6 | 0.0 |
| 2010 | 2 | 12 | 8.0 | 1.4 | 6.9 | 0.6 |
| 2010 | 2 | 13 | 5.8 | 0.9 | 5.0 | 1.5 |
| 2010 | 2 | 14 | 7.9 | 1.0 | 6.3 | 0.0 |
| 2010 | 2 | 15 | 9.1 | 2.7 | 5.3 | 0.2 |
| 2010 | 2 | 16 | 7.4 | -1.0 | 3.5 | 0.0 |
| 2010 | 2 | 17 | 6.2 | -0.6 | 5.2 | 0.2 |
| 2010 | 2 | 18 | 5.7 | -0.4 | 6.2 | 0.0 |
| 2010 | 2 | 19 | 5.7 | -1.5 | 4.6 | 0.0 |
| 2010 | 2 | 20 | 5.3 | -2.8 | 3.6 | 3.9 |
| 2010 | 2 | 21 | 6.1 | -0.9 | 3.0 | 0.0 |
| 2010 | 2 | 22 | 5.1 | -0.9 | 7.1 | 0.0 |
| 2010 | 2 | 23 | 7.8 | 1.9 | 10.9 | 20.2 |
| 2010 | 2 | 24 | 9.9 | 3.7 | 5.5 | 0.7 |
| 2010 | 2 | 25 | 3.9 | 0.2 | 4.4 | 3.1 |
| 2010 | 2 | 26 | 8.5 | 0.8 | 8.3 | 0.0 |
| 2010 | 2 | 27 | 7.8 | 2.0 | 4.0 | 0.0 |
| 2010 | 2 | 28 | 9.3 | 1.1 | 5.8 | 0.1 |

| Johnstown Castle | | | | | | |
|------------------|-------|-----|---------------------------------------|---------------------------------------|--------------------------|------------------|
| Year | Month | Day | Max. Temp. (Degrees Celsius) | Min. Temp. (Degrees Celsius) | Wind Speed (Knots) | Rainfall (mm) |
| 2010 | 3 | 1 | 9.5 | -0.4 | 2.9 | 0.0 |
| 2010 | 3 | 2 | 7.8 | -0.6 | 4.7 | 0.0 |
| 2010 | 3 | 3 | 6.8 | 2.3 | 6.4 | 1.9 |
| 2010 | 3 | 4 | 6.4 | 0.4 | 5.8 | 0.0 |
| 2010 | 3 | 5 | 8.1 | -1.4 | 4.3 | 0.0 |
| 2010 | 3 | 6 | 8.3 | 2.1 | 5.7 | 0.0 |
| 2010 | 3 | 7 | 6.0 | -0.5 | 6.1 | 0.0 |
| 2010 | 3 | 8 | 5.9 | -1.3 | 5.9 | 0.0 |
| 2010 | 3 | 9 | 8.0 | 0.4 | 5.6 | 0.0 |
| 2010 | 3 | 10 | 8.2 | 1.0 | 5.9 | 0.0 |
| 2010 | 3 | 11 | 7.2 | 0.4 | 5.3 | 0.0 |
| 2010 | 3 | 12 | 9.9 | 3.4 | 5.2 | 0.0 |
| 2010 | 3 | 13 | 8.5 | 5.0 | 3.8 | 0.0 |
| 2010 | 3 | 14 | 12.1 | 3.3 | 5.3 | 0.0 |
| 2010 | 3 | 15 | 11.2 | 4.1 | 5.5 | 0.0 |
| 2010 | 3 | 16 | 8.5 | 1.1 | 7.5 | 0.1 |
| 2010 | 3 | 17 | 11.0 | 8.0 | 10.1 | 0.1 |
| 2010 | 3 | 18 | 10.0 | 7.3 | 11.3 | 4.2 |
| 2010 | 3 | 19 | 9.6 | 4.4 | 5.2 | 6.4 |
| 2010 | 3 | 20 | 11.4 | 4.7 | 8.0 | 8.5 |
| 2010 | 3 | 21 | 11.0 | 3.1 | 7.4 | 0.8 |
| 2010 | 3 | 22 | 11.2 | 3.5 | 9.0 | 4.2 |
| 2010 | 3 | 23 | 8.7 | 4.1 | 6.4 | 1.2 |
| 2010 | 3 | 24 | 11.5 | 7.7 | 8.0 | 6.5 |
| 2010 | 3 | 25 | 11.1 | 6.7 | 8.6 | 9.9 |
| 2010 | 3 | 26 | 11.3 | 6.6 | 6.9 | 0.1 |
| 2010 | 3 | 27 | 11.6 | 5.0 | 5.5 | 0.0 |
| 2010 | 3 | 28 | 11.2 | 3.9 | 3.6 | 1.0 |
| 2010 | 3 | 29 | 9.7 | 4.9 | 7.4 | 16.0 |
| 2010 | 3 | 30 | 8.8 | 0.7 | 10.9 | 12.0 |
| 2010 | 3 | 31 | 7.2 | 1.7 | 10.7 | 2.1 |

| Johnstown Castle | | | | | | |
|------------------|-------|-----|------------------------------|------------------------------|--------------------|---------------|
| Year | Month | Day | Max. Temp. (Degrees Celsius) | Min. Temp. (Degrees Celsius) | Wind Speed (Knots) | Rainfall (mm) |
| 2010 | 4 | 1 | 9.1 | -0.1 | 6.8 | 0.1 |
| 2010 | 4 | 2 | 10.1 | 2.4 | 6.6 | 3.5 |
| 2010 | 4 | 3 | 9.9 | 2.4 | 4.1 | 0.8 |
| 2010 | 4 | 4 | 9.6 | 1.4 | 8.4 | 2.5 |
| 2010 | 4 | 5 | 11.8 | 8.2 | 16.3 | 0.5 |
| 2010 | 4 | 6 | 10.7 | 6.0 | 10.2 | 12.6 |
| 2010 | 4 | 7 | 13.1 | 3.7 | 4.9 | 0.1 |
| 2010 | 4 | 8 | 12.7 | 3.1 | 5.1 | 0.0 |
| 2010 | 4 | 9 | 12.5 | 5.3 | 4.2 | 0.1 |
| 2010 | 4 | 10 | 15.2 | 3.7 | 3.6 | 0.0 |
| 2010 | 4 | 11 | 13.9 | 7.5 | 5.9 | 0.0 |
| 2010 | 4 | 12 | 10.9 | 6.3 | 5.4 | 0.0 |
| 2010 | 4 | 13 | 11.4 | 5.5 | 6.8 | 0.0 |
| 2010 | 4 | 14 | 9.4 | 5.4 | 7.8 | 0.0 |
| 2010 | 4 | 15 | 11.0 | 4.2 | 8.0 | 0.0 |
| 2010 | 4 | 16 | 11.0 | 4.7 | 5.6 | 0.0 |
| 2010 | 4 | 17 | 14.4 | 2.5 | 4.5 | 0.0 |
| 2010 | 4 | 18 | 12.6 | 4.1 | 4.5 | 0.0 |
| 2010 | 4 | 19 | 11.0 | 4.4 | 4.3 | 0.0 |
| 2010 | 4 | 20 | 11.4 | 3.0 | 4.6 | 0.0 |
| 2010 | 4 | 21 | 8.7 | 3.2 | 5.8 | 0.0 |
| 2010 | 4 | 22 | 10.8 | 2.3 | 4.5 | 0.0 |
| 2010 | 4 | 23 | 13.7 | 1.6 | 4.3 | 0.0 |
| 2010 | 4 | 24 | 12.5 | 5.5 | 7.0 | 2.6 |
| 2010 | 4 | 25 | 14.5 | 10.0 | 8.0 | 0.9 |
| 2010 | 4 | 26 | 15.9 | 7.6 | 6.5 | 0.0 |
| 2010 | 4 | 27 | 13.2 | 8.9 | 7.2 | 0.0 |
| 2010 | 4 | 28 | 13.0 | 10.3 | 8.8 | 0.4 |
| 2010 | 4 | 29 | 14.2 | 8.4 | 6.0 | 0.0 |
| 2010 | 4 | 30 | 13.9 | 6.4 | 5.0 | 3.8 |

| Johnstown Castle | | | | | | |
|------------------|-------|-----|---------------------------------------|---------------------------------------|--------------------------|------------------|
| Year | Month | Day | Max. Temp. (Degrees Celsius) | Min. Temp. (Degrees Celsius) | Wind Speed (Knots) | Rainfall (mm) |
| 2010 | 5 | 1 | 12.5 | 7.0 | 4.3 | 0.7 |
| 2010 | 5 | 2 | 11.3 | 4.2 | 6.7 | 0.8 |
| 2010 | 5 | 3 | 10.9 | 3.9 | 6.2 | 0.0 |
| 2010 | 5 | 4 | 12.4 | 4.5 | 4.9 | 0.0 |
| 2010 | 5 | 5 | 14.7 | 8.4 | 3.9 | 1.5 |
| 2010 | 5 | 6 | 13.2 | 9.2 | 5.8 | 7.8 |
| 2010 | 5 | 7 | 10.8 | 7.6 | 8.8 | 0.8 |
| 2010 | 5 | 8 | 11.9 | 6.8 | 10.2 | 0.0 |
| 2010 | 5 | 9 | 10.9 | 5.3 | 7.2 | 0.0 |
| 2010 | 5 | 10 | 12.3 | 4.5 | 6.3 | 0.0 |
| 2010 | 5 | 11 | 10.5 | 2.2 | 6.8 | 0.7 |
| 2010 | 5 | 12 | 9.6 | 4.2 | 4.7 | 0.7 |
| 2010 | 5 | 13 | 12.4 | 2.4 | 7.5 | 4.9 |
| 2010 | 5 | 14 | 15.5 | 7.4 | 4.9 | 0.5 |
| 2010 | 5 | 15 | 14.1 | 6.1 | 6.2 | 0.2 |
| 2010 | 5 | 16 | 14.4 | 7.0 | 5.0 | 0.7 |
| 2010 | 5 | 17 | 14.4 | 4.5 | 5.2 | 0.0 |
| 2010 | 5 | 18 | 14.7 | 9.6 | 7.4 | 3.9 |
| 2010 | 5 | 19 | 15.9 | 10.5 | 6.7 | 0.4 |
| 2010 | 5 | 20 | 16.2 | 9.9 | 5.7 | 0.3 |
| 2010 | 5 | 21 | 18.7 | 8.7 | 2.8 | 0.2 |
| 2010 | 5 | 22 | 21.2 | 10.6 | 3.8 | 0.0 |
| 2010 | 5 | 23 | 22.0 | 13.2 | 5.0 | 0.0 |
| 2010 | 5 | 24 | 14.9 | 9.9 | 6.2 | 0.0 |
| 2010 | 5 | 25 | 14.6 | 7.5 | 7.6 | 0.0 |
| 2010 | 5 | 26 | 13.6 | 6.7 | 7.5 | 0.0 |
| 2010 | 5 | 27 | 13.3 | 6.3 | 5.5 | 5.6 |
| 2010 | 5 | 28 | 14.1 | 6.2 | 5.9 | 0.5 |
| 2010 | 5 | 29 | 18.4 | 10.4 | 6.2 | 25.8 |
| 2010 | 5 | 30 | 16.6 | 8.6 | 5.0 | 0.0 |
| 2010 | 5 | 31 | 16.1 | 9.9 | 5.7 | 15.5 |

| Johnstown Castle | | | | | | |
|------------------|-------|-----|---------------------------------------|---------------------------------------|--------------------------|------------------|
| Year | Month | Day | Max. Temp. (Degrees Celsius) | Min. Temp. (Degrees Celsius) | Wind Speed (Knots) | Rainfall (mm) |
| 2010 | 6 | 1 | 19.5 | 10.6 | 5.2 | 11.4 |
| 2010 | 6 | 2 | 19.1 | 9.5 | 4.4 | 0.0 |
| 2010 | 6 | 3 | 19.2 | 9.5 | 5.3 | 0.0 |
| 2010 | 6 | 4 | 18.3 | 10.5 | 5.4 | 0.0 |
| 2010 | 6 | 5 | 20.3 | 11.8 | 3.7 | 0.0 |
| 2010 | 6 | 6 | 18.7 | 11.8 | 4.4 | 9.4 |
| 2010 | 6 | 7 | 14.2 | 11.6 | 7.0 | 11.1 |
| 2010 | 6 | 8 | 18.3 | 12.2 | 3.4 | 0.1 |
| 2010 | 6 | 9 | 16.7 | 12.3 | 7.7 | 0.0 |
| 2010 | 6 | 10 | 16.5 | 11.7 | 10.1 | 0.0 |
| 2010 | 6 | 11 | 19.2 | 9.1 | 5.5 | 0.0 |
| 2010 | 6 | 12 | 16.5 | 10.2 | 5.2 | 0.0 |
| 2010 | 6 | 13 | 18.1 | 10.6 | 6.5 | 2.3 |
| 2010 | 6 | 14 | 16.2 | 9.6 | 7.9 | 0.0 |
| 2010 | 6 | 15 | 17.5 | 9.7 | 4.2 | 0.0 |
| 2010 | 6 | 16 | 18.1 | 10.0 | 3.7 | 0.0 |
| 2010 | 6 | 17 | 19.2 | 13.0 | 5.2 | 0.0 |
| 2010 | 6 | 18 | 18.9 | 12.4 | 4.2 | 0.0 |
| 2010 | 6 | 19 | 15.5 | 9.1 | 7.1 | 0.0 |
| 2010 | 6 | 20 | 18.0 | 8.7 | 5.2 | 0.0 |
| 2010 | 6 | 21 | 18.6 | 10.2 | 6.5 | 0.0 |
| 2010 | 6 | 22 | 18.7 | 11.5 | 6.4 | 0.1 |
| 2010 | 6 | 23 | 18.8 | 13.1 | 8.5 | 0.3 |
| 2010 | 6 | 24 | 19.6 | 11.6 | 5.4 | 0.0 |
| 2010 | 6 | 25 | 19.1 | 13.3 | 5.2 | 0.0 |
| 2010 | 6 | 26 | 20.1 | 12.9 | 6.2 | 0.0 |
| 2010 | 6 | 27 | 19.4 | 13.1 | 9.2 | 0.2 |
| 2010 | 6 | 28 | 17.5 | 12.9 | 7.6 | 6.6 |
| 2010 | 6 | 29 | 19.7 | 13.1 | 4.0 | 0.1 |
| 2010 | 6 | 30 | 20.2 | 12.9 | 6.0 | 0.0 |

| Johnstown Castle | | | | | | |
|------------------|-------|-----|---------------------------------------|---------------------------------------|--------------------------|------------------|
| Year | Month | Day | Max. Temp. (Degrees Celsius) | Min. Temp. (Degrees Celsius) | Wind Speed (Knots) | Rainfall (mm) |
| 2010 | 7 | 1 | 18.4 | 14.3 | 9.6 | 12.5 |
| 2010 | 7 | 2 | 18.5 | 12.1 | 9.5 | 0.0 |
| 2010 | 7 | 3 | 18.1 | 10.5 | 7.4 | 0.0 |
| 2010 | 7 | 4 | 21.2 | 11.4 | 10.4 | 1.6 |
| 2010 | 7 | 5 | 19.8 | 9.7 | 5.1 | 0.4 |
| 2010 | 7 | 6 | 16.7 | 9.4 | 8.5 | 1.0 |
| 2010 | 7 | 7 | 17.9 | 13.6 | 10.6 | 2.9 |
| 2010 | 7 | 8 | 17.2 | 12.5 | 6.4 | 7.6 |
| 2010 | 7 | 9 | 17.1 | 14.2 | 9.5 | 7.5 |
| 2010 | 7 | 10 | 18.1 | 12.7 | 10.2 | 6.7 |
| 2010 | 7 | 11 | 17.6 | 10.2 | 5.6 | 0.0 |
| 2010 | 7 | 12 | 17.5 | 11.5 | 4.8 | 0.0 |
| 2010 | 7 | 13 | 15.4 | 12.5 | 5.6 | 10.2 |
| 2010 | 7 | 14 | 18.7 | 13.0 | 7.6 | 2.7 |
| 2010 | 7 | 15 | 17.2 | 10.7 | 9.2 | 31.4 |
| 2010 | 7 | 16 | 17.9 | 10.6 | 7.1 | 6.9 |
| 2010 | 7 | 17 | 17.3 | 9.3 | 8.4 | 2.9 |
| 2010 | 7 | 18 | 18.0 | 14.2 | 12.0 | 18.7 |
| 2010 | 7 | 19 | 16.9 | 13.7 | 8.1 | 19.5 |
| 2010 | 7 | 20 | 19.1 | 12.6 | 5.5 | 0.0 |
| 2010 | 7 | 21 | 19.0 | 11.2 | 3.7 | 0.8 |
| 2010 | 7 | 22 | 17.6 | 12.7 | 5.3 | 7.7 |
| 2010 | 7 | 23 | 19.1 | 10.9 | 5.0 | 0.0 |
| 2010 | 7 | 24 | 17.5 | 13.8 | 6.6 | 1.9 |
| 2010 | 7 | 25 | 22.9 | 13.8 | 4.3 | 0.0 |
| 2010 | 7 | 26 | 23.9 | 16.5 | 5.9 | 0.0 |
| 2010 | 7 | 27 | 20.8 | 13.4 | 4.8 | 0.0 |
| 2010 | 7 | 28 | 19.9 | 11.3 | 4.4 | 0.0 |
| 2010 | 7 | 29 | 19.0 | 12.5 | 4.9 | 0.0 |
| 2010 | 7 | 30 | 20.9 | 13.2 | 7.1 | 0.5 |
| 2010 | 7 | 31 | 19.3 | 12.7 | 6.2 | 0.9 |

| Johnstown Castle | | | | | | |
|------------------|-------|-----|---------------------------------------|---------------------------------------|--------------------------|------------------|
| Year | Month | Day | Max. Temp. (Degrees Celsius) | Min. Temp. (Degrees Celsius) | Wind Speed (Knots) | Rainfall (mm) |
| 2010 | 8 | 1 | 18.6 | 11.8 | 3.8 | 0.0 |
| 2010 | 8 | 2 | 18.3 | 11.8 | 4.3 | 0.0 |
| 2010 | 8 | 3 | 19.7 | 13.2 | 4.6 | 0.8 |
| 2010 | 8 | 4 | 19.5 | 12.8 | 6.6 | 0.1 |
| 2010 | 8 | 5 | 19.5 | 11.6 | 5.3 | 0.3 |
| 2010 | 8 | 6 | 17.0 | 13.9 | 7.4 | 2.3 |
| 2010 | 8 | 7 | 20.1 | 11.6 | 5.1 | 0.0 |
| 2010 | 8 | 8 | 18.7 | 10.5 | 5.9 | 0.0 |
| 2010 | 8 | 9 | 19.7 | 12.1 | 7.2 | 0.9 |
| 2010 | 8 | 10 | 21.3 | 10.4 | 5.0 | 0.0 |
| 2010 | 8 | 11 | 20.5 | 10.8 | 4.5 | 0.0 |
| 2010 | 8 | 12 | 17.9 | 12.0 | 5.5 | 0.0 |
| 2010 | 8 | 13 | 19.0 | 11.9 | 7.3 | 0.0 |
| 2010 | 8 | 14 | 17.5 | 9.2 | 6.7 | 0.0 |
| 2010 | 8 | 15 | 19.0 | 11.7 | 5.1 | 0.0 |
| 2010 | 8 | 16 | 19.8 | 13.2 | 6.2 | 1.8 |
| 2010 | 8 | 17 | 19.5 | 13.7 | 5.7 | 0.2 |
| 2010 | 8 | 18 | 18.1 | 11.1 | 6.4 | 0.1 |
| 2010 | 8 | 19 | 17.4 | 11.2 | 7.1 | 11.0 |
| 2010 | 8 | 20 | 18.7 | 12.9 | 10.8 | 2.5 |
| 2010 | 8 | 21 | 19.0 | 12.1 | 6.3 | 0.1 |
| 2010 | 8 | 22 | 18.5 | 11.3 | 5.6 | 1.7 |
| 2010 | 8 | 23 | 18.7 | 10.3 | 5.8 | 2.8 |
| 2010 | 8 | 24 | 18.7 | 10.5 | 7.6 | 0.0 |
| 2010 | 8 | 25 | 16.5 | 10.5 | 6.7 | 5.1 |
| 2010 | 8 | 26 | 17.0 | 10.7 | 7.0 | 0.0 |
| 2010 | 8 | 27 | 19.2 | 9.9 | 5.2 | 0.0 |
| 2010 | 8 | 28 | 19.2 | 8.8 | 5.4 | 0.0 |
| 2010 | 8 | 29 | 18.8 | 8.6 | 6.2 | 0.0 |
| 2010 | 8 | 30 | 16.0 | 7.3 | 4.0 | 0.0 |
| 2010 | 8 | 31 | 18.7 | 7.2 | 3.8 | 0.0 |

| Johnstown Castle | | | | | | |
|------------------|-------|-----|---------------------------------------|---------------------------------------|--------------------------|------------------|
| Year | Month | Day | Max. Temp. (Degrees Celsius) | Min. Temp. (Degrees Celsius) | Wind Speed (Knots) | Rainfall (mm) |
| 2010 | 9 | 1 | 18.4 | 10.9 | 4.4 | 0.1 |
| 2010 | 9 | 2 | 19.0 | 10.3 | 4.6 | 0.3 |
| 2010 | 9 | 3 | 18.8 | 11.8 | 4.6 | 0.0 |
| 2010 | 9 | 4 | 16.0 | 13.9 | 6.0 | 1.8 |
| 2010 | 9 | 5 | 17.1 | 15.0 | 8.6 | 11.5 |
| 2010 | 9 | 6 | 16.6 | 11.6 | 8.1 | 60.5 |
| 2010 | 9 | 7 | 17.3 | 11.5 | 5.0 | 1.3 |
| 2010 | 9 | 8 | 19.0 | 12.3 | 4.4 | 6.5 |
| 2010 | 9 | 9 | 18.7 | 10.4 | 7.0 | 5.5 |
| 2010 | 9 | 10 | 18.0 | 14.9 | 10.0 | 10.4 |
| 2010 | 9 | 11 | 18.7 | 10.9 | 5.8 | 4.3 |
| 2010 | 9 | 12 | 17.2 | 9.1 | 4.8 | 0.6 |
| 2010 | 9 | 13 | 18.3 | 13.7 | 11.9 | 0.3 |
| 2010 | 9 | 14 | 18.4 | 9.0 | 9.0 | 1.8 |
| 2010 | 9 | 15 | 18.5 | 8.4 | 7.2 | 0.0 |
| 2010 | 9 | 16 | 16.1 | 9.2 | 3.8 | 0.0 |
| 2010 | 9 | 17 | 15.4 | 7.2 | 5.0 | 0.0 |
| 2010 | 9 | 18 | 14.9 | 6.6 | 7.2 | 0.0 |
| 2010 | 9 | 19 | 16.1 | 13.8 | 10.3 | 0.0 |
| 2010 | 9 | 20 | 18.3 | 13.6 | 6.9 | 0.0 |
| 2010 | 9 | 21 | 17.6 | 14.2 | 7.4 | 0.1 |
| 2010 | 9 | 22 | 17.1 | 14.4 | 8.9 | 3.0 |
| 2010 | 9 | 23 | 16.8 | 11.4 | 5.8 | 0.7 |
| 2010 | 9 | 24 | 13.8 | 7.0 | 6.7 | 0.1 |
| 2010 | 9 | 25 | 13.7 | 5.8 | 5.7 | 0.0 |
| 2010 | 9 | 26 | 13.8 | 6.2 | 3.1 | 0.0 |
| 2010 | 9 | 27 | 14.7 | 4.9 | 2.5 | 0.0 |
| 2010 | 9 | 28 | 16.1 | 7.4 | 5.4 | 8.2 |
| 2010 | 9 | 29 | 17.2 | 9.1 | 4.4 | 0.1 |
| 2010 | 9 | 30 | 15.8 | 8.5 | 6.5 | 2.0 |

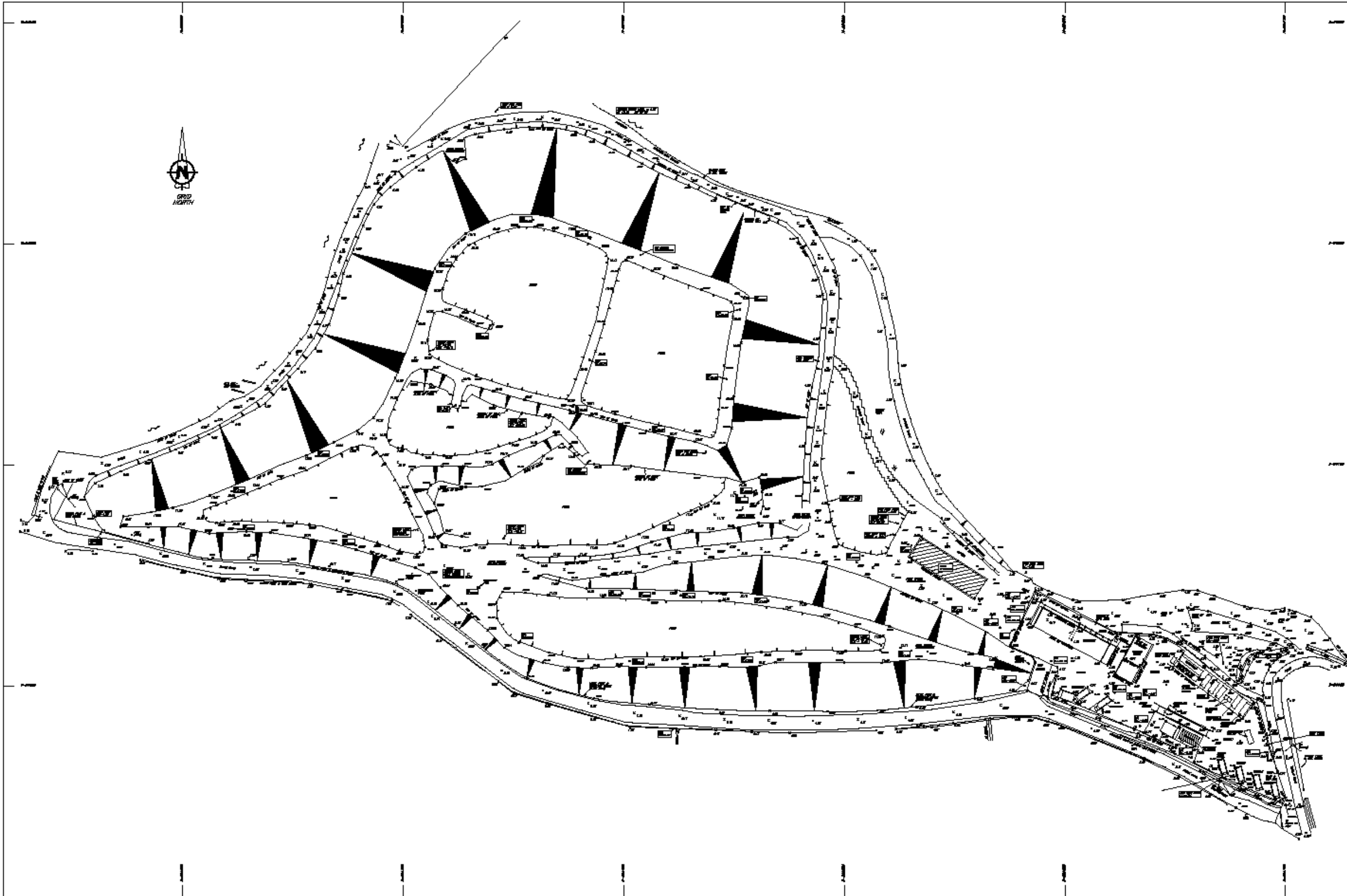
| Johnstown Castle | | | | | | |
|------------------|-------|-----|---------------------------------------|---------------------------------------|--------------------------|------------------|
| Year | Month | Day | Max. Temp. (Degrees Celsius) | Min. Temp. (Degrees Celsius) | Wind Speed (Knots) | Rainfall (mm) |
| 2010 | 10 | 1 | 17.3 | 8.4 | 7.9 | 7.7 |
| 2010 | 10 | 2 | 16.1 | 10.5 | 7.3 | 8.0 |
| 2010 | 10 | 3 | 15.8 | 10.1 | 3.8 | 5.2 |
| 2010 | 10 | 4 | 15.7 | 6.7 | 8.2 | 3.6 |
| 2010 | 10 | 5 | 15.3 | 10.8 | 8.7 | 4.6 |
| 2010 | 10 | 6 | 15.5 | 7.6 | 7.2 | 1.1 |
| 2010 | 10 | 7 | 16.1 | 11.6 | 9.7 | 1.0 |
| 2010 | 10 | 8 | 19.5 | 15.0 | 8.7 | 0.0 |
| 2010 | 10 | 9 | 16.3 | 14.3 | 8.9 | 0.0 |
| 2010 | 10 | 10 | 15.5 | 11.9 | 7.5 | 0.0 |
| 2010 | 10 | 11 | 16.6 | 10.1 | 7.0 | 0.3 |
| 2010 | 10 | 12 | 14.9 | 8.5 | 6.1 | 0.4 |
| 2010 | 10 | 13 | 12.9 | 7.7 | 4.3 | 0.3 |
| 2010 | 10 | 14 | 11.8 | 9.4 | 5.5 | 0.0 |
| 2010 | 10 | 15 | 14.7 | 8.9 | 6.4 | 0.0 |
| 2010 | 10 | 16 | 13.6 | 7.3 | 5.9 | 0.0 |
| 2010 | 10 | 17 | 13.8 | 5.8 | 4.4 | 0.0 |
| 2010 | 10 | 18 | 14.0 | 9.9 | 5.7 | 0.0 |
| 2010 | 10 | 19 | 13.0 | 4.6 | 5.6 | 0.5 |
| 2010 | 10 | 20 | 9.5 | 3.0 | 5.0 | 0.0 |
| 2010 | 10 | 21 | 12.7 | 5.8 | 4.7 | 0.0 |
| 2010 | 10 | 22 | 13.3 | 4.2 | 7.5 | 7.3 |
| 2010 | 10 | 23 | 11.8 | 4.4 | 5.1 | 0.7 |
| 2010 | 10 | 24 | 10.7 | 4.1 | 6.0 | 0.0 |
| 2010 | 10 | 25 | 12.0 | 4.2 | 7.7 | 1.1 |
| 2010 | 10 | 26 | 15.0 | 10.6 | 13.1 | 12.1 |
| 2010 | 10 | 27 | 14.5 | 9.5 | 8.9 | 2.1 |
| 2010 | 10 | 28 | 14.3 | 8.6 | 11.1 | 3.5 |
| 2010 | 10 | 29 | 14.4 | 6.9 | 11.6 | 8.8 |
| 2010 | 10 | 30 | 13.7 | 5.0 | 5.0 | 3.0 |
| 2010 | 10 | 31 | 13.1 | 8.5 | 7.7 | 17.8 |

| Johnstown Castle | | | | | | |
|------------------|-------|-----|---------------------------------------|---------------------------------------|--------------------------|------------------|
| Year | Month | Day | Max. Temp. (Degrees Celsius) | Min. Temp. (Degrees Celsius) | Wind Speed (Knots) | Rainfall (mm) |
| 2010 | 11 | 1 | 13.6 | 5.1 | 7.2 | 3.7 |
| 2010 | 11 | 2 | 13.5 | 10.4 | 12.2 | 2.9 |
| 2010 | 11 | 3 | 16.2 | 9.1 | 7.6 | 4.4 |
| 2010 | 11 | 4 | 14.6 | 13.9 | 14.6 | 0.1 |
| 2010 | 11 | 5 | 14.0 | 8.4 | 3.5 | 2.2 |
| 2010 | 11 | 6 | 10.6 | 4.4 | 5.0 | 1.7 |
| 2010 | 11 | 7 | 10.2 | 3.8 | 10.2 | 16.3 |
| 2010 | 11 | 8 | 10.1 | 5.2 | 6.0 | 5.2 |
| 2010 | 11 | 9 | 10.5 | 4.3 | 10.3 | 3.3 |
| 2010 | 11 | 10 | 10.5 | 1.8 | 6.8 | 1.2 |
| 2010 | 11 | 11 | 12.8 | 8.6 | 14.0 | 9.7 |
| 2010 | 11 | 12 | 10.2 | 6.6 | 8.0 | 0.2 |
| 2010 | 11 | 13 | 10.3 | 3.4 | 5.0 | 2.9 |
| 2010 | 11 | 14 | 8.6 | 0.1 | 2.9 | 0.1 |
| 2010 | 11 | 15 | 9.9 | 0.7 | 2.6 | 2.4 |
| 2010 | 11 | 16 | 10.6 | 1.1 | 9.4 | 12.9 |
| 2010 | 11 | 17 | 11.5 | 7.7 | 10.4 | 20.2 |
| 2010 | 11 | 18 | 11.3 | 4.6 | 6.9 | 0.6 |
| 2010 | 11 | 19 | 10.0 | 3.3 | 3.8 | 6.8 |
| 2010 | 11 | 20 | 10.1 | 6.1 | 7.3 | 0.2 |
| 2010 | 11 | 21 | 8.0 | 3.2 | 6.7 | 3.1 |
| 2010 | 11 | 22 | 6.7 | 2.9 | 6.5 | 1.7 |
| 2010 | 11 | 23 | 7.6 | 1.9 | 5.9 | 0.5 |
| 2010 | 11 | 24 | 5.9 | 1.1 | 6.1 | 0.4 |
| 2010 | 11 | 25 | 4.1 | -0.2 | 8.5 | 0.4 |
| 2010 | 11 | 26 | 4.6 | 0.3 | 8.1 | 0.0 |
| 2010 | 11 | 27 | 1.3 | -2.7 | 7.9 | 9.5 |
| 2010 | 11 | 28 | -1.5 | -4.4 | 6.0 | 7.0 |
| 2010 | 11 | 29 | 4.1 | -4.6 | 5.6 | 0.6 |
| 2010 | 11 | 30 | 4.2 | -1.9 | 9.5 | 1.7 |

| Johnstown Castle | | | | | | |
|------------------|-------|-----|---------------------------------------|---------------------------------------|--------------------------|------------------|
| Year | Month | Day | Max. Temp. (Degrees Celsius) | Min. Temp. (Degrees Celsius) | Wind Speed (Knots) | Rainfall (mm) |
| 2010 | 12 | 1 | 2.7 | -2.6 | 8.3 | 6.8 |
| 2010 | 12 | 2 | 0.5 | -3.0 | 9.0 | 7.6 |
| 2010 | 12 | 3 | 3.9 | -4.5 | 5.1 | 3.3 |
| 2010 | 12 | 4 | 3.8 | -1.1 | 5.0 | 0.2 |
| 2010 | 12 | 5 | 1.7 | -4.5 | 6.6 | 0.0 |
| 2010 | 12 | 6 | 4.9 | -2.4 | 4.1 | 0.0 |
| 2010 | 12 | 7 | 2.4 | -0.2 | 5.4 | 10.8 |
| 2010 | 12 | 8 | 1.6 | -2.6 | 8.8 | 0.0 |
| 2010 | 12 | 9 | 5.4 | -1.4 | 4.6 | 0.0 |
| 2010 | 12 | 10 | 7.6 | 3.0 | 3.4 | 0.0 |
| 2010 | 12 | 11 | 5.6 | 1.8 | 3.8 | 0.0 |
| 2010 | 12 | 12 | 7.5 | 2.4 | 5.8 | 0.0 |
| 2010 | 12 | 13 | 6.0 | 2.4 | 4.1 | 0.1 |
| 2010 | 12 | 14 | 5.8 | 2.0 | 6.1 | 0.0 |
| 2010 | 12 | 15 | 5.5 | 3.8 | 5.8 | 0.0 |
| 2010 | 12 | 16 | 7.7 | -0.9 | 7.6 | 1.0 |
| 2010 | 12 | 17 | 1.7 | -1.7 | 6.3 | 0.0 |
| 2010 | 12 | 18 | 1.5 | -3.8 | 4.3 | 0.0 |
| 2010 | 12 | 19 | 2.8 | -2.8 | 6.4 | 0.0 |
| 2010 | 12 | 20 | 2.4 | -2.5 | 6.3 | 0.0 |
| 2010 | 12 | 21 | -0.6 | -4.4 | 7.6 | 2.8 |
| 2010 | 12 | 22 | 0.1 | -3.1 | 7.2 | 0.6 |
| 2010 | 12 | 23 | 0.6 | -2.9 | 7.5 | 2.0 |
| 2010 | 12 | 24 | 0.9 | -3.8 | 8.5 | 0.1 |
| 2010 | 12 | 25 | 3.4 | -1.8 | 4.2 | 0.0 |
| 2010 | 12 | 26 | 7.3 | 1.6 | 10.8 | 4.2 |
| 2010 | 12 | 27 | 10.0 | 6.6 | 11.3 | 38.2 |
| 2010 | 12 | 28 | 10.7 | 9.3 | 7.1 | 0.9 |
| 2010 | 12 | 29 | 9.9 | 8.5 | 4.2 | 1.8 |
| 2010 | 12 | 30 | 8.7 | 7.3 | 4.1 | 0.6 |
| 2010 | 12 | 31 | 7.6 | 5.4 | 3.3 | 0.0 |

Appendix G

Topographical Survey



NOTES

1. ALL PROPOSED DEVELOPMENT SHALL BE IN ACCORDANCE WITH THE DEVELOPMENT PLAN FOR THE AREA OF CARRIGROHANE, CO. WATERFORD.

2. THE DEVELOPMENT SHALL BE IN ACCORDANCE WITH THE DEVELOPMENT PLAN FOR THE AREA OF CARRIGROHANE, CO. WATERFORD.

3. THE DEVELOPMENT SHALL BE IN ACCORDANCE WITH THE DEVELOPMENT PLAN FOR THE AREA OF CARRIGROHANE, CO. WATERFORD.

4. THE DEVELOPMENT SHALL BE IN ACCORDANCE WITH THE DEVELOPMENT PLAN FOR THE AREA OF CARRIGROHANE, CO. WATERFORD.

LEGEND

PROPOSED DEVELOPMENT

EXISTING DEVELOPMENT

EXISTING ROADS

EXISTING WALLS

EXISTING FENCES

EXISTING UTILITIES

EXISTING TREES

EXISTING WATERWAYS

EXISTING BOUNDARIES

EXISTING BUILDINGS

EXISTING PAVEMENT

EXISTING GRASS

EXISTING WOODLAND

EXISTING OPEN SPACE

EXISTING FIELDS

EXISTING PLOTS

EXISTING LOTS

EXISTING UNITS

EXISTING HOUSES

EXISTING GARAGES

EXISTING SHEDS

EXISTING BARN

EXISTING STABLES

EXISTING COTTAGE

EXISTING CHURCH

EXISTING SCHOOL

EXISTING PUBLIC HOUSE

EXISTING SHOP

EXISTING OFFICE

EXISTING FACTORY

EXISTING WAREHOUSE

EXISTING GARAGE

EXISTING WORKSHOP

EXISTING TOOLSHED

EXISTING GREENHOUSE

EXISTING HEDGEROW

EXISTING DRAINAGE

EXISTING FLOODING

EXISTING EROSION

EXISTING LANDSLIDE

EXISTING COLLAPSE

EXISTING BURIED

EXISTING UNKNOWN

EXISTING OTHER

PROJ. NO.
CARRIGROHANE, CO. WATERFORD

PREPARED BY
WATERFORD COUNTY COUNCIL

DATE
2023/03/20

SCALE
1:1000

DATE OF PLAN
2023/03/20

DATE OF REV. 1
2023/03/20

DATE OF REV. 2
2023/03/20

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2023/03/20

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2023/03/20

DATE OF REV. 99
2023/03/20

DATE OF REV. 100
2023/03/20

Appendix H

Management Structure

**Management Structure of Waterford
County Council**

County Manager Mr Ray O' Dwyer



Director of Services

Environment & Planning Mr. Brian White



Senior Engineer Mr. Gabriel Hynes



Senior Executive Engineer



Executive Scientific Officer

Mr. Paul Carroll

Executive Engineer

Ms. Aoife O Flaherty

**Environmental
Consultants**

MCOS



Civic Amenity Manager

Mr. David Regan



Caretaker

Mr. Bill O Keeffe



3 – Site Operatives

Appendix 1

Pollutant Release Transfer Register



Environmental Protection Agency

| PRTR# : W0032 | Facility Name : Dungarvan Waste Disposal Site | Filename : W0032_2010(1).xls | Return Year : 2010 |

[Guidance to completing the PRTR workbook](#)

AER Returns Workbook

Version 1.1.11

| | |
|-----------------------|------|
| REFERENCE YEAR | 2010 |
|-----------------------|------|

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

| N | 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. |
| 3.4 | Surface impoundment, including placement of liquid or sludge discards into pits, ponds or lagoons. |
| 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. |
| 4.2 | Recycling or reclamation of organic substances which are not used as solvents (including composting and other biological transformation processes). |
| 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 | -7.64444 52.104 |
| River Basin District | IESE |
| NACE Code | 3821 |
| Main Economic Activity | Treatment and disposal of non-hazardous waste |
| 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 | |
| Number of Installations | 0 |
| Number of Operating Hours in Year | 2145 |
| Number of Employees | 2 |
| User Feedback/Comments | |
| Web Address | |

2. PRTR CLASS ACTIVITIES

| Activity Number | Activity Name |
|-----------------|---------------|
| 50.1 | General |
| 50.1 | General |

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

| | |
|---|-----|
| Is it applicable? | No |
| Have you been granted an exemption ? | 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

[Link to previous years emissions data](#)

SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS

| RELEASES TO AIR | | | | | Please enter all quantities in this section in KGs | | | |
|-----------------|------|--------------|-------------|---|--|-------------------|------------------------|----------------------|
| POLLUTANT | | METHOD | | | ADD EMISSION POINT | QUANTITY | | |
| No. Annex II | Name | M/C/E | Method Code | Designation or Description | Emission Point 1 | T (Total) KG/Year | A (Accidental) KG/Year | F (Fugitive) KG/Year |
| | | | | | | 0.0 | 0.0 | 0.0 |
| ADD NEW ROW | | DELETE ROW * | | * Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button | | | | |

SECTION B : REMAINING PRTR POLLUTANTS

| RELEASES TO AIR | | | | | Please enter all quantities in this section in KGs | | | |
|-----------------|--|--------------|-------------|---|--|-------------------|------------------------|----------------------|
| POLLUTANT | | METHOD | | | ADD EMISSION POINT | QUANTITY | | |
| No. Annex II | Name | M/C/E | Method Code | Designation or Description | Emission Point 1 | T (Total) KG/Year | A (Accidental) KG/Year | F (Fugitive) KG/Year |
| 01 | Methane (CH4) | C | OTH | MODEL USEPA LANDGEM | | 669300.0 | 669300.0 | 0.0 |
| 03 | Carbon dioxide (CO2) | C | OTH | MODEL USEPA LANDGEM | | 1836000.0 | 1836000.0 | 0.0 |
| 07 | Non-methane volatile organic compounds (NMVOC) | C | OTH | MODEL USEPA LANDGEM | | 28770.0 | 28770.0 | 0.0 |
| ADD NEW ROW | | DELETE ROW * | | * Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button | | | | |

[EMISSIONS \(As required in your Licence\)](#)

| RELEASES TO AIR | | | | | Please enter all quantities in this section in KGs | | | |
|-----------------|------|--------------|-------------|---|--|-------------------|------------------------|----------------------|
| POLLUTANT | | METHOD | | | ADD EMISSION POINT | QUANTITY | | |
| Pollutant No. | Name | M/C/E | Method Code | Designation or Description | Emission Point 1 | T (Total) KG/Year | A (Accidental) KG/Year | F (Fugitive) KG/Year |
| | | | | | | 0.0 | 0.0 | 0.0 |
| ADD NEW ROW | | DELETE ROW * | | * Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button | | | | |

Additional Data Requested from Landfill operators

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

Landfill:

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

Dunganvan Waste Disposal Site

| T (Total) kg/Year | M/C/E | Method Used | | Facility Total Capacity m3 per hour |
|--|----------|-------------|----------------------------|--|
| | | Method Code | Designation or Description | |
| Total estimated methane generation (as per site model) | 669300.0 | C | LANDGEM | N/A |
| Methane flared | 0.0 | | | 0.0 (Total Flaring Capacity) |
| Methane utilised in engine/s | 0.0 | | | 0.0 (Total Utilising Capacity) |
| Net methane emission (as reported in Section A above) | 669300.0 | C | LANDGEM | N/A |

4.2 RELEASES TO WATERS

[Link to previous years emissions data](#)

| PRTR# : W0032 | Facility Name : Dungarvan Waste Disposal Site | Filename : W0032_2010(1).xls | Return Year : 2010 |

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SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS

Data on ambient monitoring of storm/surface water or groundwater, conducted as part of your licence requirements, should NOT be submitted under AER / PRTR

| RELEASES TO WATERS | | | | | Please enter all quantities in this section in KGs | | | |
|--------------------|------|--------------|-------------|---|--|-------------------|------------------------|----------------------|
| POLLUTANT | | METHOD | | | ADD EMISSION POINT | QUANTITY | | |
| No. Annex II | Name | M/C/E | Method Code | Designation or Description | Emission Point 1 | T (Total) KG/Year | A (Accidental) KG/Year | F (Fugitive) KG/Year |
| | | | | | | 0.0 | 0.0 | 0.0 |
| ADD NEW ROW | | DELETE ROW * | | * Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button | | | | |

SECTION B : REMAINING PRTR POLLUTANTS

| RELEASES TO WATERS | | | | | Please enter all quantities in this section in KGs | | | |
|--------------------|------|--------------|-------------|---|--|-------------------|------------------------|----------------------|
| POLLUTANT | | METHOD | | | ADD EMISSION POINT | QUANTITY | | |
| No. Annex II | Name | M/C/E | Method Code | Designation or Description | Emission Point 1 | T (Total) KG/Year | A (Accidental) KG/Year | F (Fugitive) KG/Year |
| | | | | | | 0.0 | 0.0 | 0.0 |
| ADD NEW ROW | | DELETE ROW * | | * Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button | | | | |

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

| RELEASES TO WATERS | | | | | Please enter all quantities in this section in KGs | | | |
|--------------------|------|--------------|-------------|---|--|-------------------|------------------------|----------------------|
| POLLUTANT | | METHOD | | | ADD EMISSION POINT | QUANTITY | | |
| Pollutant No. | Name | M/C/E | Method Code | Designation or Description | Emission Point 1 | T (Total) KG/Year | A (Accidental) KG/Year | F (Fugitive) KG/Year |
| | | | | | | 0.0 | 0.0 | 0.0 |
| ADD NEW ROW | | DELETE ROW * | | * Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button | | | | |

4.3 RELEASES TO WASTEWATER OR SEWER

[Link to previous years emissions data](#)

| PRTR# : W0032 | Facility Name : Dungarvan Waste Disposal Site | Filename : W0032_2010(1).xls |

27/04/2011 12:29

SECTION A : PRTR POLLUTANTS

| OFFSITE TRANSFER OF POLLUTANTS DESTINED FOR WASTE-WATER TREATMENT OR SEWER | | | | | Please enter all quantities in this section in KGs | | | |
|--|------|--------------|-------------|---|--|-------------------|------------------------|----------------------|
| POLLUTANT | | METHOD | | | ADD EMISSION POINT | QUANTITY | | |
| No. Annex II | Name | M/C/E | Method Code | Designation or Description | Emission Point 1 | T (Total) KG/Year | A (Accidental) KG/Year | F (Fugitive) KG/Year |
| | | | | | | 0.0 | 0.0 | 0.0 |
| ADD NEW ROW | | DELETE ROW * | | * Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button | | | | |

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

| OFFSITE TRANSFER OF POLLUTANTS DESTINED FOR WASTE-WATER TREATMENT OR SEWER | | | | | Please enter all quantities in this section in KGs | | | |
|--|------|--------------|-------------|---|--|-------------------|------------------------|----------------------|
| POLLUTANT | | METHOD | | | ADD EMISSION POINT | QUANTITY | | |
| Pollutant No. | Name | M/C/E | Method Code | Designation or Description | Emission Point 1 | T (Total) KG/Year | A (Accidental) KG/Year | F (Fugitive) KG/Year |
| | | | | | | 0.0 | 0.0 | 0.0 |
| ADD NEW ROW | | DELETE ROW * | | * Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button | | | | |

4.4 RELEASES TO LAND

[Link to previous years emissions data](#)

| PRTR# : W0032 | Facility Name : Dungarvan Waste Disposal Site | Filename : W0032_2010(1).xls | Return Year : 2010 |

27/04/2011 12:29

SECTION A : PRTR POLLUTANTS

| RELEASES TO LAND | | | | | Please enter all quantities in this section in KGs | | | |
|------------------|------|--------------|-------------|---|--|-------------------|------------------------|----------------------|
| POLLUTANT | | METHOD | | | ADD EMISSION POINT | QUANTITY | | |
| No. Annex II | Name | M/C/E | Method Code | Designation or Description | Emission Point 1 | T (Total) KG/Year | A (Accidental) KG/Year | F (Fugitive) KG/Year |
| | | | | | | 0.0 | 0.0 | 0.0 |
| ADD NEW ROW | | DELETE ROW * | | * Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button | | | | |

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

| RELEASES TO LAND | | | | | Please enter all quantities in this section in KGs | | | |
|------------------|------|--------------|-------------|---|--|-------------------|------------------------|----------------------|
| POLLUTANT | | METHOD | | | ADD EMISSION POINT | QUANTITY | | |
| Pollutant No. | Name | M/C/E | Method Code | Designation or Description | Emission Point 1 | T (Total) KG/Year | A (Accidental) KG/Year | F (Fugitive) KG/Year |
| | | | | | | 0.0 | 0.0 | 0.0 |
| ADD NEW ROW | | DELETE ROW * | | * Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button | | | | |

5. ONSITE TREATMENT & OFFSITE TRANSFERS OF WASTE

| PRTF#: W0032 | Facility Name : Dungarvan Waste Disposal Site | Filename : W0032_2010(1).xls | Return Year : 2010 |

27/04/2011 12:29

Please enter all quantities on this sheet in Tonnes

3

| Transfer Destination | European Waste Code | Hazardous | Quantity (Tonnes per Year) | Description of Waste | Waste Treatment Operation | Method Used | | Location of Treatment | Haz Waste : Name and Licence/Permit No of Next Destination Facility Non Haz Waste: Name and Licence/Permit No of Recover/Disposer | Haz Waste : Address of Next Destination Facility Non Haz Waste: Address of Recover/Disposer | Name and License / Permit No. and Address of Final Recoverer / Disposer (HAZARDOUS WASTE ONLY) | Actual Address of Final Destination i.e. Final Recovery / Disposal Site (HAZARDOUS WASTE ONLY) |
|----------------------|---------------------|-----------|----------------------------|---|---------------------------|-------------|-------------|-----------------------|--|--|--|--|
| | | | | | | M/C/E | Method Used | | | | | |
| Within the Country | 20 03 99 | No | 3822.88 | municipal wastes not otherwise specified | D1 | M | Weighed | Offsite in Ireland | Wexford County Council,W0191-02 | Holmestown Waste Management Facility,Barntown,Co. Wexford,,Ireland | | |
| Within the Country | 20 03 01 | No | 268.48 | mixed municipal waste | D1 | M | Weighed | Offsite in Ireland | Wexford County Council,W0191-02 | Holmestown Waste Management Facility,Barntown,Co. Wexford,,Ireland | | |
| Within the Country | 02 01 04 | No | 29.32 | waste plastics (except packaging) | R5 | M | Weighed | Offsite in Ireland | Irish Film Farm Plastics Group,WMP044B | Waverly Office Park,Old Naas Road,Dublin 12,,Ireland | | |
| Within the Country | 15 01 01 | No | 109.9 | paper and cardboard packaging | R3 | M | Weighed | Offsite in Ireland | Waterford Co. Council,W189-01 | Facility,Shandon,Dungarvan, Co. Waterford,Ireland | | |
| Within the Country | 04 02 22 | No | 5.76 | wastes from processed textile fibres | R5 | M | Weighed | Offsite in Ireland | Cookstown Textile Recyclers,ROC 1929 Carrier Road,Randalstown,Co. Antrim,,Ireland | | | |
| To Other Countries | 16 02 11 | Yes | 30.25 | FRIDGES discarded equipment containing chlorofluorocarbons, HCFC, HFC | R4 | M | Weighed | Abroad | KMK Metals Recycling,WCP/KK/069(A)/06 | Estate,Daingean Road,Tullamore,Co. Offaly,Ireland | Varies,Varies,Varies,Contact Laurence Kieran WEEE Ireland,EPA Auditor Dermot Burke,,Ireland | Varies,Contact Laurence Kieran WEEE Ireland,EPA Auditor Dermot Burke,,Ireland |
| To Other Countries | 16 02 13 | Yes | 99.56 | LARGE HOUSEHOLD discarded equipment containing hazardous components (16) other than those mentioned in 16 02 09 to 16 02 12 | R4 | M | Weighed | Abroad | KMK Metals Recycling,WCP/KK/069(A)/06 | Estate,Daingean Road,Tullamore,Co. Offaly,Ireland | Varies,Varies,Varies,Contact Laurence Kieran WEEE Ireland,EPA Auditor Dermot Burke,,Ireland | Varies,Contact Laurence Kieran WEEE Ireland,EPA Auditor Dermot Burke,,Ireland |
| To Other Countries | 16 02 13 | Yes | 101.6 | SMALL HOUSEHOLD discarded equipment containing hazardous components (16) other than those mentioned in 16 02 09 to 16 02 12 | R4 | M | Weighed | Abroad | KMK Metals Recycling,WCP/KK/069(A)/06 | Estate,Daingean Road,Tullamore,Co. Offaly,Ireland | Varies,Varies,Varies,Contact Laurence Kieran WEEE Ireland,EPA Auditor Dermot Burke,,Ireland | Varies,Contact Laurence Kieran WEEE Ireland,EPA Auditor Dermot Burke,,Ireland |
| To Other Countries | 16 02 13 | Yes | 36.47 | TV MONITORS discarded equipment containing hazardous components (16) other than those mentioned in 16 02 09 to 16 02 12 | R4 | M | Weighed | Abroad | KMK Metals Recycling,WCP/KK/069(A)/06 | Estate,Daingean Road,Tullamore,Co. Offaly,Ireland | Varies,Varies,Varies,Contact Laurence Kieran WEEE Ireland,EPA Auditor Dermot Burke,,Ireland | Varies,Contact Laurence Kieran WEEE Ireland,EPA Auditor Dermot Burke,,Ireland |
| To Other Countries | 16 02 11 | Yes | 0.93 | FLOURESCENT TUBES discarded equipment containing chlorofluorocarbons, HCFC, HFC | R5 | M | Weighed | Abroad | KMK Metals Recycling,WCP/KK/069(A)/06 | Estate,Daingean Road,Tullamore,Co. Offaly,Ireland | Varies,Varies,Varies,Contact Laurence Kieran WEEE Ireland,EPA Auditor Dermot Burke,,Ireland | Varies,Contact Laurence Kieran WEEE Ireland,EPA Auditor Dermot Burke,,Ireland |
| Within the Country | 17 04 07 | No | 25.96 | mixed metals | R5 | M | Weighed | Offsite in Ireland | Mr. Binman,WCP/KK/069(A)/06 | Limerick,Ireland Luddenmore,Grange ,Kilmalock,Co. | | |
| Within the Country | 17 05 04 | No | 9.58 | soil and stones other than those mentioned in 17 05 03 | R3 | M | Weighed | Offsite in Ireland | Mr. Binman,WCP/KK/069(A)/06 | Limerick,Ireland Luddenmore,Grange ,Kilmalock,Co. | | |
| Within the Country | 17 01 07 | No | 49.1 | mixture of concrete, bricks, tiles and ceramics other than those mentioned in 17 01 06 | R3 | M | Weighed | Offsite in Ireland | Mr. Binman,WCP/KK/069(A)/06 | Limerick,Ireland Luddenmore,Grange ,Kilmalock,Co. | | |
| Within the Country | 17 02 02 | No | 5.94 | glass | R5 | M | Weighed | Offsite in Ireland | Mr. Binman,WCP/KK/069(A)/06 | Limerick,Ireland Monaghan | | |
| Within the Country | 17 02 02 | No | 19.38 | BOTTLES glass | R5 | M | Weighed | Offsite in Ireland | Rehab Recycling,Reg No. 635 Permit no. 03/07 | Road,Cork,,,,,Ireland | | |
| Within the Country | 02 01 07 | No | 2167.69 | GARDEN WASTE/BROWN BIN waste from forestry | R3 | M | Weighed | Offsite in Ireland | Miltown Composting Systems,W0270-01 | Fethard,Co. Tipperary,,,,,Ireland | | |
| Within the Country | 17 02 01 | No | 44.88 | wood | R3 | M | Weighed | Offsite in Ireland | Mr. Binman,WCP/KK/069(A)/06 | Luddenmore,Grange ,Kilmalock,Co. Limerick,Ireland | | |
| Within the Country | 16 05 04 | Yes | 0.18 | gases in pressure containers (including halons) containing dangerous substances | R5 | M | Weighed | Offsite in Ireland | ENVA Ireland,WCP/KK/059(A)/07 | Clonmanim Industrial Estate,Portlaoise,Co. Laois,,Ireland | ENVA Ireland,WCP/KK/059 (A) 06,Clonmanim Industrial Estate,Portlaoise,Co. Laois,,Ireland | Clonmanim Industrial Estate,Portlaoise,Co. Laois,,Ireland |
| Within the Country | 13 02 06 | Yes | 1.06 | synthetic engine, gear and lubricating oils | R9 | M | Weighed | Offsite in Ireland | ENVA Ireland,WCP/KK/059(A)/07 | Clonmanim Industrial Estate,Portlaoise,Co. Laois,,Ireland | ENVA Ireland,WCP/KK/059 (A) 06,Clonmanim Industrial Estate,Portlaoise,Co. Laois,,Ireland | Clonmanim Industrial Estate,Portlaoise,Co. Laois,,Ireland |
| Within the Country | 08 01 21 | Yes | 2.5 | waste paint or varnish remover | D5 | M | Weighed | Offsite in Ireland | ENVA Ireland,WCP/KK/059(A)/07 | Clonmanim Industrial Estate,Portlaoise,Co. Laois,,Ireland | ENVA Ireland,WCP/KK/059 (A) 06,Clonmanim Industrial Estate,Portlaoise,Co. Laois,,Ireland | Clonmanim Industrial Estate,Portlaoise,Co. Laois,,Ireland |

Appendix J

Energy Efficiency Audit

Dungarvan Landfill & Civic Amenity Site Energy Audit Report

15 April 2011



**Client: Waterford County Council,
Civic Offices,
Dungarvan**

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



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 utilising 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 30 KW wind turbine.

Mechanisms are currently not available to facilitate the utilisation of the landfill gas, the methane volumes, have not made it feasible and calculations have shown that concentrations and grid access issues will inhibited the installation of a large scale CHP Plant where by electricity would be sold to the grid & excess heat would be dumped. The expected landfill gas rates will be too small to justify any form of capital expenditure on equipment that can be used for energy purposes. 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 leachate pumps & gas flare.

| Dungarvan Landfill Electrical Consumption Analysis Bord Gais Old Rate 2010 | | | | | | | |
|---|-----------------|------------------|-----------------|-----------------------|-----------------|---------------|--------|
| | 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 2010 | | | | | | | |
|---|-----------------|------------------|-----------------|-----------------------|-----------------|---------------|--------|
| | 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 2010 | | | | | | | |
|---|--------------|--------------|-------------|----------------|-------------|------------|--------|
| | 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 2010 | | | | | | | |
|---|--------------|--------------|-------------|----------------|-------------|------------|--------|
| | 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 | | | | | | | |

3. Break Down in Electrical Consumption

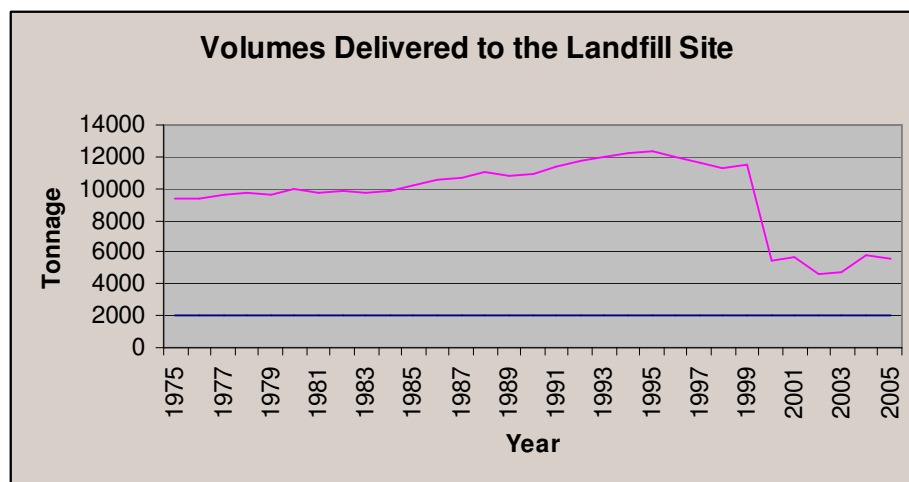
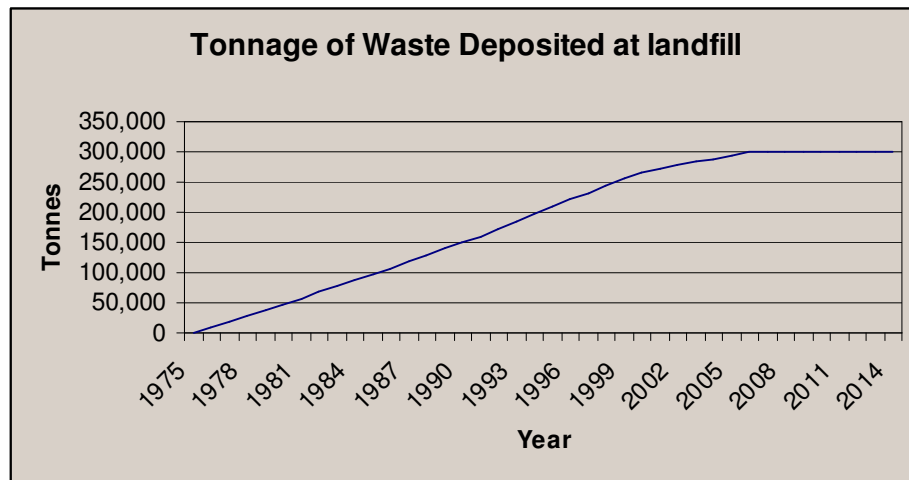
| Dungarvan Landfill Electrical Consumption Breakdown for Office Area | | | | | | |
|--|------------------------|-----------------------|------------------------------------|-------------------------------------|-------------------|---------------------|
| | Number of Items | Hours per year | Electrical Loading in Watts | Total electrical Load KWh.YR | % 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 | |
| Fax Machine | 1 | 8760 | 60 | 525.6 | 2.05 | |
| | | | | 24794.55 | | |

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 | 20000 | 65,000 | 0.23 | 0.19 | € 4600 | 14 |
| | | | | | | |

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

The installation of a wind turbine at the Dungarvan landfill is less favourable to that of Tramore as the site is significantly less exposed and the resulting output a wind turbine installation would be significantly less.

Recommendations

| Dungarvan Landfill Energy Audit | | | |
|--|--------------------------------|--|---|
| Item | Cost | Payback | Note |
| Install wind turbine | €65,000 | € 4,600 annual cost saving, will have a resulting payback of 12/13 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. |

Appendix K

Leachate Extraction System Details

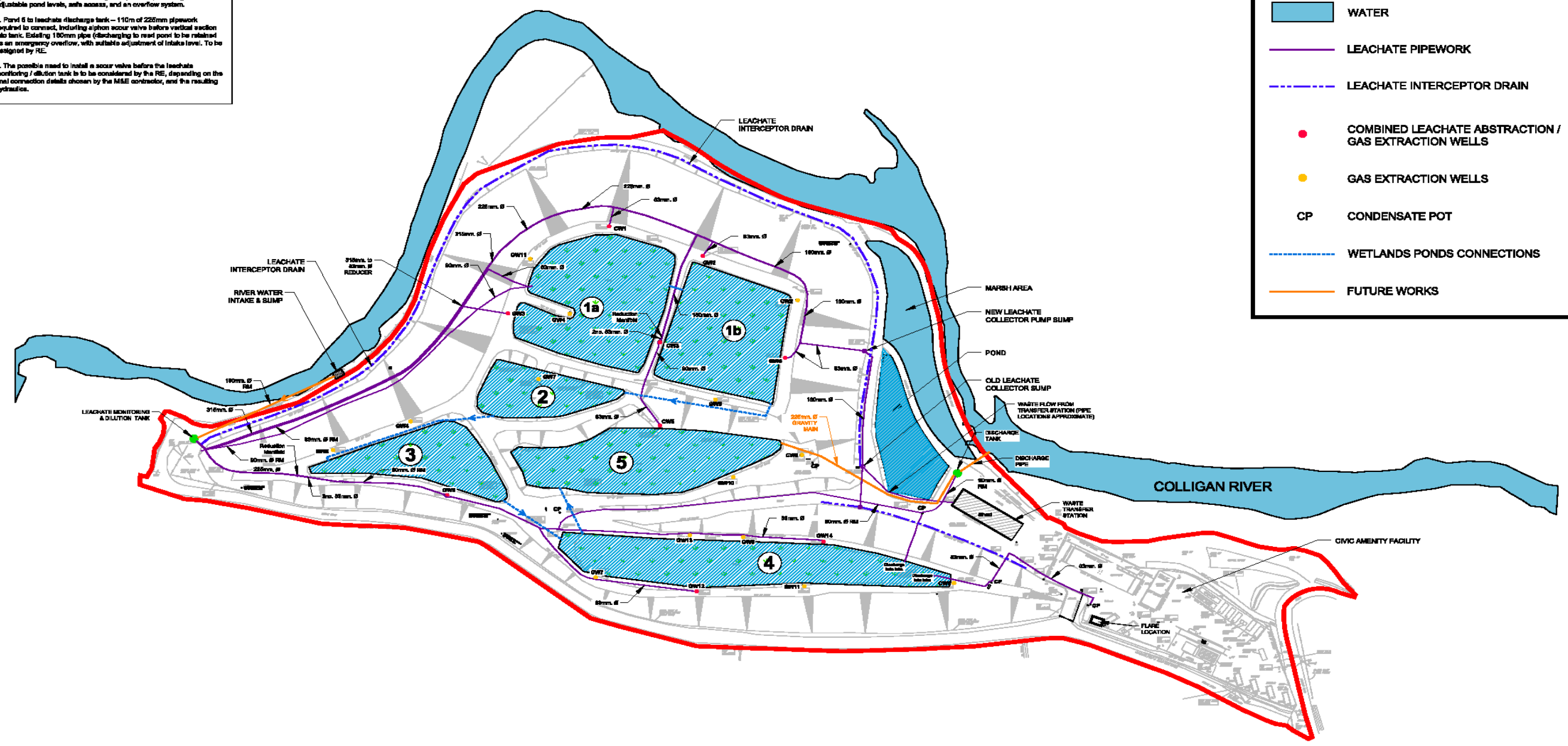
REMAINING WORKS:

1. Asset and construction / installation of the MSE-SCADA contract. This includes the site control hut, borehole pumps, all necessary MSE-SCADA equipment, connections at 2 No. leachate tanks, power supply.
2. River water intake sump - this forms part of the leachate treatment system and provides dilution water from the river to the dilution tank. The details are shown in Drawing DG0708. The pumpstock to be purchased and costs.
3. 30m of twin ducts and 160mm pump main from the future river water intake sump to the dilution tank; connection between old leachate collector MH1 and new sump, minor pipework and ducting surrounding IT tanks.
4. Ponds level control works - chambers and level control. The current temporary arrangement for adjusting pond levels is difficult and unsafe. A system of level control is to be designed by the RE, including for adjustable pond levels, safe access, and an overflow system.
5. Pond 6 to leachate discharge tank - 110m of 225mm pipework required to connect, including a 180mm secure valve before vertical section into tank. Existing 180mm pipe (discharging to road) to be retained as an emergency overflow, with suitable adjustment of intake level. To be designed by RE.
6. The possible need to install a secure valve before the leachate monitoring / dilution tank is to be considered by the RE, depending on the final connection details chosen by the MSE contractor, and the resulting hydraulics.



LEGEND

- EXTENT OF SITE
- CONSTRUCTED WETLANDS
- WATER
- LEACHATE PIPEWORK
- LEACHATE INTERCEPTOR DRAIN
- COMBINED LEACHATE ABSTRACTION / GAS EXTRACTION WELLS
- GAS EXTRACTION WELLS
- CP CONDENSATE POT
- WETLANDS PONDS CONNECTIONS
- FUTURE WORKS



R:\MIS\0300\03000 Series - Construction\Aug08\leachate\leachate layout.dwg

NOTES

1. This drawing is the property of RPS. It is a confidential document and must not be copied, used, or its content divulged without prior written consent.
2. All Levels refer to Ordnance Survey Datum, Mean Sea Level.
3. DO NOT SCALE, use figured dimensions only. If in doubt ask.

| | | | |
|-----|---------|------------------------|-----|
| Rev | Issued | Description | App |
| RD1 | Aug '10 | As Built Issue | |
| CD1 | Aug '08 | Issue for Construction | |
| No. | Date | Amendment / Issue | App |

Client: **WATERFORD COUNTY COUNCIL**
 County Council Chamber, Front Lobby
 Civic Offices, Dungarvan, Co. Waterford
 Phone: 053 2200 Fax: 053 42811

Drawn By: RH
 Checked By: BOK
 Approved By: PM
 Date: Aug 2008

RPS RPS Engineering
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 12000000
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 ireland@rpsgrp.com

Project: **DUNGARVAN LANDFILL**

Drawing Status: As Built
 Scale / Sheet Size: 1:1000 @ A1, 1:2000 @ A3

Drawing Number: **MDR0350/DG0606**
 Title: **LEACHATE ABSTRACTION & TREATMENT SYSTEM**
 Rev: **R01**

Dungarvan Landfill Capping Works – Proposed Temporary Leachate Extraction /Treatment

It is proposed to operate a temporary leachate abstraction and treatment system at Dungarvan Landfill. The following describes the technical aspects to setup the temporary system

Existing setup:

The landfill infrastructure includes leachate boreholes, collector pipework, 2 No. leachate system tanks (25m³ each), and the multi-pond wetland treatment system (5 ponds). As construction was not completed, these are in various stages of completion. There are no borehole pumps or other system pumps, no river water extraction, and various connections and lengths of pipework are still to be completed. Refer to sketch DSK003 enclosed.

Currently, leachate is extracted from the old leachate drain collector sump only, by tractor and tanker, approximately every three weeks, and discharged to Pond 1. In addition, all 5 ponds are ‘topped up’ with river water at the same time. The wetland treatment system is operational on this basis, with gravity overflows allowing detention and flow from pond 1 down to pond 5, and then to the existing reed pond.

Proposed Temporary Leachate Extraction / Treatment

In order to set up a temporary leachate extraction/ treatment system, a suitable borehole to extract leachate would be chosen based on monitoring to date, a pump would be installed and set up to discharge to the existing leachate collector pipework. A final connection would be made to the Dilution and Monitoring Tank (westward tank). A suitable groundwater monitoring borehole, e.g. RC8, will be used to provide dilution water, by equipping and connecting to the system, relaying dilution water to the tank. Leachate from the old leachate drain collector sump, still to be extracted by tractor-tanker, would be added to the tank every 2 weeks. Leachate and the dilution well water will be tested for ammonia and pH, and setup so that dilution to less than 100 mg/l ammonia is achieved in the tank. A pump will be setup in the tank and will discharge daily to pond 1A (via the existing rising main).

An estimated 1-2 m³/day would be extracted from the leachate borehole, and approximately 5 m³ from the old collector sump (every 2-4 weeks). Pending testing, it is expected that 4-

5m³/day will be extracted from the groundwater borehole, to dilute water in the tank to less than 100 mg/l ammonia. Treated water will be re-circulated from the final pond, Pond 5, back to Pond 1A, at all times when evapotranspiration equals or exceeds rainfall and inputs. Persistent or heavy rainfall will dilute the ponds and overflow from Pond 5 to the lower pond and marsh area adjacent the river.

Instant and grab sample monitoring would be carried out at Pond 5. Although it is noted that no treated leachate/water will normally discharge from Pond 5, it is expected that the treated leachate will comply with the following limits proposed in the *Response to EPA Request for Information on Leachate Treatment (Waste licence review application, Dec 08)*:

| Parameter | Emission Limit (all units in mg/l except pH) |
|-------------------------|---|
| PH | 6 - 9 |
| BOD | 45 |
| Suspended Solids | 50 |
| Orthophosphate (mg/l P) | 2 |
| Total Ammonia (as N) | 5 |

It is proposed that ammonia and pH be tested weekly onsite by portable meter, at both Pond 5 and in the dilution tank, with the remaining tests carried out in the laboratory monthly (Pond 5 sample only). There is also an annual monitoring proposal for additional parameters included in the waste licence review application which can be adhered to, this is attached. It is noted that it is possible to shutoff flow from each wetland pond for a period if results are unsatisfactory, and return to Pond 1A or/and the dilution tank if necessary.

| Lab no. | Old Code | Date sampled | pH | Molybdate Reactive | | | | | Nitrite mg/l | Nitrate mg/l | Total Nitrogen mg/l | Suspended solids mg/l | COD mg/l | BOD mg/l | Chloride mg/l | Conductivity | Non-purgeable organic carbon mg/l | Comments |
|----------|---------------------------------|--------------|---------|--------------------|----------------|----------------------|--------------|--------------|--------------|--------------|---------------------|-----------------------|----------|----------|---------------|------------------|-----------------------------------|----------|
| | | | | Ammonium mg/l | Phosphate mg/l | Total Phosphate mg/l | Nitrite mg/l | Nitrate mg/l | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| 20100702 | Dungavan Landfill Pond 1 | 10-Sep-10 | 7.44 | 47.888 | 0.327 | 0.495 | 0.052 | <-0.2 | | | 18.5 | 96 | 9 | 240.523 | 1771 | 28.90 | | |
| 20100703 | Dungavan Landfill Pond 2 | 10-Sep-10 | 7.47 | 0.206 | 0.038 | 0.131 | <-0.003 | <-0.2 | | | <2 | 39 | | 92.211 | 611 | 14.18 | | |
| 20100704 | Dungavan Landfill Pond 3 | 10-Sep-10 | 7.52 | 0.038 | 0.003 | 0.036 | <-0.003 | <-0.2 | | | 1.0 | 27 | | 48.598 | 470 | 11.05 | | |
| 20100705 | Dungavan Landfill Pond 4 | 10-Sep-10 | 7.43 | 0.025 | 0.002 | 0.027 | <-0.003 | <-0.2 | | | 2.2 | 21 | | 40.994 | 425 | 9.91 | | |
| 20100706 | Dungavan Landfill Pond 5 IN | 10-Sep-10 | 7.30 | 0.026 | 0.006 | 0.036 | <-0.003 | <-0.2 | | | 5.4 | 27 | | 17.962 | 308 | 11.32 | | |
| 20100701 | Dungavan Landfill Leachate Pond | 10-Sep-10 | 7.67 | 3.797 | 0.029 | 0.099 | 0.171 | 0.334 | | | 6.0 | 23 | 1 | 25.202 | 468 | 10.20 | | |
| 20100707 | Dungavan Landfill Pond 5 OUT | 10-Sep-10 | 7.82 | 0.009 | 0.002 | 0.040 | <-0.003 | <-0.2 | | | <2 | 27 | 2 | 13.631 | 337 | 11.79 | | |
| 20100699 | RC8 | 10-Sep-10 | 7.46 | 76.440 | 0.240 | 0.414 | 0.024 | <-0.2 | | | 27.4 | 87 | 3 | 357.332 | 3460 | 16.56 | | |
| 20100700 | RC8A | 10-Sep-10 | 7.67 | 276.565 | 1.507 | 1.854 | 0.075 | 0.585 | | | 107.5 | 262 | 23 | 288.586 | 4390 | 62.18 | | |
| 20100711 | Dungavan Landfill Pond 1 | 14-Sep-10 | 7.90 | 67.541 | 0.280 | 0.569 | 0.029 | <-0.2 | 87.560 | | 24.7 | 141 | 13 | 353.039 | 2680 | 30.71 | Total N measured | |
| 20100712 | Dungavan Landfill Pond 2 | 14-Sep-10 | 7.38 | 0.343 | 0.040 | 0.211 | 0.024 | <-0.2 | 1.850 | | 35.7 | 50 | | 92.113 | 673 | 16.63 | Total N measured | |
| 20100713 | Dungavan Landfill Pond 3 | 14-Sep-10 | 7.71 | 0.094 | 0.003 | 0.041 | <-0.003 | <-0.2 | 0.525 | | 1.7 | 27 | | 49.430 | 493 | 11.37 | Total N measured | |
| 20100714 | Dungavan Landfill Pond 4 | 14-Sep-10 | 8.26 | 0.396 | 1.032 | 0.927 | 0.000 | <-0.2 | 0.338 | 1.0 | 27 | | 41.898 | 441 | 10.17 | Total N measured | | |
| 20100708 | Dungavan Landfill Pond 5 IN | 14-Sep-10 | 7.71 | 0.010 | 0.001 | 0.146 | <-0.003 | <-0.2 | 0.268 | 15.8 | 27 | | 24.664 | 355 | 9.43 | Total N measured | | |
| 20100710 | Dungavan Landfill Leachate Pond | 14-Sep-10 | 7.83 | 2.534 | 0.020 | 0.097 | 0.215 | 0.172 | 2.280 | 12.7 | 50 | | 24.738 | 491 | 10.55 | Total N measured | | |
| 20100716 | Dungavan Landfill Pond 5 OUT | 14-Sep-10 | 7.90 | 0.076 | 0.001 | 0.038 | <-0.003 | <-0.2 | 0.585 | 1.0 | 33 | 2 | 13.989 | 358 | 12.74 | Total N measured | | |
| 20100715 | RC8 | 14-Sep-10 | 7.97 | 94.205 | 0.490 | 0.625 | 0.051 | <-0.2 | 108.300 | 8.0 | 109 | | 113.981 | 2020 | 30.29 | Total N measured | | |
| 20100709 | RC8A | 14-Sep-10 | 7.52 | 107.618 | 0.389 | 0.428 | 0.002 | <-0.2 | 135.200 | 1.7 | 116 | | 374.041 | 4000 | 23.95 | Total N measured | | |
| 20100807 | Dungavan Landfill Pond 1 | 6-Oct-10 | 7.34 | 157.826 | 0.724 | 1.091 | 0.005 | <-0.2 | | 12.7 | 160 | | 530.030 | 4300 | 100.30 | | | |
| 20100808 | Dungavan Landfill Pond 2 | 6-Oct-10 | 7.58 | 63.519 | 0.117 | 0.351 | 0.013 | <-0.2 | | 8.8 | 136 | | 413.254 | 2840 | 41.25 | | | |
| 20100809 | Dungavan Landfill Pond 3 | 6-Oct-10 | 7.72 | 15.419 | <-0.02 | 0.040 | 0.013 | <-0.2 | | 1.4 | 70 | | 266.175 | 1688 | 22.24 | | | |
| 20100810 | Dungavan Landfill Pond 4 | 6-Oct-10 | 7.61 | 0.049 | 0.001 | 0.036 | 0.003 | <-0.2 | 1.200 | <2 | 39 | | 109.706 | 768 | 12.04 | | | |
| 20100811 | Dungavan Landfill Pond 5 IN | 6-Oct-10 | 7.34 | 0.016 | 0.009 | 0.038 | 0.003 | 0.199 | 1.140 | 1.3 | 39 | | 32.144 | 406 | 10.80 | | | |
| 20100806 | Dungavan Landfill Leachate Pond | 6-Oct-10 | 7.52 | 0.274 | 0.019 | 0.038 | 0.014 | 0.265 | 1.270 | 5.4 | 39 | | 21.064 | 421 | 11.02 | | | |
| 20100812 | Dungavan Landfill Pond 5 OUT | 6-Oct-10 | 7.49 | 0.054 | <-0.02 | 0.018 | 0.002 | 0.164 | 1.100 | 6 | 39 | | 21.756 | 382 | 11.21 | | | |
| 20100813 | RC8 | 6-Oct-10 | 7.48 | 193.879 | 1.032 | 1.390 | 0.022 | <-0.2 | | 4.6 | 229 | | 208.174 | 3330 | 38.67 | | | |
| 20100805 | RC8A | 6-Oct-10 | 7.26 | 114.518 | 0.398 | 0.409 | <-0.004 | <-0.2 | | 7.6 | 117 | | 369.864 | 4040 | 63.32 | | | |
| 20100827 | Dungavan Landfill Pond 1 | 13-Oct-10 | 7.40 | 123.819 | 0.713 | 0.864 | 0.007 | <-0.2 | | 10 | 160 | 10 | 543.746 | 4150 | 85.47 | | | |
| 20100828 | Dungavan Landfill Pond 2 | 13-Oct-10 | 7.80 | 43.972 | 0.182 | 0.342 | 0.084 | <-0.2 | 52.400 | 6.5 | 121 | | 443.415 | 3060 | 38.02 | | | |
| 20100829 | Dungavan Landfill Pond 3 | 13-Oct-10 | 7.84 | 17.596 | <-0.02 | 0.040 | 0.028 | <-0.2 | | 1.5 | 70 | | 290.895 | 1827 | 27.34 | | | |
| 20100830 | Dungavan Landfill Pond 4 | 13-Oct-10 | 7.87 | 0.033 | <-0.02 | 0.029 | 0.004 | <-0.2 | | <2 | 39 | | 99.488 | 772 | 15.26 | | | |
| 20100831 | Dungavan Landfill Pond 5 IN | 13-Oct-10 | 7.70 | 0.075 | 0.002 | 0.052 | 0.005 | <-0.2 | | 13 | 33 | | 40.549 | 476 | 13.47 | | | |
| 20100826 | Dungavan Landfill Leachate Pond | 13-Oct-10 | 7.55 | 0.453 | 0.011 | 0.052 | 0.015 | 0.078 | 0.928 | 3.6 | 27 | | 22.632 | 440 | 12.82 | | | |
| 20100832 | Dungavan Landfill Pond 5 OUT | 13-Oct-10 | 7.71 | 0.077 | 0.002 | 0.023 | 0.004 | <-0.2 | | 1.33 | 27 | 2 | 22.763 | 394 | 13.27 | | | |
| 20100824 | RC8 | 13-Oct-10 | 7.40 | 91.187 | 0.740 | 0.992 | 0.009 | <-0.2 | | 10.33 | 119 | | 165.602 | 1964 | 34.79 | | | |
| 20100825 | RC8A | 13-Oct-10 | 7.35 | 124.587 | 0.440 | 0.472 | 0.002 | <-0.2 | | 1 | 148 | | 389.074 | 4540 | 83.38 | | | |
| 20100852 | Dungavan Landfill Pond 1 | 22-Oct-10 | 154.480 | | 0.184 | 0.398 | 0.328 | 0.276 | | 7.8 | 366 | | 634.410 | | | | | |
| 20100853 | Dungavan Landfill Pond 2 | 22-Oct-10 | 66.074 | | 0.139 | 0.315 | 0.916 | 1.013 | | 9.8 | 356 | | 464.985 | | | | | |
| 20100854 | Dungavan Landfill Pond 3 | 22-Oct-10 | 6.926 | | 0.073 | 0.272 | 0.326 | <-0.2 | | 18 | 40 | | 316.502 | | | | | |
| 20100855 | Dungavan Landfill Pond 4 | 22-Oct-10 | 0.037 | | 0.005 | 0.036 | <-0.003 | <-0.2 | | 1.6 | 24 | | 99.656 | | | | | |
| 20100856 | Dungavan Landfill Pond 5 IN | 22-Oct-10 | 0.853 | | 0.128 | 0.410 | 0.002 | <-0.2 | | 24.4 | 28 | | 44.527 | | | | | |
| 20100851 | Dungavan Landfill Leachate Pond | 22-Oct-10 | 0.256 | | 0.019 | 0.090 | 0.009 | <-0.2 | | 12.8 | 19 | | 21.910 | | | | | |
| 20100857 | Dungavan Landfill Pond 5 OUT | 22-Oct-10 | <0.2 | | 0.002 | 0.027 | <-0.003 | <-0.2 | | <2 | 0 | | 22.777 | | | | | |
| 20100849 | RC8 | 22-Oct-10 | 94.505 | | 1.081 | 1.112 | 0.018 | <-0.2 | | 10.2 | 338 | | 195.499 | | | | | |
| 20100850 | RC8A | 22-Oct-10 | 157.730 | | 0.317 | 0.425 | 0.013 | <-0.2 | | 18.4 | 365 | | 778.740 | | | | | |
| 20100883 | Dungavan Landfill Pond 1 | 29-Oct-10 | 7.54 | 122.110 | 0.393 | 0.594 | 0.152 | 0.707 | | 25.67 | 131 | | 266.587 | 2436 | | | | |
| 20100884 | Dungavan Landfill Pond 2 | 29-Oct-10 | 7.94 | 52.056 | 0.124 | 0.279 | 0.377 | 0.423 | | 16 | 127 | | 414.192 | 2422 | | | | |
| 20100885 | Dungavan Landfill Pond 3 | 29-Oct-10 | 7.93 | 127.785 | 0.024 | 0.122 | 0.127 | <-0.2 | | 9 | 62 | | 270.180 | 1339 | | | | |
| 20100886 | Dungavan Landfill Pond 4 | 29-Oct-10 | 7.94 | 1.726 | 0.002 | 0.049 | 0.020 | <-0.2 | | 11.75 | 45 | | 196.577 | 958 | | | | |
| 20100887 | Dungavan Landfill Pond 5 IN | 29-Oct-10 | 7.65 | 0.018 | 0.011 | 0.061 | 0.001 | <-0.2 | | 11.5 | 30 | | 52.926 | 419 | | | | |
| 20100882 | Dungavan Landfill Leachate Pond | 29-Oct-10 | 7.80 | 0.143 | 0.027 | 0.173 | 0.006 | 0.008 | | 25.75 | 34 | | 21.661 | 363 | | | | |
| 20100888 | Dungavan Landfill Pond 5 OUT | 29-Oct-10 | 7.69 | 0.035 | 0.003 | 0.032 | <-0.003 | <-0.2 | | 0 | 23 | | 23.010 | 314 | | | | |
| 20100890 | RC8 | 29-Oct-10 | 7.94 | 9.820 | 0.037 | 0.099 | 0.179 | 2.045 | | 51 | 36 | | 26.223 | 506 | | | | |
| 20100881 | RC8A | 29-Oct-10 | 11.344 | | 0.164 | 0.240 | <-0.049 | 1.568 | | 15.25 | 59 | | 28.210 | 588 | | | | |
| 20100902 | Dungavan Landfill Pond 1 | 4-Nov-10 | 7.76 | 93.740 | 0.301 | 0.599 | 0.369 | 0.759 | 117.400 | 16.7 | 121 | 8 | 249.151 | 2510 | 34.60 | | | |
| 20100903 | Dungavan Landfill Pond 2 | 4-Nov-10 | 8.06 | 31.586 | 0.150 | 0.284 | 0.337 | 0.401 | 42.470 | 3.5 | 143 | | 342.966 | 2070 | 34.47 | | | |
| 20100904 | Dungavan Landfill Pond 3 | 4-Nov-10 | 7.92 | 28.993 | 0.026 | 0.295 | 0.389 | 0.197 | 39.170 | 9.2 | 84 | | 345.189 | 2080 | 25.37 | | | |
| 20100905 | Dungavan Landfill Pond 4 | 4-Nov-10 | 7.91 | 16.690 | 0.012 | 0.065 | 0.135 | <-0.2 | 22.550 | 0.4 | 64 | | 307.765 | 1748 | 20.29 | | | |
| 20100906 | Dungavan Landfill Pond 5 IN | 4-Nov-10 | 7.39 | 0.290 | 0.022 | 0.167 | <-0.003 | <-0.2 | 2.730 | 9.6 | 85 | | 161.900 | 1007 | 21.23 | | | |
| 20100901 | Dungavan Landfill Leachate Pond | 4-Nov-10 | 7.81 | 0.067 | 0.013 | 0.113 | 0.013 | 0.070 | 0.723 | 4.6 | 68 | | 30.605 | 452 | 10.58 | | | |
| 20100907 | Dungavan Landfill Pond 5 OUT | 4-Nov-10 | 7.47 | 0.047 | 0.007 | 0.041 | <-0.003 | <-0.2 | 1.010 | 4 | 82 | 2 | 51.634 | 518 | 11.04 | | | |
| 20100899 | RC8 | 4-Nov-10 | 6.93 | 51.709 | 0.073 | 0.598 | <-0.003 | <-0.2 | 70.280 | 98 | 187 | | 76.990 | 1517 | 30.12 | | | |
| 20100900 | RC8A | 4-Nov-10 | 7.06 | 17.245 | 0.074 | 0.133 | 0.010 | 0.438 | 22.590 | 2.75 | 70 | | 42.726 | 806 | 10.10 | | | |
| 20100929 | RC8 | 18-Nov-10 | 7.37 | 128.044 | 0.998 | 1.548 | 0.039 | <-0.2 | | | 140 | | 145.478 | | | | | |
| 20100930 | RC8A | 18-Nov-10 | 7.20 | 56.077 | 0.197 | 1.0656 | 0.053 | <-0.2 | | | 127 | | 86.345 | | 36.95 | | | |
| 20100931 | Dungavan Landfill Leachate Pond | 18-Nov-10 | 7.71 | 0.216 | 0.026 | 0.072 | 0.043 | 0.116 | | | 27 | | 60.043 | | 11.39 | | | |
| 20100932 | Dungavan Landfill Pond 1 | 18-Nov-10 | 7.84 | 57.219 | 0.105 | 0.414 | 0.176 | 4.53 | | | 103 | 15 | 230.4 | | 30.22 | | | |
| 20100933 | Dungavan Landfill Pond 2 | 18-Nov-10 | 7.73 | 20.39 | 0.098 | 0.2016 | 0.258 | 2.122 | | | 181 | | 278.159 | | 26.41 | | | |
| 20100934 | Dungavan Landfill Pond 3 | 18-Nov-10 | 7.58 | 12.801 | 0.041 | 0.134 | 0.868 | 3.485 | | | 164 | | 254.528 | | 23.62 | | | |
| 20100935 | Dungavan Landfill Pond 4 | 18-Nov-10 | 8.06 | 12.802 | 0.008 | 0.0288 | 0.158 | 0.86 | | | 157 | | 280.807 | | 17.4 | | | |
| 20100936 | Dungavan Landfill Pond 5 IN | 18-Nov-10 | 7.77 | 2.609 | 0.008 | 0.0288 | 0.044 | <-0.2 | | | 39 | | 179.863 | | 15.76 | | | |
| 20100937 | Dungavan Landfill Pond 5 OUT | 18-Nov-10 | 7.85 | 0.065 | 0.006 | 0.0126 | 0.035 | <-0.2 | | | 27 | 0 | 103.358 | | 14.84 | | | |
| 20100938 | RC8 | 24-Nov-10 | 21.465 | | 0.16 | | 0.041 | <-0.2 | | | 32 | | 374.026 | | | | | |
| 20100939 | RC8A | 24-Nov-10 | 63.65 | | 0.098 | | 0.054 | <-0.2 | | | 119 | | 100.166 | | | | | |
| 20100940 | Dungavan Landfill Leachate Pond | 24-Nov-10 | 0.064 | | 0.011 | | 0.04 | 0.104 | | | 20 | | 72.208 | | | | | |
| 20100941 | Dungavan Landfill Pond 1 | 24-Nov-10 | 53.522 | | 0.073 | | 0.377 | 7.418 | | | 88 | 5 | 227.96 | | | | | |
| 20100942 | Dungavan Landfill Pond 2 | 24-Nov-10 | 16.68 | | 0.084 | | 0.183 | 1.756 | | | 70 | | 236.201 | | | | | |
| 20100943 | Dungavan Landfill Pond 3 | | | | | | | | | | | | | | | | | |

Appendix L – Environmental Liability Risk Assessment

REVIEW OF ENVIRONMENTAL LIABILITIES

1 A. IDENTIFICATION OF ENVIRONMENTAL RECEPTORS

The term 'environmental receptors' describes those parts of the surroundings likely to be affected by the processes that are ongoing at Dungarvan Landfill. The significant environmental receptors identified are listed below. These receptors are used as a starting point to ensure that all significant risks are identified and all major aspects of the environment are taken into account.

Environmental Receptors:

- Groundwater
- Surface water
- Adjacent National Heritage Area (NHA)
- Human Beings
- Air Quality

1 B. IDENTIFICATION OF PROCESSES

A number of processes associated with the operation of a public civic amenity facility, and other processes associated with the restoration and aftercare period of the Landfill site were identified during the course of the workshop and afterwards and are listed below:

Processes:

- General Facility Operations – including nuisance control, traffic management, routine maintenance, monitoring and other site operations.
- Civic Amenity Facility Operations – including the temporary storage and transfer of waste.
- Landfill Gas – including landfill gas generation, migration, and control.
- Leachate – including leachate generation, collection, storage and transfer off site.

These current processes have been identified to cover all activities on site that may result in a risk to the environmental receptors. Each environmental receptor was assessed against the list of processes in order to identify potential hazards.

1 C. IDENTIFICATION OF RISKS ASSOCIATED WITH RECEPTORS AND PROCESSES

- 1 Improper handling of waste by staff and members of the public
- 2 Vehicles and/or person accidents in the Civic amenity area
- 3 Overfilling of storage containers in the Civic Amenity area
- 4 Risk of hazardous material passing inspection and being accepted at Civic Amenity
- 5 Member of public slipping/tripping in civic amenity area
- 6 Improper storage of permitted household hazardous waste
- 7 Escape of contaminated liquid from the Civic Amenity containment system
- 8 Off site migration of litter causing nuisance
- 9 Vermin carrying disease out of the landfill
- 10 Odours causing a nuisance
- 11 H&S Accident during environmental monitoring
- 12 Drowning in Colligan River or Leachate Wetlands System of staff or unauthorised member of public
- 13 Human exposure to leachate and /or landfill gas during general maintenance operations
- 14 Fire in the CA or landfill
- 15 Landfill gas migration off site and accumulation in structures.
- 16 Escape of gas to the atmosphere
- 17 Degradation of capping.
- 18 Leachate break out due to breach in liner
- 19 Failure of leachate collection infrastructure leading to groundwater contamination
- 20 Escape of leachate from leachate storage tank to ground
- 21 Intrusion / Vandalism at flare compound
- 22 Dust causing a nuisance, blown off site.

2.A - ASSESSMENT OF RISKS

These risks were assessed against the risk classification table below. The risk classification table was designed to reflect the critical levels of risk appropriate to the landfill. Risk ratings were applied to each risk. The severity rating adopted for each risk reflected the highest severity rating of the severity parameters (safety, environment).

A risk score was calculated for each risk using the selected severity and occurrence ratings. The risks were then ranked and compared based on the risk scores. The risks were placed in a risk matrix to

illustrate the ranking and level of each risk, and allow the risks to be visually prioritised. The risk matrix is a particularly useful tool for tracking changes in risk levels over time. The level of management required for each risk is identified from the risk matrix.

Table 2 A. - RISK CLASSIFICATION TABLE

| Rating | Description | Likelihood of Occurance (%) | Severity | |
|--------|-------------|-----------------------------|-------------------------------|---|
| | | | Safety | Environment |
| 1 | Nil | 0% | No injury | No Effect |
| 2 | Very Low | 0-5% | First aid injury | Slight effect, temporary |
| 3 | Low | 5-10% | Medically treated injury | Minor effect, temporary |
| 4 | Medium | 10-20% | Lost time injury to 1 week | Local impact, recoverable losses |
| 5 | High | 20-50% | Lost time injury > 1 week | Major Impact, severe damage |
| 6 | Very High | >50 | Permanent Disability Fatality | Massive impact, severe long term damage |

Table 2.B - RISK RANKING

| Risk | Potential Failure Mode | Risk Score |
|------|---|------------|
| 2 | Vehicles and/or person accidents in the Civic amenity area | 20 |
| 12 | Drowning in Colligan River or Leachate Treatment Wetlands of staff or unauthorised member of public | 18 |
| 21 | Intrusion / Vandalism at flare compound | 18 |
| 18 | Leachate break out due to breach in capping | 16 |
| 8 | Off site migration of litter causing nuisance | 15 |
| 3 | Overfilling of storage containers in the Civic Amenity area | 12 |
| 5 | Member of public slipping/tripping in civic amenity area | 12 |
| 11 | H&S Accident during environmental monitoring | 12 |
| 13 | Human exposure to leachate and /or landfill gas during general maintenance | 12 |

| | | |
|----|--|----|
| 14 | Fire in the CA or landfill | 12 |
| 15 | Landfill gas migration off site and accumulation in structures | 12 |
| 17 | Degradation of capping | 12 |
| 20 | Escape of leachate from leachate storage tank to ground | 12 |
| 4 | Risk of hazardous material passing inspection and being accepted | 9 |
| 6 | Improper storage of permitted household hazardous waste | 9 |
| 7 | Escape of contaminated liquid from the Civic Amenity containment | 9 |
| 10 | Odours causing a nuisance | 9 |
| 1 | Improper handling of waste by staff and members of the public | 8 |
| 9 | Vermin carrying disease out of the landfill | 6 |
| 16 | Escape of gas to the atmosphere | 6 |
| 19 | Failure of leachate collection infrastructure leading to groundwater contamination | 6 |
| 22 | Dust causing a nuisance, blown off site | 6 |

2.B RISK MATRIX

The Risk Matrix has been developed to allow the risks to be easily displayed and prioritised. The severity and occurrence ratings are used in the matrix; with the level of severity forming the x-axis and the likelihood of occurrence forming the y-axis. This matrix will provide a visual tool for regular risk reviews since the success of mitigation can be easily identified. The risk matrix is displayed below. The risks have been colour coded in the matrix to provide a broad indication of the critical nature of each risk. The colour code is as follows:

- Red (deep red and light red) – These are considered to be high-level risks requiring priority attention. These risks have the potential to be catastrophic and as such should be addressed quickly.
- Amber / Yellow – These are medium-level risks requiring action, but are not as critical as a red coded risk.

□ Green (light and dark green) – These are lowest-level risks and indicate a need for continuing awareness and monitoring on a regular basis. Whilst they are currently low or minor risks, some have the potential to increase to medium or even high-level risks and must therefore be regularly monitored and if cost effective mitigation can be carried out to reduce the risk even further this should be pursued.

Risk Matrix – Current Risk Status

| | | | | | | | | |
|------------|---------|---|-----|-------|------------|--------|------|-------------------|
| | V. High | 6 | | | | | | |
| | High | 5 | | | 8 | 2 | | |
| Occurrence | Medium | 4 | | 1 | 3 | 18 | | |
| | Low | 3 | | | 4,6,7,10 | 5 | | 21,12 |
| | V.Low | 2 | | | 9,16,19,22 | | | 11,13,14,15,17,20 |
| | Nil | 1 | | | | | | |
| | | | 1 | 2 | 3 | 4 | 5 | 6 |
| | | | Nil | V.Low | Low | Medium | High | V.High |
| | | | | | Severity | | | |

The risk matrix indicates that there are three risks in the red zone that requires priority attention. Two risks are in the yellow/amber zone indicating that these risk requires action as soon as possible. All remaining risks are located in the green zone indicating a need for continuing awareness and monitoring on a regular basis.

2.C - DISCUSSION OF RISK LEVELS

The following risk lies in the red zone and require priority attention:

- Risk 2 - Vehicles and/or person accidents in the Civic amenity area*
- Risk 12 - Drowning in Colligan river or Leachate Treatment Wetlands of staff or unauthorised member of public*
- Risk 21 - Intrusion / Vandalism at flare compound*

The following risks lie in the amber / yellow zone and require attention as soon as possible:

- Risk 8 – Off site migration of litter causing nuisance*
- Risk 18 – Leachate break out due to breach in capping*

All remaining risks lie in the green zone. These risks require continuing awareness and monitoring on a regular basis. As these risks may have the potential to increase to yellow or red zone risks, additional risk management measures should be put in place to manage them at their current levels, or preferably to reduce them further, if required.

3.A - IDENTIFICATION AND ASSESSMENT OF MITIGATION ACTIONS

Risks requiring additional mitigation actions were identified in Section 2.C. These are comprised of three risks located in the red zone and two risks located in the amber / yellow zone. All remaining risks were found to be in the green zone.

Additional risk mitigation measures were identified for the three risks in the red zone, reducing the risk for one to green, one to yellow, and one remains unchanged at red, but a possible future mitigation was identified for the third (the risk level remains unchanged until monitoring indicates the mitigation is warranted). The three risks that are in the red zone are inherently risky, and thus procedures and monitoring is necessary on an ongoing basis. A review should be carried out regularly identifying any further opportunities to reduce these risks, and to ensure that the risk level does not increase.

One of the risks in the yellow zone have a certain level of risk by its nature, and the risk cannot be readily reduced as mitigation measures are already in place. These measures will reduce these risks to more acceptable levels. One yellow zone risk was reduced to a green risk by mitigation measures. Again, a review should be carried out regularly identifying any further opportunities to reduce these risks, and to ensure that the risk level does not increase. Since green zone risks may have the potential to increase to yellow or red zone risks, these risk mitigation measures should be implemented since they are considered cost-effective.

3.B - EFFECTIVENESS OF MITIGATION MEASURES IN RISK REDUCTION

The risk scores have been re-calculated on the basis that the additional mitigation measures are fully implemented. **Table 3.1** provides the revised risk scores after the implementation of the risk mitigation measures, and compares them to the current risk score. **Table 3.2** provides a revised risk matrix following the implementation of the risk mitigation measures.

Table 3.1 indicates that the risk scores for 4 of the risks are reduced by the implementation of the measures, whilst there would be no significant change to 18 of the risks. However, recommended mitigation measures have been proposed and assessed for 6 of the 18 risks which do not exhibit improved risk scores, and these measures should increase the robustness of the risk controls already in place.

In addition, the risk matrix indicates that two of red code risks have been reduced to a yellow/amber code risk, and one to green. One yellow/amber code risk has been reduced to a green zone risk, and one of the green code risks have moved to the lower green zone.

The recommended mitigation measures therefore show a real reduction in risk at the landfill and since they are considered cost-effective, should be implemented.

Table 3.1 – Proposed Risk Mitigation Measures

| Risk | Potential Failure Mode/Risk | Current Controls | Recommended Mitigation Measures | Current Risk Score | Revised Risk Score |
|-------------|---|--|--|---------------------------|---------------------------|
| 2 | Vehicles and/or person accidents in the Civic amenity area | Traffic Management Plan | Implement additional traffic management systems such as one way system and closure during skip lifts | 20 | 16 |
| 12 | Drowning in Colligan River or Leachate Treatment Wetlands of staff or unauthorised member of public | Partial Fence | Fencing around all leachate ponds and erection of additional life buoys | 18 | 12 |
| 21 | Intrusion / Vandalism at flare compound | Caretaking, Telemetry, Security Fence | Erection of Security Camera | 18 | 18 |
| 18 | Leachate break out due to breach in capping | SW/GW monitoring, visual monitoring | Current measures adequate | 16 | 16 |
| 8 | Off site migration of litter causing nuisance | Staff vigilance | Review current arrangements, increased litter collection, control | 15 | 12 |
| 3 | Overfilling of storage containers in the Civic Amenity area | Current CA procedures | Increased policing | 12 | 12 |
| 5 | Member of public slipping/tripping in civic amenity area | Current CA procedures | Extra awareness, extra signs, information, supervision | 12 | 12 |
| 11 | H&S Accident during environmental monitoring | Use experienced personnel | Current measures adequate | 12 | 12 |
| 13 | Human exposure to leachate and /or landfill gas during general maintenance | Use experienced personnel, training, documented procedures, inoculations | Current measures adequate | 12 | 12 |
| 14 | Fire in the CA or landfill | Emergency Response procedure, waste inspection procedure | Review CA procedures | 12 | 12 |
| 15 | Landfill gas migration off site and accumulation in structures | Gas extraction and flaring system installed | Current measures adequate | 12 | 12 |
| 17 | Degradation of capping | Monitoring | Current measures adequate | 12 | 12 |
| 20 | Escape of leachate from leachate storage tank to ground | Groundwater monitoring, caretaking, security fencing, overflow alarm | Erection of bund around tanks | 12 | 10 |

| | | | | | |
|-----------|--|---|--|----------|----------|
| | | | | | |
| 4 | Risk of hazardous material passing inspection and being accepted | Waste Inspection procedure, waste inspected at waste disposal area. If unsuitable remove waste to quarantine area | Current measures adequate | 9 | 9 |
| 6 | Improper storage of permitted household hazardous waste | Current CA procedures | Current measures adequate | 9 | 9 |
| 7 | Escape of contaminated liquid from the Civic Amenity containment | Design of containment system | Recording of emptying of containment system | 9 | 9 |
| 10 | Odours causing a nuisance | Landfill capped, gas extraction and flaring system installed | Current measures adequate | 9 | 9 |
| 1 | Improper handling of waste by staff and members of the public | Staff wear PPE, supervision on public site | Extra awareness, extra signs, information, supervision | 8 | 6 |
| 9 | Vermin carrying disease out of the landfill | Nuisance control procedures | Current measures adequate | 6 | 6 |
| 16 | Escape of gas to the atmosphere | Landfill capped, gas extraction and flaring system installed | Current measures adequate | 6 | 6 |
| 19 | Failure of leachate collection infrastructure leading to groundwater contamination | System monitoring and a back - up system | Current measures adequate | 6 | 6 |
| 22 | Dust causing a nuisance, blown off site | Cap prepared for natural colonisation | Current measures adequate | 6 | 6 |

Table 3.2 – Revised Risk matrix – Post Recommended Mitigation Measures

| | | | | | | | | |
|------------|---------|---|-----|-------|------------|--------|------|----------------|
| | V. High | 6 | | | | | | |
| | High | 5 | | | | | | |
| Occurrence | Medium | 4 | | 1 | 3,8 | 18,2 | | |
| | Low | 3 | | | 4,6,7,10 | 5,12 | | 21 |
| | V.Low | 2 | | | 9,16,19,22 | | 20 | 11,13,14,15,17 |
| | Nil | 1 | | | | | | |
| | | | 1 | 2 | 3 | 4 | 5 | 6 |
| | | | Nil | V.Low | Low | Medium | High | V.High |
| | | | | | Severity | | | |

Appendix M – Site Slope Stability Assessment

Dungarvan Landfill Slope Stability Assessment 2010

A slope stability assessment was carried out for the facility during the 2010 AER reporting period, Jan 1st 2010 – December 31st 2010, by the facility manager. It was noted that generally slope stability has not been affected by construction work undertaken in the course of the remediation process and construction of the leachate treatment wetlands on site. Works to augment slope stability during the construction phase are included below. Individual slopes referred to are outlined on the attached site plan.

1. Eastern Slope, north of Haul Road



A surface water drainage channel and channel for leachate pumping have been dug along the base of this slope and a pump/sump for dilution of leachate have also been installed along with gravel pathways to the sump pump and existing monitoring well. These works have not destabilised the slope in any way. Vegetation thereon is thriving.

2. Northern Slope on eastern end of landfill, adjacent to Colligan River



A section of river gabions providing bank protection at Dungarvan landfill collapsed in October 2008, caused by heavy construction traffic during capping works. Substantial works involving the replacement of 20m length of damaged gabions, approx 4m deep, strengthening the gabions structure by deepening the extent, and raising the gabions retaining to track level were subsequently carried out. The above photos illustrate the work. The works that were undertaken have proved to be successful as No slippage has taken place in the area since the works have been carried out.

3. Former Haul Road



Slopes along both sides of the former landfill haul road remain stable and vegetation is thriving thereon. This will be augmented during the next reporting period with suitable wild flowers.

4. Northern slope at western end of landfill



A channel which forms part of the leachate extraction system has been dug along the base of this slope. The channel has had No adverse effect on the stability of the slope. Vegetation in this area is thriving.

5. Northern facing slope on southern side of haul road



This is the largest slope on the landfill. The largest wetland pond in the leachate extraction system has been formed at the top of this slope. Despite this there is No sign of shrinkage or instability as a result of the works carried out in this area. Vegetation on this slope is strong.

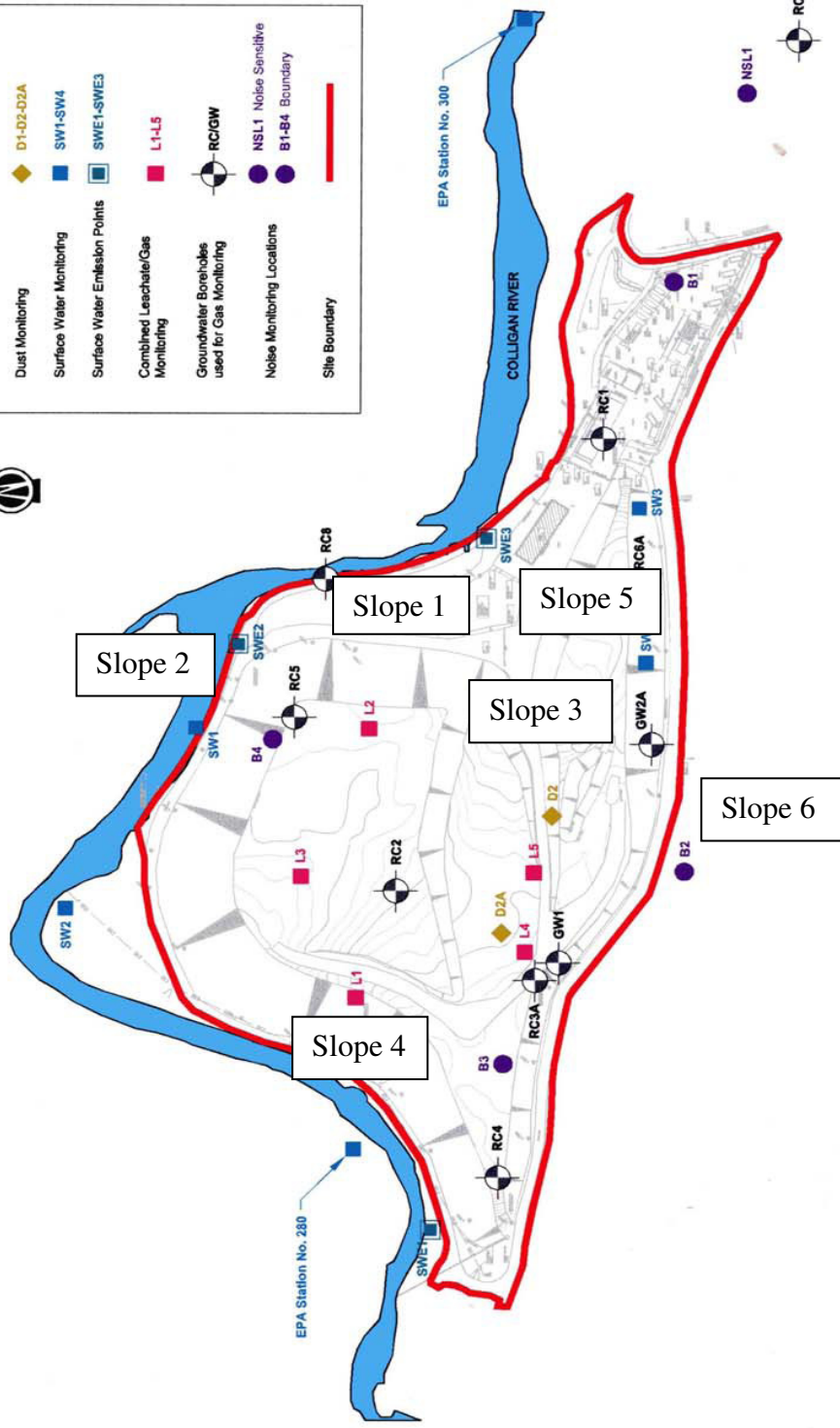
6. Southern Slope of Landfill



Generally there are No stability issues on this slope aside from a small area that needs attention in around monitoring points RC3A and GW1 where a gravel access path has been formed and has caused some instability. This will be addressed under the remediation contract and repair works in this area will be carried out by Waterford County Council staff.

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 Boundary: B1-B4
- Site Boundary: [Red Line]



NOTES

- The boundary shown is of the site.
- Not all monitoring locations are shown.
- Not all monitoring locations are shown.
- Not all monitoring locations are shown.

| | | | | | | | | | |
|---------|---|-------------|---------|--------------|---------|---------------|---------|-------------|-------------|
| Client | WATERBURY COUNTY COUNCIL Waste Management Department Waste Transfer Station | Drawn By | RS1 | Checked By | RS1 | Approved By | RS1 | Date | 07/2008 |
| Project | DUNDEWAN LANDFILL WASTE LICENCE APPLICATION | Drawn Date | 07/2008 | Checked Date | 07/2008 | Approved Date | 07/2008 | Scale | 1:2000 @ A3 |
| Map No. | MUR/0350/D30505 | Project No. | 0350 | Drawn By | RS1 | Checked By | RS1 | Approved By | RS1 |