

*Comhairle Contae Thiobraid Árann Thuaidh*  
**North Tipperary County Council**



**Ballaghveny Landfill  
Waste Licence Compliance**

**Annual Environmental Report 2008**

**June 2009**

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# Ballaghveny Landfill Licence Compliance W0078-02

## Annual Environmental Report 2008

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## EXECUTIVE SUMMARY

This is the eighth Annual Environmental Report (AER) produced for Ballaghveny Landfill Site, Ballymackey, Nenagh, Co. Tipperary and has been compiled in accordance with the requirements of Schedule G of Waste Licence W0078-02.

The purpose of the report is to summarise the interaction of the facility with the local environment. The AER includes where applicable the information specified in Schedule G of the Waste Licence and in accordance with the EPA publication Landfill Manuals as follows;

- Investigations for Landfills 1995,
- Landfill Monitoring, 2nd Ed 2004,
- Landfill Operational Practices 1997,
- Landfill Restoration and Aftercare 1999, and
- Landfill Site design 2001.

## 1 INTRODUCTION

Waste licence Register Number: W0078-02

### **Name of Operator, Name and Address of Facility:**

North Tipperary County Council,  
Ballaghveny Landfill Site,  
Ballymackey,  
Nenagh,  
Co. Tipperary.

### **Reporting Period**

The reporting period for the purposes of this AER is the 1<sup>st</sup> of January 2008 to 31<sup>st</sup> December 2008.

## Site Description

The site is located in a rural area, which is not heavily populated, and its surrounding lands consist of flat open fields screened by dense forestry. Agriculture is the principal land use in the vicinity of the landfill, with pig farming, horses and dairying as the main activities. Access to the site is generally from the Nenagh/Dublin N7 National Primary Route along rural roads.

The landfill site is located in the townlands of Ballaghveny and Woodville approximately 4km north of Toomevara and 11km north-east of Nenagh. The site is approximately 16.3ha in size and is situated on the eastern side of approximately 40ha of land owned by North Tipperary County Council (NTCC) which also includes Woodville House.

The original site, approximately 5.3ha in size, was purchased as a disused quarry by North Tipperary County Council (NTCC) following an investigation by An Foras Forbartha in 1985. A total of 5 No. Cells were developed and cells nos. 3-5 are lined. In 2000 NTCC bought Woodville house and associated lands to the west and north of the existing landfill.

Three additional lined cells, cells 6, 7 and 8 were developed and filled from September 2001 to June 2005. Cells 9, 10 and 11 were constructed in 2004/2005 and came into operation in June 2005.

## 2 WASTE ACTIVITIES AT THE FACILITY

The waste activities carried out at the facility include waste disposal and recover activities and are in accordance with the requirements of the licence (W0078-02).

Waste disposal activities carried out at the facility are in accordance with the third schedule (disposal) of the Waste Management Act, 1996 to 2005 as follows:

- Class 1. Deposit on, in or under land (including landfill),
- Class 2 Land treatment, including biodegradation of liquid or sludge discards in soils,
- Class 4 Surface impoundment, including placement of liquid or sludge discards into pits, ponds or lagoons,
- Class 5 Specially engineered landfill, including placement into lined discrete cells which are capped and isolated from one another and the environment,

- Class 11 Blending or mixture prior to submission to any activity referred to in a preceding paragraph of this Schedule,
- Class 12 Repackaging prior to submission to any activity referred to in a preceding paragraph of this Schedule, and
- Class 13 Storage prior to submission to any activity referred to in a preceding paragraph of this Schedule, other than temporary storage, pending collection, on the premises where the waste concerned is produced.

Waste recovery activities carried out at the facility are in accordance with the fourth schedule (recovery) of the Waste Management Act, 1996 to 2005 as follows:

- Class 2 Recycling or reclamation of organic substances, which are not used as solvents (including composting and other biological transformation processes),
- Class 3 Recycling or reclamation of metals and metal compounds,
- Class 4 Recycling or reclamation of other inorganic materials,
- Class 10 The treatment of any waste on land with a consequential benefit for an agricultural activity or ecological system,
- Class 11 Use of waste obtained from any activity referred to in a preceding paragraph of this Schedule, and
- Class 13 Storage of waste intended for submission to any activity referred to in a preceding paragraph of this Schedule, other than temporary storage, pending collection, on the premises where such waste is produced.

### **3 WASTE RECEIVED, DISPOSED AND RECOVERED IN 2008**

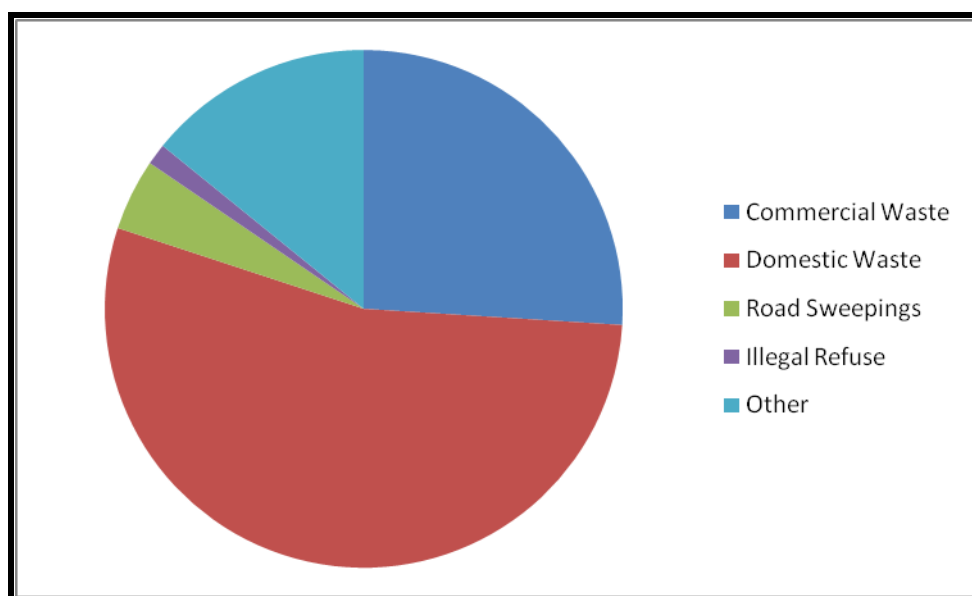
#### **3.1 WASTE ACCEPTED FOR DISPOSAL**

The total tonnage of material accepted for disposal at the Ballaghveny Landfill Site during the reporting period was 25,096 tonnes. **Table 3.1** illustrates the tonnage comparison with previous years.

**Table 3.1 Total Tonnage of Waste Landfilled at Ballaghveny Landfill Facility from 2001-2008**

| Year | Total Tonnage Accepted |
|------|------------------------|
| 2001 | 28,588                 |
| 2002 | 35,787                 |
| 2003 | 36,612                 |
| 2004 | 32,622                 |
| 2005 | 26,115                 |
| 2006 | 31,802                 |
| 2007 | 28,470                 |
| 2008 | 25,096                 |

A breakdown of the waste disposed of in 2008 at the facility is shown in **Figure 3.1**.



**Figure 3.1 Waste Types Accepted for Disposal at Ballaghveny Landfill Facility in 2008.**

### 3.2 WASTE ACCEPTED FOR RECYCLING

Ballaghveny Landfill constructed its new Civic Amenity site in March 2003. The construction of this facility allowed for the expansion of recycling services. The Facility now accepts the following materials for recycling;

- Scrap Metal,
- Plastic,

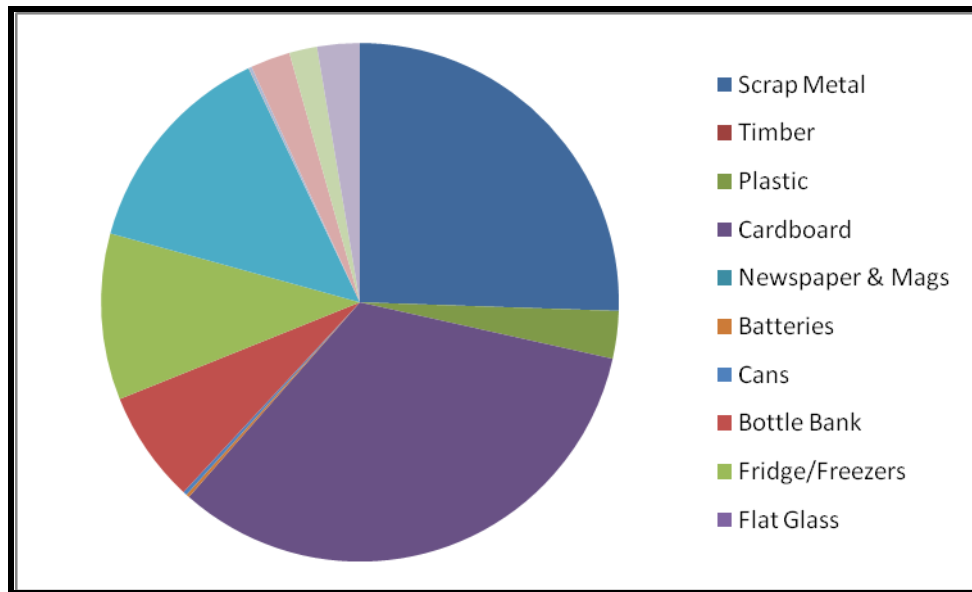
- Cardboard,
- Newspapers & Magazines,
- Batteries,
- Bottle Bank,
- Clothes Bank,
- Fridge/Freezers,
- WEEE,
- Flat Glass,
- Flourescent Bulbs,
- Gas Cylinders, and
- Christmas Trees.

In 2008 a total of 319 tonnes of materials were exported from the site for recycling.

**Table 3.3 Quantity of Waste Recycled at Ballaghveny Landfill Facility in 2008**

| Year | Total tonnage recycled at Ballaghveny Landfill |
|------|--|
| 2004 | 196  |
| 2005 | 287  |
| 2006 | 269  |
| 2007 | 287  |
| 2008 | 319  |

The breakdown for material types recycled in 2008 is shown in the **Figure 3.2**.



**Figure 3.2 Breakdown of Recycled Material at Ballaghveny Landfill Facility, 2008**

### 3.3 WASTE RECORDS

All waste materials accepted at the site are recorded on two separate documents - a computer printout of the waste accepted and a waste transfer document. The following details are recorded.

#### 3.3.1 Computer Printout

- Landfill name address and telephone number,
- Vehicle registration number,
- Contractor name (Customer / Supplier) Customer account number,
- Customer address,
- Date and time of waste delivery,
- European waste catalogue number for waste,
- Waste / product description,
- Waste / product code for site,
- Identification number of person who inspected the load,
- Accepted or rejected status,
- Weight entering site and weight of container leaving site,
- Net weight of waste accepted,
- Landfill charge,
- Weighbridge operators signature, and

- Driver's signature.

### 3.3.2 Waste transfer Docket

- Landfill name address and telephone number and waste licence number,
- Name and address of contractor who collected the waste,
- Contractors waste collection permit number,
- Premises that waste originated from,
- Odour characteristics,
- European waste catalogue number for waste,
- Net weight of waste accepted,
- Weighbridge operators signature, and
- Driver's signature.

## 4 REMAINING FACILITY CAPACITY

### Cell 9

The most recent topographical survey of the landfill was carried out in January 2009 (Appendix A). Based on this survey and the proposed final profile of the landfill, the remaining void space in Cell 9 at the end of January 2009 was approximately 32,000m<sup>3</sup>.

A compaction rate calculation was carried out in March 2009 and found the average waste compaction rate to be 0.76t/m<sup>3</sup> between May 2007 and January 2009. Applying this compaction rate to the remaining void space in Cell 9 of 32,000m<sup>3</sup>, the potential remaining waste intake in cell 9 is 24,200 tonnes approximately (from end January 2009).

### Cells 10 and 11

The remaining void space in Cells 10 and 11 (including wedge), based on the proposed final profile, is 217,003m<sup>3</sup>. This volume includes for back filling against Cell 9 and Cells 6-8 to form the final profile.

Based on the compaction rate of 0.76t/m<sup>3</sup> this remaining void space equates to approximately 165,000 tonnes of filling.

## 5 METHODS OF WASTE DEPOSITION

The waste is placed in lined discrete cells. The waste is deposited and compacted in a series of thin layers along a gently inclined surface in accordance with Condition 6.9 of licence W0078-02.

The average compaction rate for placed waste between May 2007 and January 2009 was 0.76 tonnes/m<sup>3</sup>.

## 6 SUMMARY REPORT OF EMISSIONS

The required monitoring programme at Ballaghveny Landfill Facility is specified in Schedule C of Waste Licence W0078-02. The environmental monitoring period for this AER is 1<sup>st</sup> January 2008 to 31<sup>st</sup> December 2008.

The following sections summarise the environmental monitoring undertaken at Ballaghveny Landfill Facility during the reporting period. Drawing DG0001-01 in **Appendix B** shows the location of all monitoring points. The results and analysis of this monitoring were submitted by North Tipperary County Council to the Agency in the form of four quarterly monitoring reports during 2008. These results are included in Appendix C.

### Leachate

Sampling and monitoring of leachate was completed at purpose installed leachate extraction wells (LM01 to LM08) and at the leachate lagoon on site. Some of these sampling points were analysed for a suit of chemical parameters and indicated that leachate composition taken from the inactive capped cells within the landfill is typical for older waste where the biological process is in decline. Samples taken at LM08 reflect values typical of a younger landfill where the biological processes are more active.

Leachate levels were also monitored and demonstrated that levels were elevated at LM04 and LM05 in January 2008, when compared to the remaining sampling points. However this level decreased to a more static level for the remainder of the year. Levels of leachate in the remaining sampling points did not fluctuate substantially throughout the year.

Overall the leachate composition, appearance and levels were typical for a landfill site of its nature.



## Surface Water

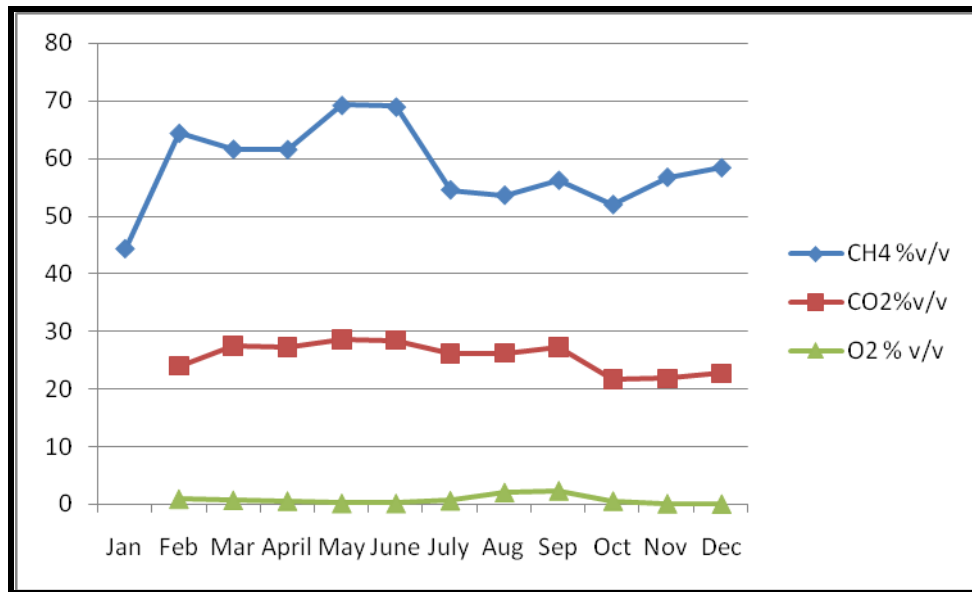
Five surface water sampling points were monitored throughout the year. These monitoring points were located on the Ballaghveny stream and the Ollatrim River. The sampling points are located upstream and downstream of the landfill facility. All samples were compared to limits as set out in the European Communities (quality of surface water intended for the abstraction of drinking water) Regulations, 1989 and the European Communities (quality of salmonid waters) Regulations, 1988. All parameters were within the required limits with the exception of slightly low levels of dissolved oxygen noted at SW1 in the third and fourth monitoring period and at SW4 in the fourth quarter. Both of these sampling points are upstream of the landfill facility. The surface water quality of the Ballaghveny Stream and the Ollatrim River remain satisfactory.

## Groundwater

Groundwater was monitored at six boreholes located in and around the landfill. The samples were compared to limits as set out in the European Communities (drinking water) Regulations, 2000. All samples were in compliance with the Regulations with the exception of ammonia levels which were consistently elevated at GW5 and GW9 and in the third quarter at BH3. It was noted that monitoring point GW5 is located north of the facility and groundwater flow is in a southerly direction. High levels of ammonia at this point can therefore be attributed to other activities in the area. Sampling points GW9 and BH3 are in close proximity to each other to the south east of the landfill and could be influenced by activities at the landfill. Close monitoring and analysis of ammonia levels at these two sampling points should continue to take place in the future.

## Landfill Gas

Landfill gas is monitored at six gas wells within the waste body and at 12 wells around the perimeter of the landfill. During 2008 levels of methane, carbon dioxide and oxygen were monitored. Levels of all of these parameters were within the requirements of the landfill licence (W0078-02) with only low levels of methane (0.10%v/v) detected at some of the perimeter wells in August, September and October. The average levels of these parameters recorded during 2008 within the waste body itself are presented in **Figure 6.1**.



**Figure 6.1 Average Composition of Gas in Waste Body During 2008**

### Odour

The level of nuisance odours for the reporting period was considered to be minimal and was mainly confined to areas surrounding the gas vents.

### Noise

ANV Technology completed a noise survey for the site in August 2008. No exceedance was detected on this date.

### Dust Monitoring

Dust monitoring was carried out at monitoring points DSP1-4 in the second, third and fourth quarter of 2008. The highest recorded dust concentrations in Q2 and Q4 were 294.4 (DSP2) and 188 mg/m<sup>2</sup>/day (DSP1) respectively, which were both below the 350 mg/m<sup>2</sup>/day limit. The highest recorded dust concentration in Q3 was 2,410.8 mg/m<sup>2</sup>/day (DSP 3), which exceeded the 350 mg/m<sup>2</sup>/day limit.

## 7 RESOURCE AND ENERGY CONSUMPTION SUMMARY

Resource and energy consumption at the facility can be summarised approximately as follows:

### **Diesel Fuel**

The landfill has a tractor, which used 3,444 litres of diesel in 2008. The only other diesel fuel that was used at Ballaghveny landfill during 2008 was in the mechanical plant used for the depositing and compaction of the waste in the cells and in the construction of the new cells. This plant was either on hire from private contractors or owned by the private contractors and subsequently is fuelled by the contractors. Therefore no record of this fuel is maintained at the site.

### **Electricity Consumption**

Ballaghveny Landfill now obtains electrical energy from Energia.

A total of 50,285 units of electricity were used at the site during 2008.

### **Water Consumption**

Water used on site is for two purposes. Water is imported onto the site from a nearby river and is sprinkled to prevent dust nuisances arising on site. Water used on site for drinking and washing purposes is sourced from a public water supply - approximately 1,579 m<sup>3</sup> of water were used for this purpose during the period under review.

### **Energy Audit**

An energy audit of the facility was completed in June 2008. The audit concluded that day time use of energy was for the majority used in running of the computers and lights and at night time most energy was used in the running of heaters. At the landfill itself, energy is consumed in three main ways; diesel from machinery, leachate pumps and the gas flare. A landfill energy efficiency action plan has been implemented at the facility.

## 8 LEACHATE

Condition 6.2 of Waste Licence W0078-02 deals with leachate management at the facility.

All leachate is pumped to the leachate storage lagoon to the north of Cells 6-8. The existing leachate lagoon has a capacity of 1,020m<sup>3</sup>. Allowing for a free board of 0.5m in accordance with the Waste Licence, the leachate storage capacity of the lagoon is 694m<sup>3</sup>.

Leachate is tankered from the lagoon to the Nenagh Waste Water Treatment Plant for treatment.

In 2008, 40,232 m<sup>3</sup> of leachate was collected at the site and treated at the WWTP in Nenagh. Every load of leachate transported was weighed and recorded. **Table 8.1** illustrates the volume comparison with previous years.

**Table 8.1 Leachate Volumes Removed from Ballaghveny Landfill Facility from 2001 to 2008**

| Year | Total Leachate Removed m <sup>3</sup> |
|------|---------------------------------------|
| 2001 | 6,210                                 |
| 2002 | 14,466                                |
| 2003 | 12,217                                |
| 2004 | 13,273                                |
| 2005 | 18,672                                |
| 2006 | 16,657                                |
| 2007 | 26,016                                |
| 2008 | 40,232                                |

### Leachate Levels

In accordance with condition 6.2 of waste licence W0078-02 leachate levels and freeboard in leachate storage are to be monitored continuously.

The leachate levels in the lagoon will be linked to a telemetry system, which was due to be installed in May 2009.

The telemetry system will monitor the following;

- Levels of landfill leachate in the leachate lagoon,
- Levels of leachate in up to 22 points in the landfill including leachate monitoring boreholes, gas monitoring wells and leachate pumping chambers,
- Levels and flow rates in each of three surface water lagoons, and
- Water quality analysis at the outlet at each of three of the surface water lagoons.

Additional monitoring to be included, but which is not specifically required in the waste license includes;

- Monitoring of leachate pumps at up to 6 leachate pumping chambers, and
- Monitoring of landfill gas flare.

A central monitoring station will be located at the landfill administration building control room.

## 9 DEVELOPMENT WORKS

**Table 9.1** lists the proposed landfill development works to be carried out during 2009.

**Table 9.1 Proposed Development Work for 2009**

| <b>Proposed Development Work for 2009</b>  | <b>Commencement and Duration</b>                 |
|--|--|
| SCADA telemetry system for leachate management                                       | Due to commence installation on site in May 2009 |
| Construction of Cell 10 intercell bund to split Cell 10 into Cell 10 A and Cell 10 B | Construction due to commence on site in May 2009 |
| Lining of Northern Slope of Cell 9 with gas drainage geocomposite and LLDPE liner.   | Construction due to commence on site in May 2009 |

## 10 RESTORATION OF COMPLETED CELLS

Cells 1-8 of the landfill have been capped and restored as per waste licence W0078-02.

It is estimated that filling of Cell 9 will be completed in late 2009. In May 2009, the northern slope of Cell 9 will be lined with gas drainage geocomposite and LLDPE liner. The remainder of Cell 9 will be capped following completion of filling later in 2009.

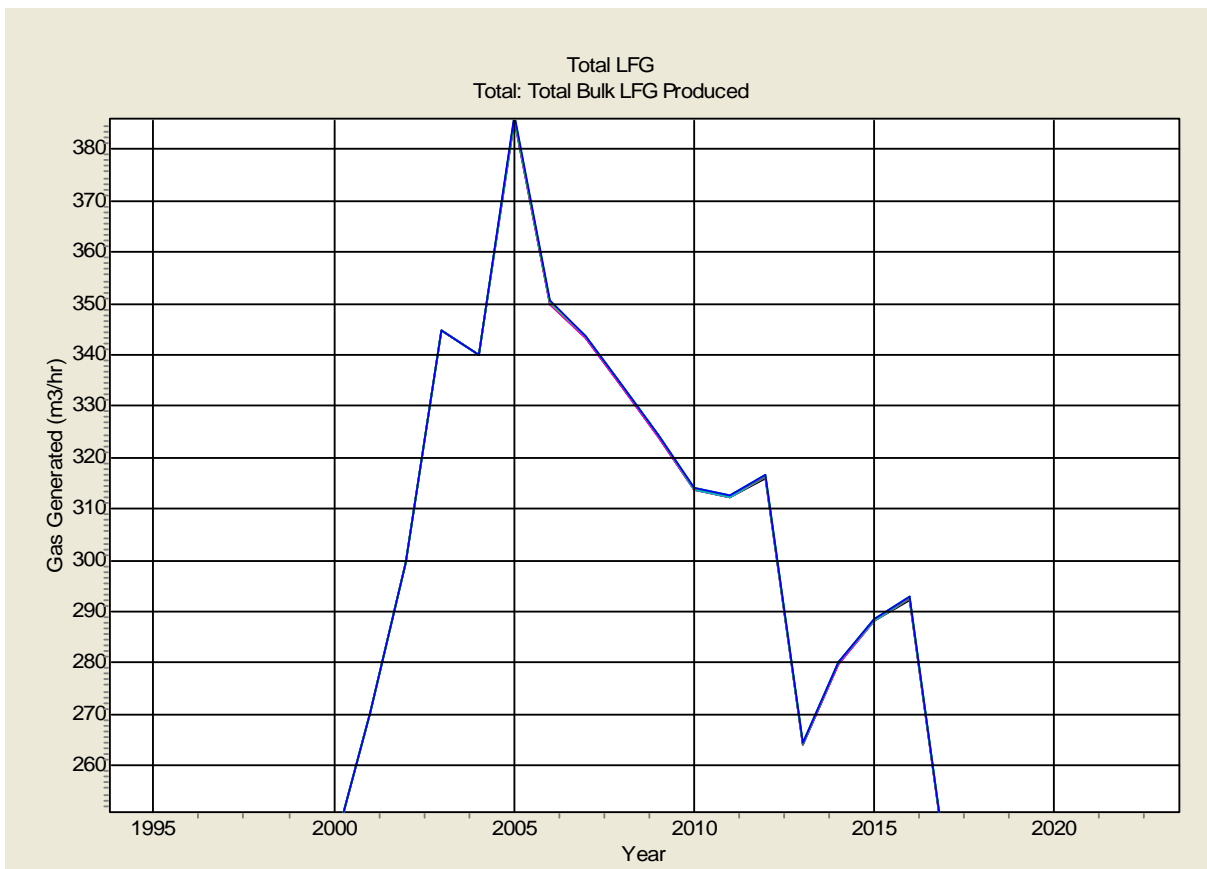
## 11 SITE SURVEY

**Appendix A** –Topographical Survey of Ballaghveny Landfill shows survey of the site which was carried out on 22<sup>nd</sup> January 2009.

## 12 LANDFILL GAS

### 12.1 GAS GENERATION ESTIMATES USING GASSIM

Landfill gas generation at Ballaghveny Landfill was modelled using GasSim Version 2.0. Total bulk landfill gas generated in 2008 was estimated to be 334m<sup>3</sup>/hr as shown in **Figure 12.1**. This equates to 2,925,840m<sup>3</sup> of landfill gas generated at the landfill in 2008 as estimated by GasSim.



**Figure 12.1 Total Bulk Landfill Gas Generation as Estimated Using GasSim.**

The projected gas generation rate for 2009 is 324m<sup>3</sup>/yr based on the GasSim Model.

### 12.2 GAS COLLECTION AND FLARING

The landfill gas flare which was originally installed in 2002 was recommissioned in June 2008. The flare has a maximum capacity of 500m<sup>3</sup>/hr. Landfill gas is collected in 8 no. vertical gas wells throughout the landfill and directed to the gas flare.

The flare was operational during 2008 for a total of 4,141 hours. The average gas flow through the flare was 100m<sup>3</sup>/hr. The volume of gas flared during 2008 was therefore approximately 41,415m<sup>3</sup>.

## 13 WATER BALANCE CALCUALTION

A revised water balance calculation was carried out in April 2009 in accordance with Section 7.2 of the EPA Manual Landfill Site Design. See **Appendix D** attached. The estimated leachate generation figure for 2008 was 36,224m<sup>3</sup>. As referred to in Section 8 above, the actual quantity of leachate tankered from the landfill in 2008 was 40,232m<sup>3</sup>.

## 14 PROCEDURES

A summary of procedures developed to date are outlined below. These procedures were drafted as part of the EMS development and implementation.

### **Awareness and Training Procedure**

This procedure ensures that all personnel are adequately trained for their work and are aware of the dangers and responsibilities of their work.

### **Communications Procedure**

This procedure is used to ensure that stakeholders have adequate access to the environmental performance of the facility, to address local community concerns, to demonstrate site management commitment to the environment, to inform landfill employees and contractors of relevant environmental management systems requirements and performance.

### **Corrective Action Procedure**

This procedure ensures that corrective action is taken to ensure all elements of the waste licence are fulfilled. This includes investigations, action plans, mitigation, preventative action, monitoring, documentation and training.



## **Emergency Response Procedure (ERP)**

An emergency is identified as a fire/explosion, damage to the integrity of the on-site leachate management system, spillage of leachate during transport or discharge at treatment works, migration of landfill gas or a person falling into the leachate lagoons. The emergency plan is linked into the major emergency plan for North Tipperary County Council. The control of operations under the ERP shall be the responsibility of the site manager. The site manager will assess the situation and if the situation is outside the capabilities of site staff, external emergency services will be contacted.

## **Environmental Incident Procedure**

This procedure relates to the action that would be taken in response to any adverse environmental incident. This includes investigations, evaluation of environmental damage, mitigation and reporting to the Agency.

## **Fire Control Procedure**

This outlines the procedures to be undertaken in the case of a fire and the methods by which fires will be controlled. It also outlines methods of fire prevention. The site manager will assess any fires on site and if the situation is outside the capabilities of site staff, external emergency services will be contacted.

## **Leachate Monitoring Procedure**

This procedure aims to prevent the uncontrolled discharge of leachate from the leachate lagoon and lined cells.

## **Leachate Handling Procedure**

This procedure outlines the correct method of transporting leachate to the appropriate treatment works so as to prevent leachate spillages.

## **Waste Acceptance Procedure**

This procedure was developed in accordance with the EPA Waste Acceptance Manual, 1997. All waste documentation from contractors is checked, North Tipperary County Council

currently use a waste transfer document. Waste is examined at the tip-head and is visually verified by trained staff. Members of the public who wish to dispose of waste must report to the site office and detail the type and quantity of waste for deposition. This is also visually verified. Wastes that are brought to the site and are rejected shall be returned to the contractor/member of the public or placed in the quarantine area and disposed of to a suitable facility.

### **Operation of the Facility in Adverse Wind Conditions**

This procedure was developed as part of condition 6.5 of licence W0078-02. It outlines how the site will run in adverse wind conditions. It relates to size of the tipping area, correct covering of material, perimeter fencing, extra litter pickers, wind speed and the proper presentation of waste by contractors and members of the public.

### **Vermin & Fly infestations Programme**

This programme was developed for the control, prevention and eradication of vermin and fly infestations. It includes measures to control, eradicate and prevent scavenging birds, rodents and flies.

## 15 ENVIRONMENTAL OBJECTIVES AND TARGETS

A number of objectives and targets were outlined for 2008 in the AER for 2007. **Table 15.1** shows the progress made on these objectives.

**Table 15.1 Status of Objectives and Targets for 2008**

| Objective and Targets  | Target date | Status             |
|--|-------------|--------------------|
| Installation of the SCADA telemetry system   | May 09      | Ongoing            |
| Complete the installation of the gas infrastructure and the commissioning of the gas flare | April 08    | Partially Complete |
| Expansion of the environmental procedures for the facility                                 | Continuous  | Ongoing            |

**Table 15.2 Schedule of Environmental Objectives and Targets for 2009**

| Objectives and Targets   | Target date |
|--|-------------|
| <b>Expansion of the Environmental Procedures for the Facility</b> - As part of the facilities Environmental Management Plan (EMP) implementation of existing procedures and development of new procedures will continue to take place. | Continuous  |
| <b>Provide Staff Training</b> - Training will be provided to all relevant environmental staff onsite. This will include details of the current Waste Licence and site safety and daily duties as they arise.                           | Continuous  |
| <b>Increase Recycling Figures</b> – The amount of waste that is currently being recycled at the facility should be maintained and where possible this figure should continue to increase on an annual basis.                           | Continuous  |
| <b>Installation of the SCADA telemetry system</b> – The SCADA system which will continuously monitor all the leachate levels on the site is to be installed in 2009.   | May 2009    |
| <b>Increase Landfill Gas Extraction</b> – This is to be achieved by extending the gas collection system to include the leachate extraction boreholes.  | Oct 09      |
| <b>Construct Intercell Bund Cell 10:</b> The area of cell 10 is to be effectively halved from its current area of 8,000m <sup>2</sup> to an area of 4,000 m <sup>2</sup> .   | May 2009    |
| <b>Line North Slope of Cell 9:</b> The northern slope of Cell 9 is being lined with LLDPE liner to allow for the commencement of filling in Cell 10a   | May 2009    |
| <b>Recertification of bunds:</b> Certification of the bunds was carried out in 2008 and will be carried out again for the reporting period to the end of 2010  | End 2010    |

## **16 TANK, PIPELINE AND BUND TESTING AND INSPECTION REPORT**

A diesel bund was constructed during 2003 and was certified by Mr. Philip McGrath B.E on the 10<sup>th</sup> June 2003. This bund was recertified on the 20<sup>th</sup> of June 2006 by Mr. Aidan Fahy of RPS. The bund is due for recertification in 2009.

## **17 INCIDENTS AND COMPLAINTS**

There were two complaints reported at the facility in 2008 and no reports of incidents. On the 15<sup>th</sup> January 2008 there was a complaint from Ms. Geraldine McNulty regarding litter on the local roads and on the 5<sup>th</sup> March 2008 Mr. J.J. Hogan made a complaint with regard to odour.

All complaints and incidents are responded to as soon as possible and recorded. Corrective action, if considered necessary, is recorded and reported to the Agency. Details of all incidents, responses and corrective actions are maintained and available for inspection on-site.

## **18 REVIEW OF NUISANCE CONTROL**

The site is inspected daily by the landfill manager and recorded in a weekly site inspection report book. Litter picking is carried out on a daily basis and daily and weekly inspection sheets are maintained at the site office as required. Litter netting, 5m in height, has been erected around all active cells. In addition to the site inspection the landfill manager carries out regular inspections in the area surrounding the facility and litter picking along roads leading to the landfill and surrounding fields is carried out as and when required.

Overhead CCTV cameras have been installed at the weighbridge to enable inspection of loads brought to the facility. The weighbridge operator inspects each load brought to the facility and ensures that they are covered with adequate netting.

In dry weather all haul roads are sprayed with water as and when required to mitigate airborne dust. A wheel wash has been installed at the facility through which all vehicles pass prior to leaving the facility.

The bird control programme includes completion of a daily log of activities, detailing the methods employed and the effectiveness of those methods on a particular day. This register is maintained at the site office. The vermin and fly control register is also maintained at the

site office. Both of these programmes have been very successful in controlling the activity of birds, vermin and flies at the facility.

## **19 FINANCIAL PROVISIONS, STAFFING & PUBLIC INFORMATION**

### **19.1 FINANCIAL PROVISION**

North Tipperary County Council has made the necessary provisions to ensure that there is adequate funding for the management, development and restoration of Ballaghveny Landfill Facility. An environmental liability risk assessment (ELRA) is currently being completed and this will further recommend the financial provision required for the facility.

### **19.2 STAFFING**

#### **Details of Management Structure**

- North Tipperary County Council has overall responsibility for management and operation of the Ballaghveny landfill facility,
- Senior Executive Officer Mr. Liam Bergin, has overall responsibility for the management of waste in North Tipperary,
- Executive Engineer. Seamus Deely, is responsible for the day to day implementation of the waste licence for Ballaghveny landfill,
- Executive Environmental Scientist/Landfill Manager: Olga Doyle, is responsible for the day-to-day management, monitoring and operation of the facility,
- Environmental Technician Mr. Sean Madigan, Environmental technician
- Site caretaker: Mr. Michael Haverty,
- Site general operatives: Mr. Tommy Collins, Mr. Ned Fitzpatrick and Mr. John Whyte
- Contractors: 2 machine drivers, and
- RPS Consulting engineers have been appointed to provide North Tipperary County Council with site engineering, infrastructure development and reporting assistance.

### **19.3 PUBLIC INFORMATION, MONITORING AND REPORTING REQUIREMENTS**

North Tipperary County Council submitted a Waste Licence Communications Programme to the Agency and this was approved by the Agency.

The following documentation may be viewed by the public at Ballaghveny Landfill, Ballymackey, Nenagh:

### **19.3.1 Public Information Documentation Index**

- Complaints Register,
- Weekly Inspection Reports,
- Corrective Action Procedure, and
- Training Records.

### **19.3.2 Environmental Monitoring Records**

- Monthly Landfill gas composition,
- Quarterly Surface water composition,
- Weekly Surface water visual & odour inspections,
- Weekly Leachate Levels,
- Quarterly Leachate composition,
- Quarterly Leachate visual & odour inspections,
- Monthly Groundwater levels,
- Quarterly Groundwater composition,
- Quarterly Groundwater visual & odour inspections,
- Quarterly report containing 5.1 to 5.9,
- Annual Biological Assessment of Ballaghveny Stream,
- Dust monitoring,
- Noise Monitoring,
- Ecological monitoring,
- Cover stockpile monitoring, and
- Meteorological monitoring.

### **19.3.3 Other Monitoring Activity**

- Accident/First Aid Report Form,
- Leachate Consignment Register,
- Fires Report,
- Waste Licence,
- EIS for Landfill Extension Report,
- Waste Acceptance/Rejection Records,

- AER (Annual Environmental Report),
- Environmental Management Programme,
- Management Structure,
- Licence Requirement Action Plan,
- Operational Procedures/ Forms,
- Document Control,
- Meetings with the Ballymackey Environmental Action Group,
- Calibration Register,
- Contingency plans,
- Waste Acceptance Procedures,
- Maintenance Register,
- Non-conformances,
- Incident Reports,
- Potential Fire Risk Assessment Report,
- Once off reports to EPA,
- Material Safety Data Sheets,
- Topographical Surveys,
- Integrity of tankers,
- Conditioning plan,
- Midlands waste management plan,
- Visitors Logbook,
- Plant Hire Logbook,
- Dust Control Logbook,
- Mud Control Logbook,
- Waste Recovery Logbook,
- Waste Inspection Logbook,
- Litter picking Logbook,
- Daily cover report Logbook,
- Fly-spraying Logbook,
- Bird Control Logs and Reports,
- Rodent baiting records, and
- Internal County Council monthly reports.

The internal county council monitoring reports include details on environmental monitoring, waste types and quantities, expenditure, labour, plant hire, white goods register, visitors

logbook, fly-spraying, dust and mud control, daily cover, weekly site inspection reports, daily cover, litter picking and complaints.

All copies of environmental data and prescribed reports obtained and prepared on behalf of the licensee are forwarded to the Agency. Copies of reports and correspondence are retained and available for inspection at Ballaghveny Landfill Facility.

## 20 ANNUAL BUDGET AND FACILITY RUNNING COSTS

### Revenue/Operational Codes 2008

|                                  |              |              |
|----------------------------------|--------------|--------------|
| Landfill Levy                    | Ref 05110010 | = €429,456   |
| Landfill Operational Costs       | Ref 05110011 | = €1,006,912 |
| Ballymackey Community Group fund | Ref 05111012 | = €30,000    |

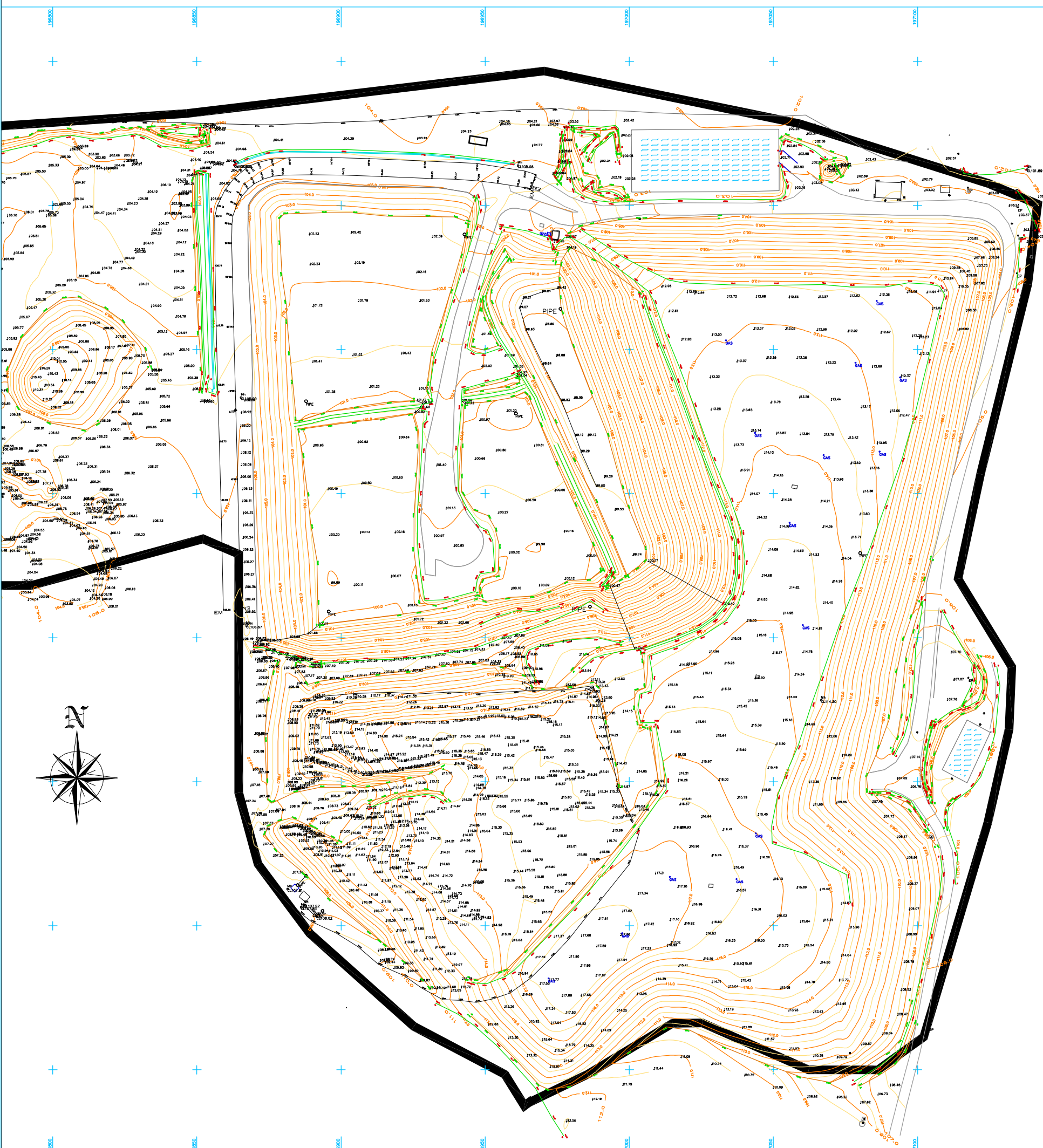
### Capital Costs for 2008

|                                  |              |                     |
|----------------------------------|--------------|---------------------|
| Cell Development                 | Ref 00511010 | = €36,835           |
| Cells 9-11                       | Ref 00511012 | = €422,603          |
| Capping Contracts Cells 1-5      | Ref 00511012 | = €107,277          |
| Capping Contracts Cells 6-8      | Ref 00511014 | = €1,217,297        |
| Telemetry Contract               | Ref 00511015 | = €13,115           |
| <b>Total Landfill Costs 2008</b> |              | <b>= €3,263,495</b> |



## **APPENDIX A**

### **Topographical Survey of Ballaghveny Landfill**



- Key:
- Road Gully
  - Manhole with Cover Level
  - Eriem Inspection Chamber
  - Telegraph Pole
  - Lamp Post
  - Water Meter
  - Valve
  - Fire Hydrant
  - ESB Meter Pillar
  - ESB Pole
  - Road Sign
  - Anamorph Junction
  - Manhole with Cover Level
  - Terrace - Concrete Terrace
  - Marsh Fencible
  - Rock Outcrop
  - Fence
  - TBM - Temporary Bench Mark
  - Tree

| REV | AMENDMENTS | DATE        |
|-----|------------|-------------|
| A   | 3d drawing | SA 30.01.09 |

Zenith Land Surveys

3 CANAL PLACE  
 THE BASH  
 KERRY, CO. KERRY

Email: [zenith@zenith.ie](mailto:zenith@zenith.ie)  
 Phone: (066) 7123366 Fax: (066) 7123558

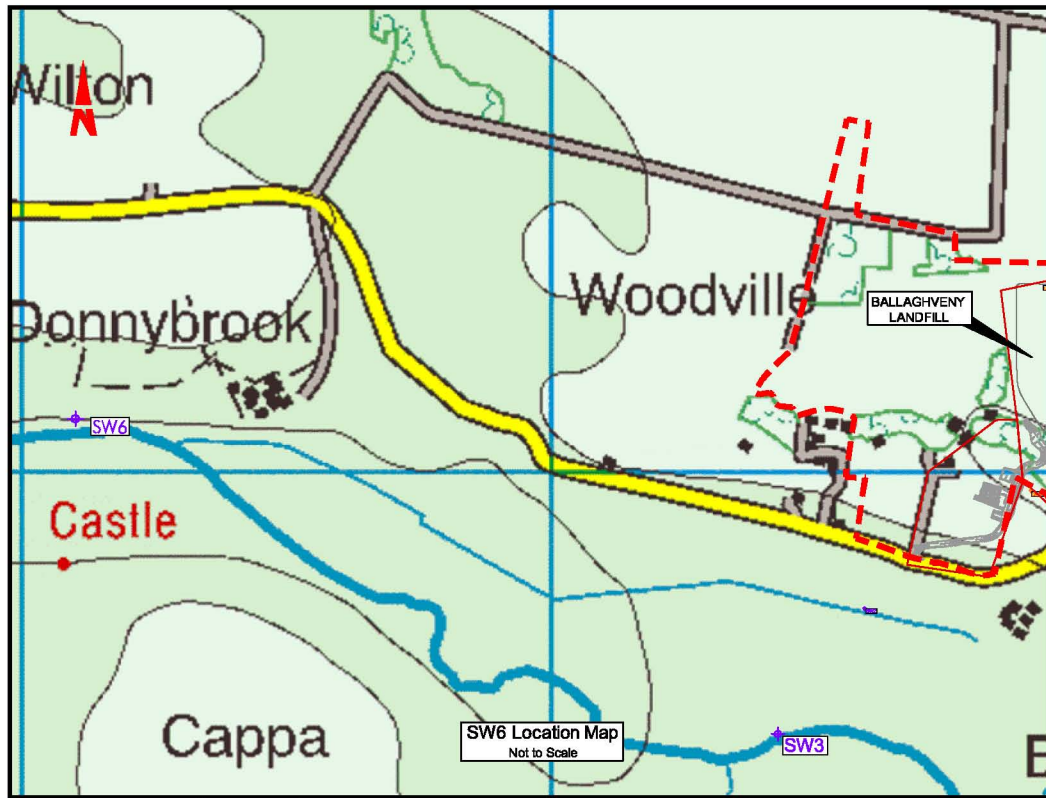
Tipperary County Council(North)

PROJECT: Ballaghveny Landfill,  
 Nenagh,  
 Co. Tipperary.  
 DRAWING: Topographical Survey  
 SURVEYED: 22.01.09 DATE: 28.01.09  
 REVISED: DRAWN: MC  
 ORIGINAL SCALE: 1:500 APPROVED: WM  
 DRAWING No. 09\_307\_A revA

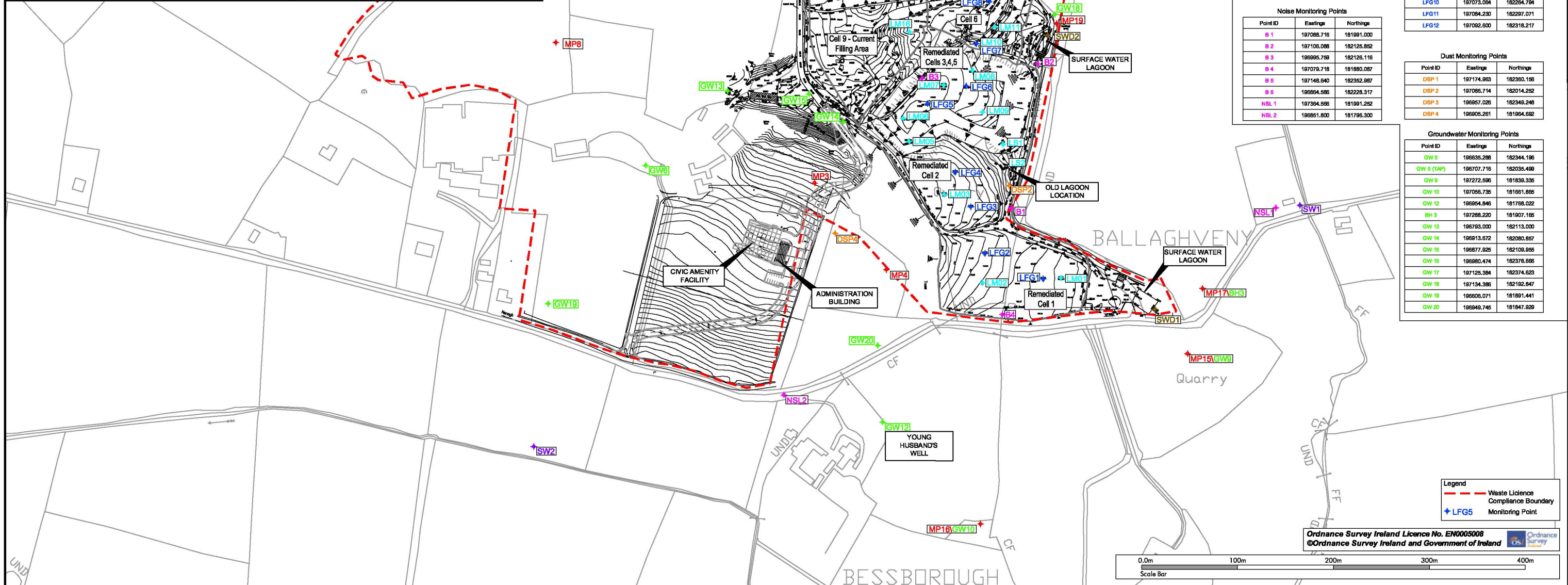
# **APPENDIX B**

**Drawing No. DG0001-F01**





SW6 Location Map  
Not to Scale



| Leachate Monitoring Points |            |            |
|----------------------------|------------|------------|
| Point ID                   | Eastings   | Northings  |
| LM 01                      | 197140.606 | 181918.180 |
| LM 02                      | 197068.815 | 181913.202 |
| LM 03                      | 197018.904 | 182005.404 |
| LM 04                      | 196982.327 | 182060.414 |
| LM 05                      | 196976.250 | 182084.636 |
| LM 07                      | 197018.508 | 182119.134 |
| LM 08                      | 197048.250 | 182134.378 |
| LM 09                      | 197059.000 | 182091.000 |
| LM 10                      | 197062.473 | 182162.200 |
| LM 11                      | 197071.896 | 182178.830 |
| LM 12                      | 197085.418 | 182231.103 |
| LM 13                      | 197048.619 | 182272.844 |
| LM 14                      | 197039.857 | 182304.767 |
| LM 15                      | 197099.720 | 182291.947 |
| LM 16                      | 196982.620 | 182174.608 |
| Leachate Lagoon            | 197007.896 | 182367.880 |

| Surface Water Monitoring Points |            |            |
|---------------------------------|------------|------------|
| Point ID                        | Eastings   | Northings  |
| SW 1                            | 197398.879 | 181993.919 |
| SW 2                            | 196991.153 | 181742.593 |
| SW 3                            | 196427.752 | 181505.857 |
| SW 4                            | 197263.542 | 182598.982 |
| SW 5                            | 196103.271 | 182100.086 |

| Leachate Sump Points |            |            |
|----------------------|------------|------------|
| Point ID             | Eastings   | Northings  |
| LS1                  | 197080.348 | 182057.682 |
| LS2                  | 197007.722 | 182357.133 |
| LS3                  | 196982.883 | 182317.597 |

| Emission Monitoring Points     |             |             |
|--------------------------------|-------------|-------------|
| Point ID                       | Eastings    | Northings   |
| Surface Water Discharge Points |             |             |
| SWD 1                          | 197238.6702 | 181885.7829 |
| SWD 2                          | 197126.8524 | 182171.2224 |
| SWD 3                          | 197150.421  | 182371.056  |
| Gas Flare                      |             |             |
| GF 1                           | 197092.129  | 182364.206  |

| Noise Monitoring Points |            |            |
|-------------------------|------------|------------|
| Point ID                | Eastings   | Northings  |
| B 1                     | 197088.716 | 181991.000 |
| B 2                     | 197106.098 | 182125.852 |
| B 3                     | 196995.759 | 182126.116 |
| B 4                     | 197079.718 | 181980.087 |
| B 5                     | 197148.840 | 182362.887 |
| B 6                     | 196984.596 | 182228.317 |
| NSL 1                   | 197364.696 | 181991.262 |
| NSL 2                   | 196851.800 | 181796.300 |

| Landfill Gas Monitoring Points (perimeter) |            |            |
|--|------------|------------|
| Point ID                                   | Eastings   | Northings  |
| MP 2                                       | 196997.353 | 182361.999 |
| MP 3                                       | 196883.794 | 182017.250 |
| MP 4                                       | 196958.702 | 181928.926 |
| MP 5                                       | 196635.288 | 182344.196 |
| MP 7                                       | 196645.947 | 182278.134 |
| MP 8                                       | 196614.041 | 182163.562 |
| MP 15                                      | 197272.596 | 181836.336 |
| MP 16                                      | 197056.735 | 181961.856 |
| MP 17                                      | 197288.220 | 181907.165 |
| MP 18                                      | 197145.173 | 182333.276 |
| MP 19                                      | 197136.189 | 182183.236 |

| Landfill Gas Monitoring Points (within waste) |            |            |
|---|------------|------------|
| Point ID                                      | Eastings   | Northings  |
| LFG 1   | 197122.133 | 181917.251 |
| LFG 2   | 197061.362 | 181943.791 |
| LFG 3   | 197046.657 | 181992.289 |
| LFG 4   | 197030.657 | 182028.620 |
| LFG 5   | 197001.763 | 182069.850 |
| LFG 6   | 197041.893 | 182118.244 |
| LFG 7   | 197052.473 | 182162.200 |
| LFG 8   | 197065.794 | 182206.110 |
| LFG 9   | 197061.609 | 182241.620 |
| LFG 10  | 197073.094 | 182294.794 |
| LFG 11  | 197084.230 | 182337.071 |
| LFG 12  | 197092.600 | 182378.217 |

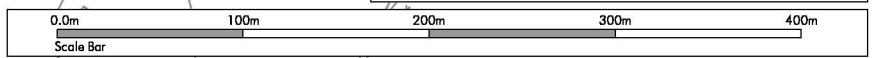
| Dust Monitoring Points |            |            |
|------------------------|------------|------------|
| Point ID               | Eastings   | Northings  |
| DSP 1                  | 197174.963 | 182360.156 |
| DSP 2                  | 197085.714 | 182014.252 |
| DSP 3                  | 196957.026 | 182349.248 |
| DSP 4                  | 196905.261 | 181964.692 |

| Groundwater Monitoring Points |            |            |
|-------------------------------|------------|------------|
| Point ID                      | Eastings   | Northings  |
| GW 6                          | 196635.288 | 182344.196 |
| GW 6 (TAP)                    | 196707.716 | 182035.499 |
| GW 8                          | 197272.596 | 181839.336 |
| GW 10                         | 197056.735 | 181961.856 |
| GW 12                         | 196984.646 | 181768.022 |
| GW 13                         | 197288.220 | 181907.165 |
| GW 14                         | 196793.000 | 182113.000 |
| GW 14                         | 196913.672 | 182080.857 |
| GW 15                         | 196877.826 | 182108.956 |
| GW 16                         | 196980.474 | 182378.606 |
| GW 17                         | 197125.394 | 182374.823 |
| GW 18                         | 197134.398 | 182192.847 |
| GW 19                         | 196606.071 | 181991.441 |
| GW 20                         | 196949.745 | 181847.929 |

Legend  
 --- Waste Licence Compliance Boundary  
 + LFG5 Monitoring Point

Ordnance Survey Ireland Licence No. EN0005008  
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**NOTES**

- This drawing is the property of RPS Consulting Engineers. It is a confidential document and must not be copied, used, or its content divulged without prior written consent.
- All Levels refer to Ordnance Survey Datum, Malin Head.
- DO NOT SCALE, use figured dimensions only, if in doubt ask.

| No. | Date     | Amendment / Issue | App. |
|-----|----------|-------------------|------|
| F01 | 28/05/08 | Final Issue       | D.C. |

|              |             |          |                 |
|--------------|-------------|----------|-----------------|
| Drawn by:    | J.O.B.      | Job No:  | 060504001       |
| Checked by:  | A.F.        | File No: | 060504007DG0001 |
| Approved by: | W.M.        | Drg. No: | DG0001-01       |
| Scale:       | 1:2000 @ A1 | Rev:     | F01             |
| Date:        | Apr. 2002   |          |                 |

## **APPENDIX C**

### **Results from Quarterly Monitoring Reports**

# **Appendix 1**

## **Leachate Composition**

---



Environmental Protection Agency  
An tSeirbhís Náisiúnta um an Grianóige agus an Aer

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

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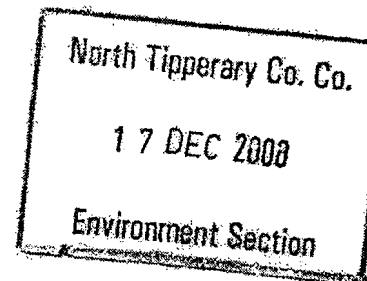
Report of: Analysis of landfill site sample(s)  
Report to: North Tipperary County Council  
Report date: 12/12/08

---

Facility: **Ballaghveny Landfill**  
Ballymackey, Co. Tipperary,  
Reference No: W0078-01

---

Date collected: 28/10/2008      Date received: 28/10/2008



|                           |         |        | Laboratory Ref:                | 2805637            | 2805638          | 2805639          | 2805640          | 2805641           | 2805642          |
|---------------------------|---------|--------|--------------------------------|--------------------|------------------|------------------|------------------|-------------------|------------------|
|                           |         |        | Type of sample:                | Leachate           | Leachate         | Leachate         | Leachate         | Leachate          | Leachate         |
|                           |         |        | Location code:                 | WST-W0078-01-LM1   | WST-W0078-01-LM3 | WST-W0078-01-LM5 | WST-W0078-01-LM7 | WST-W0078-01-LM8  | WST-W0078-01-LL2 |
|                           |         |        | Sampling point:                | Light brown colour | Amber colour     | Black colour     | Location Dry     | Dark brown colour | Black colour     |
|                           |         |        | Sampled by:                    | Jim McGarry        | Jim McGarry      | Jim McGarry      | Jim McGarry      | Jim McGarry       | Jim McGarry      |
|                           |         |        | Time Sampled:                  | 14:10              | 14:20            | 14:06            | 13:50            | 13:40             | 14:35            |
|                           |         |        | Start/End - Dates of Analysis: |                    |                  |                  |                  |                   |                  |
|                           |         |        | Status of results:             | Final Report       | Final Report     | Final Report     | Final Report     | Final Report      | Final Report     |
| Parameter                 | Units   | Limits |                                |                    |                  |                  |                  |                   |                  |
| F Temperature             | °C      |        | 13.0                           | 13.0               | 15.0             | -                | 25.0             | 10.0              |                  |
| Biochemical Oxygen Demand | mg/l O2 |        | 13.0                           | 44.0               | 84.0             | -                | 160.0            | 42.0              |                  |
| Chemical Oxygen Demand    | mg/l O2 |        | 323                            | 1239               | 1374             | -                | 4450             | 481               |                  |
|                           |         |        |                                |                    |                  |                  |                  |                   |                  |

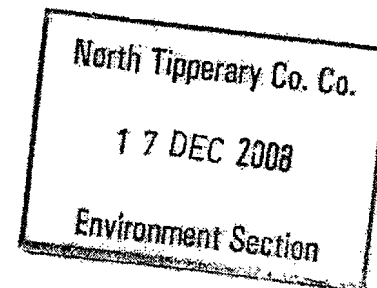
Comments:

- 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: *Jan Smith*

*Michael Neill*  
Michael Neill, Regional  
Chemist

Date: *12/12/08*





# **Appendix 2**

## **Leachate Levels**



## Leachate Extraction & Monitoring Points as per DG0152-02

Ballaghveny Landfill

Waste Licence 0078-02

October-08

|                           |                                |   |                                  |
|---------------------------|--------------------------------|---|----------------------------------|
| <b>Site Name :</b>        | <b>Operator :</b>              | <b>Site Address :</b>                           | <b>National Grid Reference :</b> |
| Ballaghveny Landfill Site | North Tipperary County Council | Ballaghveny, Ballymackey, Nenagh, Co. Tipperary | 197040.85E, 182012.11N           |

**Instrument used :**

Geotechnical Instruments EA 450/010 Borehole Dipper

**Sampling Points: Leachate Lagoon**

LM01, LM02, LM03, LM04, LM05, LM06, LM07, LM08, LM09,

**Monitoring Personnel:**

Sean Madigan (Site Technician)

### RESULTS

| Date | Time | Site Status | Weather | Leachate Levels Monitoring Point | Leachate Monitoring Total Borehole depth (in Meters) | Depth at which Leachate reached (in meters) | Height of Leachate (in Meters) |
|------|------|-------------|---------|----------------------------------|--|---|--------------------------------|
|------|------|-------------|---------|----------------------------------|--|---|--------------------------------|

|           |       |      |  |                 |       |      |      |
|-----------|-------|------|--|-----------------|-------|------|------|
| 14-Oct-08 | 11:00 | Open | overcast   | Leachate Lagoon |       |      |      |
|           |       |      |  | LM1             | 10.00 | 7.85 | 2.85 |
|           |       |      |  | LM2             | 11.80 | 8.40 | 2.50 |
|           |       |      |  | LM3             | 12.80 | 9.60 | 2.70 |
|           |       |      |  | LM4             | 11.30 | 8.90 | 2.40 |
|           |       |      |  | LM5             | 11.20 | 8.70 | 2.60 |
|           |       |      | Monitoring points sealed as part of Gas collection network | LM6             | 10.60 |      |      |
|           |       |      |  | LM7             | 11.50 |      |      |
|           |       |      |  | LM8             | 13.00 |      |      |
|           |       |      |  | LM9             | 13.00 |      |      |

|           |       |      |  |                 |       |      |      |
|-----------|-------|------|--|-----------------|-------|------|------|
| 16-Oct-08 | 11:00 | Open | overcast   | Leachate Lagoon |       |      |      |
|           |       |      |  | LM1             | 10.00 | 7.85 | 2.85 |
|           |       |      |  | LM2             | 11.80 | 8.60 | 2.40 |
|           |       |      |  | LM3             | 12.80 | 9.60 | 2.70 |
|           |       |      |  | LM4             | 11.30 | 8.80 | 2.40 |
|           |       |      |  | LM5             | 11.20 | 8.70 | 2.60 |
|           |       |      | Monitoring points sealed as part of Gas collection network | LM6             | 10.60 |      |      |
|           |       |      |  | LM7             | 11.50 |      |      |
|           |       |      |  | LM8             | 13.00 |      |      |
|           |       |      |  | LM9             | 13.00 |      |      |

|           |       |      |  |                 |       |      |      |
|-----------|-------|------|--|-----------------|-------|------|------|
| 22-Oct-08 | 11:00 | Open | dry overcast   | Leachate Lagoon |       |      |      |
|           |       |      |  | LM1             | 10.00 | 7.80 | 2.80 |
|           |       |      |  | LM2             | 11.80 | 8.50 | 2.40 |
|           |       |      |  | LM3             | 12.80 | 9.70 | 2.60 |
|           |       |      |  | LM4             | 11.30 | 8.80 | 2.40 |
|           |       |      |  | LM5             | 11.20 | 8.80 | 2.40 |
|           |       |      | Monitoring points sealed as part of Gas collection network | LM6             | 10.60 |      |      |
|           |       |      |  | LM7             | 11.50 |      |      |
|           |       |      |  | LM8             | 13.00 |      |      |
|           |       |      |  | LM9             | 13.00 |      |      |

|           |       |      |  |                 |       |      |      |
|-----------|-------|------|--|-----------------|-------|------|------|
| 29-Oct-08 | 11:00 | Open | cold/windy   | Leachate Lagoon |       |      |      |
|           |       |      |  | LM1             | 10.00 | 7.15 | 2.85 |
|           |       |      |  | LM2             | 11.80 | 8.50 | 2.40 |
|           |       |      |  | LM3             | 12.80 | 9.75 | 2.55 |
|           |       |      |  | LM4             | 11.30 | 8.80 | 2.40 |
|           |       |      |  | LM5             | 11.20 | 8.85 | 2.35 |
|           |       |      | Monitoring points sealed as part of Gas collection network | LM6             | 10.60 |      |      |
|           |       |      |  | LM7             | 11.50 |      |      |
|           |       |      |  | LM8             | 13.00 |      |      |
|           |       |      |  | LM9             | 13.00 |      |      |

**Leachate Extraction & Monitoring Points as per DG0152-02**

**Ballaghveny Landfill**      **Waste Licence 0078-02**

**November-08**

|                           |                                |   |                                  |
|---------------------------|--------------------------------|---|----------------------------------|
| <b>Site Name :</b>        | <b>Operator :</b>              | <b>Site Address :</b>                           | <b>National Grid Reference :</b> |
| Ballaghveny Landfill Site | North Tipperary County Council | Ballaghveny, Ballymackey, Nenagh, Co. Tipperary | 197040.85E, 182012.11N           |

**Instrument used :**  
Geotechnical Instruments EA 450/010 Borehole Dipper

**Sampling Points: Leachate Lagoon**  
LM01, LM02, LM03, LM04, LM05, LM06, LM07, LM08, LM09.

**Monitoring Personnel:**  
John White

**RESULTS**

| Date      | Time  | Site Status | Weather    | Leachate Levels Monitoring Point | Leachate Monitoring Total Borehole depth (in Meters) | Depth at which Leachate reached (in meters) | Height of Leachate (in Meters) |
|-----------|-------|-------------|------------|----------------------------------|--|---|--------------------------------|
| 18-Nov-08 | 11:00 | Open        | overcast   | Leachate Lagoon                  |  |   |                                |
|           |       |             |            | LM1                              | 10.00  | 17.05                                       | 2.95                           |
|           |       |             |            | LM2                              | 11.00  | 19.40                                       | 2.50                           |
|           |       |             |            | LM3                              | 12.30  | 23.50                                       | 2.50                           |
|           |       |             |            | LM4                              | 11.30  | 18.95                                       | 2.45                           |
|           |       |             |            | LM5                              | 11.20  | 18.70                                       | 2.50                           |
|           |       |             |            | LM6                              | 13.30  | 15.50                                       | 2.50                           |
|           |       |             |            | LM7                              | 14.50  | 15.50                                       | 2.50                           |
|           |       |             |            | LM8                              | 15.30  | 15.50                                       | 2.50                           |
| LM9       | 14.00 | 15.50       | 2.50       |                                  |  |   |                                |
| 19-Nov-08 | 11:00 | Open        |            | Leachate Lagoon                  |  |   |                                |
|           |       |             |            | LM1                              | 10.00  | 17.10                                       | 2.90                           |
|           |       |             |            | LM2                              | 11.00  | 19.50                                       | 2.40                           |
|           |       |             |            | LM3                              | 12.30  | 23.60                                       | 2.50                           |
|           |       |             |            | LM4                              | 11.30  | 19.00                                       | 2.50                           |
|           |       |             |            | LM5                              | 11.20  | 18.70                                       | 2.50                           |
|           |       |             |            | LM6                              | 13.30  | 15.50                                       | 2.50                           |
|           |       |             |            | LM7                              | 14.50  | 15.50                                       | 2.50                           |
|           |       |             |            | LM8                              | 15.30  | 15.50                                       | 2.50                           |
| LM9       | 14.00 | 15.50       | 2.50       |                                  |  |   |                                |
| 20-Nov-08 | 11:00 | Open        |            | Leachate Lagoon                  |  |   |                                |
|           |       |             |            | LM1                              | 10.00  | 17.20                                       | 2.80                           |
|           |       |             |            | LM2                              | 11.00  | 19.60                                       | 2.40                           |
|           |       |             |            | LM3                              | 12.30  | 23.70                                       | 2.50                           |
|           |       |             |            | LM4                              | 11.30  | 19.10                                       | 2.50                           |
|           |       |             |            | LM5                              | 11.20  | 18.80                                       | 2.50                           |
|           |       |             |            | LM6                              | 13.30  | 15.50                                       | 2.50                           |
|           |       |             |            | LM7                              | 14.50  | 15.50                                       | 2.50                           |
|           |       |             |            | LM8                              | 15.30  | 15.50                                       | 2.50                           |
| LM9       | 14.00 | 15.50       | 2.50       |                                  |  |   |                                |
| 27-Nov-08 | 11:00 | Open        | cold/windy | Leachate Lagoon                  |  |   |                                |
|           |       |             |            | LM1                              | 10.00  | 17.10                                       | 2.90                           |
|           |       |             |            | LM2                              | 11.00  | 19.50                                       | 2.40                           |
|           |       |             |            | LM3                              | 12.30  | 23.60                                       | 2.50                           |
|           |       |             |            | LM4                              | 11.30  | 19.00                                       | 2.50                           |
|           |       |             |            | LM5                              | 11.20  | 18.70                                       | 2.50                           |
|           |       |             |            | LM6                              | 13.30  | 15.50                                       | 2.50                           |
|           |       |             |            | LM7                              | 14.50  | 15.50                                       | 2.50                           |
|           |       |             |            | LM8                              | 15.30  | 15.50                                       | 2.50                           |
| LM9       | 14.00 | 15.50       | 2.50       |                                  |  |   |                                |

## Leachate Extraction & Monitoring Points as per DG0152-02

Ballaghveny Landfill Waste Licence 0078-02

December-08

|                           |                                |   |                                  |
|---------------------------|--------------------------------|---|----------------------------------|
| <b>Site Name :</b>        | <b>Operator :</b>              | <b>Site Address :</b>                           | <b>National Grid Reference :</b> |
| Ballaghveny Landfill Site | North Tipperary County Council | Ballaghveny, Ballymackey, Nenagh, Co. Tipperary | 197040.85E, 182012.11N           |

**Instrument used :**  
Geotechnical Instruments EA 450/010 Borehole Dipper

**Sampling Points: Leachate Lagoon**  
LM01, LM02, LM03, LM04, LM05, LM06, LM07, LM08, LM09

**Monitoring Personnel:**  
John White

### RESULTS

| Date | Time | Site Status | Weather | Leachate Levels Monitoring Point | Leachate Monitoring Total Borehole depth (in Meters) | Depth at which Leachate reached (in meters) | Height of Leachate (in Meters) |
|------|------|-------------|---------|----------------------------------|--|---|--------------------------------|
|------|------|-------------|---------|----------------------------------|--|---|--------------------------------|

|           |       |      |          |  |       |       |      |
|-----------|-------|------|----------|--|-------|-------|------|
| 17-Dec-08 | 11:00 | Open | Overcast | Leachate Lagoon  |       |       |      |
|           |       |      |          | LM1  | 10.00 | 7.40  | 2.60 |
|           |       |      |          | LM2  | 11.00 | 9.40  | 1.60 |
|           |       |      |          | LM3  | 12.50 | 9.40  | 3.10 |
|           |       |      |          | LM4  | 11.50 | 8.80  | 2.70 |
|           |       |      |          | LM5  | 14.20 | 8.70  | 5.50 |
|           |       |      |          | Monitoring points sealed as part of Gas collection network | LM6   | 13.60 |      |
|           |       |      |          |  | LM7   | 14.50 |      |
|           |       |      |          |  | LM8   | 13.30 |      |
|           |       |      |          |  | LM9   | 13.00 |      |

|           |       |      |  |  |       |       |      |
|-----------|-------|------|--|--|-------|-------|------|
| 17-Dec-08 | 11:00 | Open |  | Leachate Lagoon  |       |       |      |
|           |       |      |  | LM1  | 10.00 | 7.20  | 2.80 |
|           |       |      |  | LM2  | 11.00 | 9.50  | 1.50 |
|           |       |      |  | LM3  | 12.20 | 9.50  | 2.70 |
|           |       |      |  | LM4  | 11.50 | 8.85  | 2.65 |
|           |       |      |  | LM5  | 14.20 | 8.70  | 5.50 |
|           |       |      |  | Monitoring points sealed as part of Gas collection network | LM6   | 13.60 |      |
|           |       |      |  |  | LM7   | 14.50 |      |
|           |       |      |  |  | LM8   | 13.00 |      |
|           |       |      |  |  | LM9   | 13.00 |      |

|           |       |      |  |  |       |       |      |
|-----------|-------|------|--|--|-------|-------|------|
| 19-Dec-08 | 11:00 | Open |  | Leachate Lagoon  |       |       |      |
|           |       |      |  | LM1  | 10.00 | 7.10  | 2.90 |
|           |       |      |  | LM2  | 11.00 | 9.50  | 1.50 |
|           |       |      |  | LM3  | 12.30 | 9.50  | 2.80 |
|           |       |      |  | LM4  | 11.50 | 8.80  | 2.70 |
|           |       |      |  | LM5  | 14.20 | 8.70  | 5.50 |
|           |       |      |  | Monitoring points sealed as part of Gas collection network | LM6   | 13.60 |      |
|           |       |      |  |  | LM7   | 14.50 |      |
|           |       |      |  |  | LM8   | 13.30 |      |
|           |       |      |  |  | LM9   | 13.00 |      |

|           |       |      |            |  |       |       |      |
|-----------|-------|------|------------|--|-------|-------|------|
| 19-Dec-08 | 11:00 | Open | cold windy | Leachate Lagoon  |       |       |      |
|           |       |      |            | LM1  | 10.00 | 7.40  | 2.60 |
|           |       |      |            | LM2  | 11.00 | 9.50  | 1.50 |
|           |       |      |            | LM3  | 12.50 | 9.50  | 3.00 |
|           |       |      |            | LM4  | 11.50 | 8.80  | 2.70 |
|           |       |      |            | LM5  | 14.20 | 8.70  | 5.50 |
|           |       |      |            | Monitoring points sealed as part of Gas collection network | LM6   | 13.60 |      |
|           |       |      |            |  | LM7   | 14.50 |      |
|           |       |      |            |  | LM8   | 13.30 |      |
|           |       |      |            |  | LM9   | 13.00 |      |

## **Appendix 3**

# **Leachate Visual Inspection**



Environmental Protection Agency  
An tAidmheannaíocht um an Gníomhaireacht

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

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

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Facility: **Ballaghveny Landfill**  
Ballymackey, Co. Tipperary,  
Reference No: W0078-01

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Date collected: 28/10/2008      Date received: 28/10/2008

North Tipperary Co. Co.  
17 DEC 2008  
Environment Section

|                           |         |        | Laboratory Ref:                | 2805637            | 2805638          | 2805639          | 2805640          | 2805641           | 2805642          |  |
|---------------------------|---------|--------|--------------------------------|--------------------|------------------|------------------|------------------|-------------------|------------------|--|
|                           |         |        | Type of sample:                | Leachate           | Leachate         | Leachate         | Leachate         | Leachate          | Leachate         |  |
|                           |         |        | Location code:                 | WST-W0078-01-LM1   | WST-W0078-01-LM3 | WST-W0078-01-LM5 | WST-W0078-01-LM7 | WST-W0078-01-LM8  | WST-W0078-01-LL2 |  |
|                           |         |        | Sampling point:                | Light brown colour | Amber colour     | Black colour     | Location Dry     | Dark brown colour | Black colour     |  |
|                           |         |        | Sampled by:                    | Jim McGarry        | Jim McGarry      | Jim McGarry      | Jim McGarry      | Jim McGarry       | Jim McGarry      |  |
|                           |         |        | Time Sampled:                  | 14:10              | 14:20            | 14:06            | 13:50            | 13:40             | 14:35            |  |
|                           |         |        | Start/End - Dates of Analysis: |                    |                  |                  |                  |                   |                  |  |
|                           |         |        | Status of results:             | Final Report       | Final Report     | Final Report     | Final Report     | Final Report      | Final Report     |  |
| Parameter                 | Units   | Limits |                                |                    |                  |                  |                  |                   |                  |  |
| F Temperature             | °C      |        | 13.0                           | 13.0               | 15.0             | -                | 25.0             | 10.0              |                  |  |
| Biochemical Oxygen Demand | mg/l O2 |        | 13.0                           | 44.0               | 84.0             | -                | 160.0            | 42.0              |                  |  |
| Chemical Oxygen Demand    | mg/l O2 |        | 323                            | 1239               | 1374             | -                | 4450             | 481               |                  |  |
|                           |         |        |                                |                    |                  |                  |                  |                   |                  |  |

Comments:

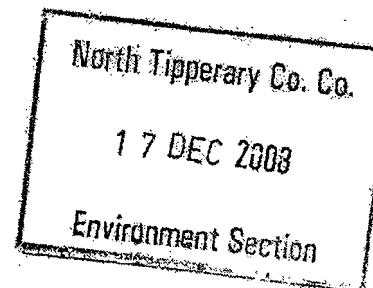
- 1) Results highlighted and in bold are outside specified limits.
- 2) All Metals Analysed in the EPA, Dublin Laboratory.  
Cyanide Analysed in the EPA Cork Laboratory.  
Phenols Analysed in the EPA Castlebar Laboratory.
- 3) nm "Not measured"
- 4) nd "None detected"
- 5) nt "No time" - Time not recorded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

Signed:

*Michael Neill*  
Michael Neill, Regional  
Chemist

Date:

*12/17/03*



# **Appendix 4**

## **Surface water composition**





Environmental Protection Agency  
An tAidmheiríocht um Chaomnú Comhshionann

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

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

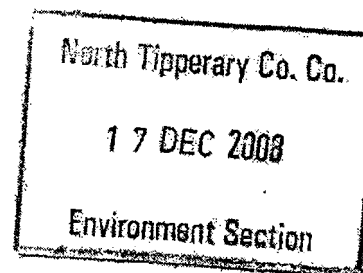
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Facility: **Ballaghveny Landfill**  
Ballymackey, Co. Tipperary,

Reference No: W0078-01

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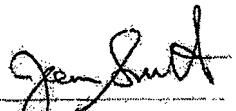
Date collected: 28/10/2008      Date received: 28/10/2008



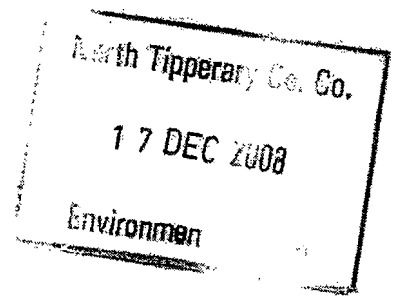
|                              |              |        | Laboratory Ref:                | 2805631          | 2805632          | 2805633                     | 2805634          |
|------------------------------|--------------|--------|--------------------------------|------------------|------------------|-----------------------------|------------------|
|                              |              |        | Type of sample:                | Surface Water    | Surface Water    | Surface Water               | Surface Water    |
|                              |              |        | Location code:                 | WST-W0078-01-SW2 | WST-W0078-01-SW3 | WST-W0078-01-SWD            | WST-W0078-01-SW6 |
|                              |              |        | Sampling point:                | Clear sample     | Clear sample     | No sample - not discharging |                  |
|                              |              |        | Sampled by:                    | Jim McGarry      | Jim McGarry      | Jim McGarry                 | Jim McGarry      |
|                              |              |        | Time Sampled:                  | 15:23            | 15:35            | 14:24                       | 14:54            |
|                              |              |        | Start/End - Dates of Analysis: |                  |                  |                             |                  |
|                              |              |        | Status of results:             | Final Report     | Final Report     | Final Report                | Final Report     |
| Parameter                    | Units        | Limits |                                |                  |                  |                             |                  |
| F Temperature                | °C           |        | 9.1                            | 8.4              | -                | 8.6                         |                  |
| F Dissolved Oxygen (as %Sat) | % Saturation |        | 76.0                           | 98.0             | -                | 98.0                        |                  |
| pH                           | pH           |        | 7.5                            | 7.9              | -                | 7.9                         |                  |
| Conductivity @25°C           | µS/cm        |        | 811                            | 395              | -                | 446                         |                  |
| Biochemical Oxygen Demand    | mg/l O2      |        | 1.5                            | 1.4              | -                | 0.8                         |                  |
| Chemical Oxygen Demand       | mg/l O2      |        | 20                             | 9                | -                | <8                          |                  |
| Ammonia                      | mg/l N       |        | 0.027                          | 0.003            | -                | 0.008                       |                  |
| Chloride                     | mg/l Cl      |        | 25                             | 16               | -                | 16                          |                  |
| Suspended Solids             | mg/l         |        | 10                             | <6.9             | -                | <6                          |                  |

Comments:

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

Signed:   
 10 Michael Neill, Regional Chemist

Date: 12/17/08





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

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

North Tipperary Co. Co.  
 17 DEC 2008

Facility: Ballaghveny Landfill  
 Ballymackey, Co. Tipperary,

Environment Section

Reference No: W0078-01

Date collected: 29/10/2008

Date received: 29/10/2008

| Parameter                    | Units        | Limits | 2805654 | 2805655 |
|------------------------------|--------------|--------|---------|---------|
| F Temperature                | °C           |        | 8.1     | 7.4     |
| F Dissolved Oxygen (as %Sat) | % Saturation |        | 56.0    | 56.0    |
| pH                           | pH           |        | 7.4     | 7.4     |
| Conductivity @25°C           | µS/cm        |        | 733     | 753     |
| Biochemical Oxygen Demand    | mg/l O2      |        | 1.2     | 1.3     |
| Chemical Oxygen Demand       | mg/l O2      |        | 49      | 54      |
| Ammonia                      | mg/l N       |        | 0.058   | 0.03    |
| Chloride                     | mg/l Cl      |        | 22      | 18      |
| Suspended Solids             | mg/l         |        | <10.5   | <6      |

Comments:

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

Signed: *Michael Neill*  
 Michael Neill, Regional  
 Chemist

Date: 12/12/08

# **Appendix 5**

## **Surface water visual inspection**

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|                     |                       |
|---------------------|-----------------------|
| Ballyhovey Landfill | Waste Licence 9078-02 |
|---------------------|-----------------------|

**Weekly Surfacewater Monitoring Results**

**October-08**

|   |  |  |   |
|---|--|--|---|
| <b>Site Name:</b><br>Ballyhovey Landfill Site | <b>Operator:</b><br>North Tipperary County Council | <b>Site Address:</b><br>Ballyhovey, Ballymackey, Newagh, Co. Tipperary | <b>National Grid Reference:</b><br>197040.85E, 182012.11N |
|---|--|--|---|

**Monitoring Personnel:**  
Michael Heavry

**RESULTS**

| Date     | Time  | Site Status | Weather   | Surfacewater Monitoring Stations   | Visual Inspection | Odour Inspection | Suspended Solids(mg/L) |
|----------|-------|-------------|-----------|--|-------------------|------------------|------------------------|
| 20-10-08 | 14:00 | Open        | Dry Sunny | SW1 (Dip) - 10m from SW1<br>SW2 (Dip) - 10m from SW2<br>SW3 (Dip) - 10m from SW3<br>SW4 (Dip) - 10m from SW4<br>SW5 (Dip) - 10m from SW5 | Clear             |                  |                        |
| 21-10-08 | 14:00 | Open        | Dry Sunny | SW1 (Dip) - 10m from SW1<br>SW2 (Dip) - 10m from SW2<br>SW3 (Dip) - 10m from SW3<br>SW4 (Dip) - 10m from SW4<br>SW5 (Dip) - 10m from SW5 | Clear             |                  |                        |
| 22-10-08 | 14:00 | Open        | Dry Sunny | SW1 (Dip) - 10m from SW1<br>SW2 (Dip) - 10m from SW2<br>SW3 (Dip) - 10m from SW3<br>SW4 (Dip) - 10m from SW4<br>SW5 (Dip) - 10m from SW5 | Clear             |                  |                        |
| 23-10-08 | 14:00 | Open        | Dry Sunny | SW1 (Dip) - 10m from SW1<br>SW2 (Dip) - 10m from SW2<br>SW3 (Dip) - 10m from SW3<br>SW4 (Dip) - 10m from SW4<br>SW5 (Dip) - 10m from SW5 | Clear             |                  |                        |

**COMMENTS:**

Ballyhenny Landfill Waste Licence 0078-02

**Weekly Surfacewater Monitoring Results**

**November-08**

|                          |                                |  |                                  |
|--------------------------|--------------------------------|--|----------------------------------|
| <b>Site Name :</b>       | <b>Operator :</b>              | <b>Site Address :</b>                          | <b>National Grid Reference :</b> |
| Ballyhenny Landfill Site | North Tipperary County Council | Ballyhenny, Ballymackey, Nenagh, Co. Tipperary | 197040.85E, 182012.11N           |

**Monitoring Personnel:**  
Michael Haverly

**RESULTS**

| Date      | Time  | Skip Status | Weather | Surfacewater Monitoring Stations | Visual Inspection | Odour Inspection | Suspended Solids(mg/l) |
|-----------|-------|-------------|---------|----------------------------------|-------------------|------------------|------------------------|
| 17-Nov-08 | 11:00 | Open        |         | SW1 (Down above land fill area)  | Clear             |                  |                        |
|           |       |             |         | SW2 (Down above land fill area)  | Clear             |                  |                        |
|           |       |             |         | SW3 (Down above land fill area)  | Clear             |                  |                        |
|           |       |             |         | SW4 (Down above land fill area)  | Clear             |                  |                        |
|           |       |             |         | SW5 (Down above land fill area)  | Clear             |                  |                        |
| 18-Nov-08 | 11:00 | Open        |         | SW1 (Down above land fill area)  | Clear             |                  |                        |
|           |       |             |         | SW2 (Down above land fill area)  | Clear             |                  |                        |
|           |       |             |         | SW3 (Down above land fill area)  | Clear             |                  |                        |
|           |       |             |         | SW4 (Down above land fill area)  | Clear             |                  |                        |
|           |       |             |         | SW5 (Down above land fill area)  | Clear             |                  |                        |
| 21-Nov-08 | 11:00 | Open        |         | SW1 (Down above land fill area)  | Clear             |                  |                        |
|           |       |             |         | SW2 (Down above land fill area)  | Clear             |                  |                        |
|           |       |             |         | SW3 (Down above land fill area)  | Clear             |                  |                        |
|           |       |             |         | SW4 (Down above land fill area)  | Clear             |                  |                        |
|           |       |             |         | SW5 (Down above land fill area)  | Clear             |                  |                        |
| 26-Nov-08 | 11:00 | Open        |         | SW1 (Down above land fill area)  | Clear             |                  |                        |
|           |       |             |         | SW2 (Down above land fill area)  | Clear             |                  |                        |
|           |       |             |         | SW3 (Down above land fill area)  | Clear             |                  |                        |
|           |       |             |         | SW4 (Down above land fill area)  | Clear             |                  |                        |
|           |       |             |         | SW5 (Down above land fill area)  | Clear             |                  |                        |

**COMMENTS:**

|                      |                       |
|----------------------|-----------------------|
| Ballaghveny Landfill | Waste Licence 0078-02 |
|----------------------|-----------------------|

**Weekly Surfacewater Monitoring Results**

**December-08**

|                           |                                |   |                                 |
|---------------------------|--------------------------------|---|---------------------------------|
| <b>Site Name:</b>         | <b>Operator:</b>               | <b>Site Address:</b>                            | <b>National Grid Reference:</b> |
| Ballaghveny Landfill Site | North Tipperary County Council | Ballaghveny, Ballymackey, Nenagh, Co. Tipperary | 197040.85E; 182012.11N          |

**Monitoring Personnel:**  
Michael Haverty

**RESULTS**

| Date      | Time  | Site Status | Weather       | Surfacewater Monitoring Stations        | Visual Inspection              | Odour Inspection | Suspended Solids (mg/L) |
|-----------|-------|-------------|---------------|---|--------------------------------|------------------|-------------------------|
| 05-Dec-08 | 14:00 | Open        | Overcast but  | SW1 (Bridge above Stone Bridge)         | Clear                          |                  |                         |
|           |       |             |               | SW2 (Stream above Oxenford Road)        | Clear                          |                  |                         |
|           |       |             |               | SW3 (Oxenford Road above Oxenford Road) | Clear                          |                  |                         |
|           |       |             |               | SW4 (Box above Road)                    | Clear and lots of green plants |                  |                         |
|           |       |             |               | SW5 (Oxenford Road above Oxenford Road) | Clear                          |                  |                         |
| 12-Dec-08 | 14:00 | Open        | Clear & windy | SW1 (Bridge above Stone Bridge)         | Clear                          |                  |                         |
|           |       |             |               | SW2 (Stream above Oxenford Road)        | Clear                          |                  |                         |
|           |       |             |               | SW3 (Oxenford Road above Oxenford Road) | Clear                          |                  |                         |
|           |       |             |               | SW4 (Box above Road)                    | Clear and lots of green plants |                  |                         |
|           |       |             |               | SW5 (Oxenford Road above Oxenford Road) | Clear                          |                  |                         |
| 19-Dec-08 | 14:00 | Open        | Clear & windy | SW1 (Bridge above Stone Bridge)         | Clear                          |                  |                         |
|           |       |             |               | SW2 (Stream above Oxenford Road)        | Clear                          |                  |                         |
|           |       |             |               | SW3 (Oxenford Road above Oxenford Road) | Clear                          |                  |                         |
|           |       |             |               | SW4 (Box above Road)                    | Clear and lots of green plants |                  |                         |
|           |       |             |               | SW5 (Oxenford Road above Oxenford Road) | Clear                          |                  |                         |
| 26-Dec-08 | 14:00 | Open        | Clear & windy | SW1 (Bridge above Stone Bridge)         | Clear                          |                  |                         |
|           |       |             |               | SW2 (Stream above Oxenford Road)        | Clear                          |                  |                         |
|           |       |             |               | SW3 (Oxenford Road above Oxenford Road) | Clear                          |                  |                         |
|           |       |             |               | SW4 (Box above Road)                    | Clear and lots of green plants |                  |                         |
|           |       |             |               | SW5 (Oxenford Road above Oxenford Road) | Clear                          |                  |                         |

**COMMENTS**

# **Appendix 6**

## **Groundwater composition**

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

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

North Tipperary Co. Co.  
 17 DEC 2008  
 Environment Section

Facility: **Ballaghveny Landfill**  
 Ballymackey, Co. Tipperary,  
 Reference No: W0078-01

Date collected: 28/10/2008 Date received: 28/10/2008

| Parameter                    | Units        | Limits | 2805635 | 2805636 |
|------------------------------|--------------|--------|---------|---------|
| F Depth of Borehole          | m            |        | -       | 14      |
| F Temperature                | °C           |        | 11.3    | 11.1    |
| F Dissolved Oxygen (as %Sat) | % Saturation |        | 84.0    | 37.0    |
| pH                           | pH           |        | 7.5     | 7.1     |
| Conductivity @25°C           | µS/cm        |        | 784     | 685     |
| Ammonia                      | mg/l N       |        | 0.003   | 0.51    |
| Chloride                     | mg/l Cl      |        | 46      | 9       |
| Fluoride                     | mg/l F       |        | 0.09    | <0.05   |
| Sulphate                     | mg/l SO4     |        | 33      | 22      |

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:   
 Michael Neill, Regional  
 Chemist

Date: 12/12/08



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

---

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

---

Facility: Ballaghveny Landfill  
Ballymackey, Co. Tipperary,  
Reference No: W0078-01

---

Date collected: 29/10/2008      Date received: 29/10/2008



|                              |              |        | Laboratory Ref:                | 2805656              | 2805657             | 2805658              | 2805659           | 2805660             |
|------------------------------|--------------|--------|--------------------------------|----------------------|---------------------|----------------------|-------------------|---------------------|
|                              |              |        | Type of sample:                | Groundwater          | Groundwater         | Groundwater          | Groundwater       | Groundwater         |
|                              |              |        | Location code:                 | WST-W0078-01-Bresson | WST-W0078-01-GW9new | WST-W0078-01-GW10new | WST-W0078-01-GW12 | WST-W0078-01-BH3new |
|                              |              |        | Sampling point:                | Clear sample         | Clear sample        | Clear sample         | Clear sample      | Clear sample        |
|                              |              |        | Sampled by:                    | Jim McGarry          | Jim McGarry         | Jim McGarry          | Jim McGarry       | Jim McGarry         |
|                              |              |        | Time Sampled:                  | 14:29                | 14:09               | 14:57                | 15:19             | 13:38               |
|                              |              |        | Start/End - Dates of Analysis: |                      |                     |                      |                   |                     |
|                              |              |        | Status of results:             | Final Report         | Final Report        | Final Report         | Final Report      | Final Report        |
| Parameter                    | Units        | Limits |                                |                      |                     |                      |                   |                     |
| F Depth of Borehole          | m            |        | -                              | 13                   | 13.1                | -                    | 11.7              |                     |
| F Water Level                | m            |        | -                              | 8.6                  | 10.5                | -                    | 7.2               |                     |
| F Temperature                | °C           |        | 9.9                            | 11.6                 | 11.2                | 11.6                 | 11.0              |                     |
| F Dissolved Oxygen (as %Sat) | % Saturation |        | 70.0                           | 34.4                 | 63.0                | 79.0                 | 25.0              |                     |
| pH                           | pH           |        | 7.3                            | 7.2                  | 7.1                 | 7.2                  | 7.0               |                     |
| Conductivity @25°C           | µS/cm        |        | 776                            | 1194                 | 1029                | 796                  | 928               |                     |
| Ammonia                      | mg/l N       |        | 0.013                          | 6.9                  | 0.009               | 0.006                | 0.04              |                     |
| Chloride                     | mg/l Cl      |        | 18                             | 107                  | 34                  | 33                   | 31                |                     |
| Fluoride                     | mg/l F       |        | <0.05                          | 0.06                 | <0.05               | <0.05                | <0.05             |                     |
| Sulphate                     | mg/l SO4     |        | 17                             | 32                   | 18                  | 13                   | 16                |                     |

Comments:

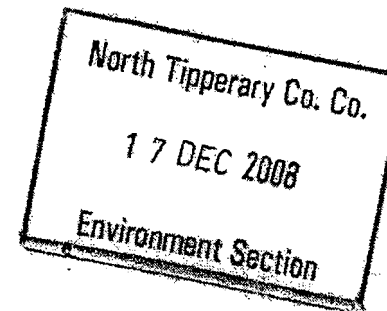
- 1) Results highlighted and in bold are outside specified limits.
- 2) All Metals Analysed in the EPA Dublin Laboratory.  
Cyanide Analysed in the EPA Cork Laboratory.  
Pherols Analysed in the EPA Castlebar Laboratory.
- 3) nm "Not measured"
- 4) nd "None detected"
- 5) nt "No time" - Time not recorded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

Signed:

*Michael Neill*  
Michael Neill, Regional  
Chemist

Date:

12/12/08



# **Appendix 7**

## **Groundwater levels**



**Quarterly Groundwater Monitoring Form**

**Ballaghveny Landfill**      **Waste Licence 0078-02**

**Quarter 4 2008**

|                           |                                |   |                                  |
|---------------------------|--------------------------------|---|----------------------------------|
| <b>Site Name :</b>        | <b>Operator :</b>              | <b>Site Address :</b>                           | <b>National Grid Reference :</b> |
| Ballaghveny Landfill Site | North Tipperary County Council | Ballaghveny, Ballymackey, Nenagh, Co. Tipperary | 197040.85E, 182012.11N           |

**Instrument used :**  
Geotechnical Instruments EA 450/010 Borehole Dipper

**Monitoring Personnel:**  
Sean Macigan (Site Technician)

**RESULTS**

| Date | Time | Site Status | Weather | Groundwater Monitoring Stations | Groundwater Monitoring Total Borehole depth (in Meters) | Depth at which Groundwater reached (in meters) | Height of Groundwater (in Meters) |
|------|------|-------------|---------|---------------------------------|---|--|-----------------------------------|
|------|------|-------------|---------|---------------------------------|---|--|-----------------------------------|

|           |       |      |             |                |       |       |       |
|-----------|-------|------|-------------|----------------|-------|-------|-------|
| 24-Oct-08 | 11:00 | Open | windy/sunny | GW5            | 13.80 | 1.50  | 12.30 |
|           |       |      |             | GW10           | 13.80 | 2.00  | 11.80 |
|           |       |      |             | GW6            | 13.80 | 4.50  | 9.30  |
|           |       |      |             | BN3            | 11.40 | 2.50  | 8.90  |
|           |       |      |             | GW12           | 11.20 | 3.20  | 8.00  |
|           |       |      |             | GW6 (EAP)      | 12.60 | 10.00 | 2.60  |
|           |       |      |             | GW3            | 11.20 | 8.10  | 3.10  |
|           |       |      |             | WGBB/GW13/Comp | 11.50 | 7.10  | 4.40  |
|           |       |      |             | BRBL/GW14/Comp | 11.50 | 7.10  | 4.40  |

|           |       |      |             |                |       |       |       |
|-----------|-------|------|-------------|----------------|-------|-------|-------|
| 19-Nov-12 | 11:00 | Open | windy/sunny | GW5            | 13.80 | 1.50  | 12.30 |
|           |       |      |             | GW10           | 13.80 | 3.00  | 10.80 |
|           |       |      |             | GW6            | 13.80 | 4.75  | 9.05  |
|           |       |      |             | BN3            | 11.20 | 2.65  | 8.55  |
|           |       |      |             | GW12           | 11.20 | 3.20  | 8.00  |
|           |       |      |             | GW6 (EAP)      | 12.60 | 13.50 | -0.90 |
|           |       |      |             | GW3            | 11.20 | 11.30 | -0.10 |
|           |       |      |             | WGBB/GW13/Comp | 11.50 | 7.20  | 4.30  |
|           |       |      |             | BRBL/GW14/Comp | 11.50 | 7.20  | 4.30  |

|           |       |      |             |                |       |       |       |
|-----------|-------|------|-------------|----------------|-------|-------|-------|
| 16-Dec-09 | 11:00 | Open | windy/sunny | GW5            | 13.80 | 1.48  | 12.32 |
|           |       |      |             | GW10           | 13.80 | 3.00  | 10.80 |
|           |       |      |             | GW6            | 13.80 | 4.50  | 9.30  |
|           |       |      |             | BN3            | 11.20 | 2.50  | 8.70  |
|           |       |      |             | GW12           | 11.20 | 3.10  | 8.10  |
|           |       |      |             | GW6 (EAP)      | 12.60 | 10.00 | 2.60  |
|           |       |      |             | GW3            | 11.20 | 8.00  | 3.20  |
|           |       |      |             | WGBB/GW13/Comp | 11.50 | 7.10  | 4.40  |
|           |       |      |             | BRBL/GW14/Comp | 11.50 | 7.10  | 4.40  |

## **Appendix 8**

# **Quarterly groundwater visual inspection**

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

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

North Tipperary Co. Co.  
 17 DEC 2008  
 Environment Section


Facility: **Ballaghveny Landfill**  
 Ballymackey, Co. Tipperary,  
 Reference No: W0078-01

Date collected: 28/10/2008 Date received: 28/10/2008

| Parameter                    | Units        | Limits | 2805635 | 2805636 |
|------------------------------|--------------|--------|---------|---------|
| F Depth of Borehole          | m            |        | -       | 14      |
| F Temperature                | °C           |        | 11.3    | 11.1    |
| F Dissolved Oxygen (as %Sat) | % Saturation |        | 84.0    | 37.0    |
| pH                           | pH           |        | 7.5     | 7.1     |
| Conductivity @25°C           | µS/cm        |        | 784     | 685     |
| Ammonia                      | mg/l N       |        | 0.003   | 0.51    |
| Chloride                     | mg/l Cl      |        | 46      | 9       |
| Fluoride                     | mg/l F       |        | 0.09    | <0.05   |
| Sulphate                     | mg/l SO4     |        | 33      | 22      |

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:   
 Michael Neill, Regional  
 Chemist

Date: 12/12/08



Environmental Protection Agency  
An tAidmheallán agus an tAidmheallán

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

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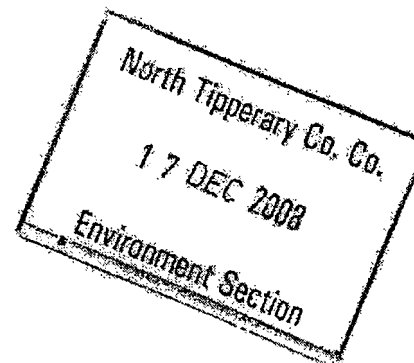
Report of: Analysis of landfill site sample(s)  
Report to: North Tipperary County Council  
Report date: 12/12/08

---

Facility: **Ballaghveny Landfill**  
Ballymackey, Co. Tipperary,  
Reference No: W0078-01

---

Date collected: 29/10/2008      Date received: 29/10/2008





|                              |              |        | Laboratory Ref:                | 2805656              | 2805657             | 2805658              | 2805659           | 2805660             |
|------------------------------|--------------|--------|--------------------------------|----------------------|---------------------|----------------------|-------------------|---------------------|
|                              |              |        | Type of sample:                | Groundwater          | Groundwater         | Groundwater          | Groundwater       | Groundwater         |
|                              |              |        | Location code:                 | WST-W0078-01-Bresson | WST-W0078-01-GW9new | WST-W0078-01-GW10new | WST-W0078-01-GW12 | WST-W0078-01-BH3new |
|                              |              |        | Sampling point:                | Clear sample         | Clear sample        | Clear sample         | Clear sample      | Clear sample        |
|                              |              |        | Sampled by:                    | Jim McGarry          | Jim McGarry         | Jim McGarry          | Jim McGarry       | Jim McGarry         |
|                              |              |        | Time Sampled:                  | 14:29                | 14:09               | 14:57                | 15:19             | 13:38               |
|                              |              |        | Start/End - Dates of Analysis: |                      |                     |                      |                   |                     |
|                              |              |        | Status of results:             | Final Report         | Final Report        | Final Report         | Final Report      | Final Report        |
| Parameter                    | Units        | Limits |                                |                      |                     |                      |                   |                     |
| F Depth of Borehole          | m            |        | -                              | 13                   | 13.1                | -                    | 11.7              |                     |
| F Water Level                | m            |        | -                              | 8.6                  | 10.5                | -                    | 7.2               |                     |
| F Temperature                | °C           |        | 9.9                            | 11.6                 | 11.2                | 11.6                 | 11.0              |                     |
| F Dissolved Oxygen (as-%Sat) | % Saturation |        | 70.0                           | 34.4                 | 63.0                | 79.0                 | 25.0              |                     |
| pH                           | pH           |        | 7.3                            | 7.2                  | 7.1                 | 7.2                  | 7.0               |                     |
| Conductivity @25°C           | µS/cm        |        | 776                            | 1194                 | 1029                | 796                  | 928               |                     |
| Ammonia                      | mg/l N       |        | 0.013                          | 6.9                  | 0.009               | 0.006                | 0.04              |                     |
| Chloride                     | mg/l Cl      |        | 18                             | 107                  | 34                  | 33                   | 31                |                     |
| Fluoride                     | mg/l F       |        | <0.05                          | 0.06                 | <0.05               | <0.05                | <0.05             |                     |
| Sulphate                     | mg/l SO4     |        | 17                             | 32                   | 18                  | 13                   | 16                |                     |

Comments:

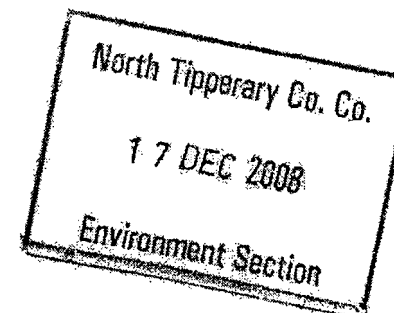
- 1) Results highlighted and in bold are outside specified limits.
- 2) All Metals Analysed in the EPA Dublin Laboratory.  
Cyanide Analysed in the EPA Cork Laboratory.  
Phenols Analysed in the EPA Castlebar Laboratory.
- 3) nm "Not measured"
- 4) nd "None detected"
- 5) nt "No time" - Time not recorded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

Signed:

*Michael Neill*  
Michael Neill, Regional  
Chemist

Date:

12/12/08



# **Appendix 9**

## **Gas monitoring results**

|                      |                       |
|----------------------|-----------------------|
| Ballaghveny Landfill | Waste Licence 0078-02 |
|----------------------|-----------------------|

**Gas Monitoring Locations as per DG152-02**

**October-08**

|                           |                                |                           |                                  |
|---------------------------|--------------------------------|---------------------------|----------------------------------|
| <b>Site Name :</b>        | <b>Operator :</b>              | <b>Site Address :</b>     | <b>National Grid Reference :</b> |
| Ballaghveny Landfill Site | North Tipperary County Council | Ballaghveny, Ballymackey, | 197040.85E, 182012.11N           |

**Instrument used :**  
Geotechnical Instruments GA94 Infra Red Gas Analyser

**Date Of Next Calibration**  
May-09

**Monitoring Personnel:**  
Sean Madigan

**Weather Conditions**  
Overcast windy

**Barometric Pressure**  
1001

**RESULTS**

| Sample Station ID      | Borehole / Vent. | Survey Depth | CH4% v/v                          | CO2% v/v | O2% v/v | Bar Pressure | Comments         |
|------------------------|------------------|--------------|-----------------------------------|----------|---------|--------------|------------------|
| <b>Cell Wells</b>      |                  |              |                                   |          |         |              |                  |
| UEG1                   | Gas Vent         | 0/0m         | 73.10%                            | 27.60%   | 0.30%   | 1001         |                  |
| UEG2                   | Gas Vent         | 0/0m         | 70.10%                            | 29.50%   | 0.40%   | 1001         |                  |
| UEG3                   | Gas Vent         | 0/0m         | 68.10%                            | 32.10%   | 0.20%   | 1001         |                  |
| UEG4                   | Gas Vent         | N/A          |                                   |          |         |              | No cap / O2 seal |
| UEG5                   | Gas Vent         | 0/0m         | 47.60%                            | 24.00%   | 2.40%   | 1001         |                  |
| UEG6                   | Gas Vent         | N/A          | sealed as part of the data system |          |         |              |                  |
| <b>Perimeter Wells</b> |                  |              |                                   |          |         |              |                  |
| MP2                    | Gas Borehole     | 1m           | 0.00%                             | 0.00%    | 19.80%  | 1001         |                  |
| MP3                    | Gas Borehole     | 1m           | 0.00%                             | 0.00%    | 19.80%  | 1001         |                  |
| MP4                    | Gas Borehole     | 1m           | 0.10%                             | 1.00%    | 18.80%  | 1001         |                  |
| MP6                    | Gas Borehole     | 1m           | 0.00%                             | 0.10%    | 18.80%  | 1001         |                  |
| MP7                    | Gas Borehole     | 1m           | 0.00%                             | 0.00%    | 19.80%  | 1001         |                  |
| MP8                    | Gas Borehole     | 1m           | 0.10%                             | 0.00%    | 18.80%  | 1001         |                  |
| MP15                   | Gas Borehole     | 1m           | 0.10%                             | 0.00%    | 18.80%  | 1001         |                  |
| MP16                   | Gas Borehole     | 1m           | 0.00%                             | 0.10%    | 18.70%  | 1001         |                  |
| MP17                   | Gas Borehole     | 1m           | 0.00%                             | 0.10%    | 18.80%  | 1001         |                  |
| MP18                   | Gas Borehole     | 1m           | 0.10%                             | 0.00%    | 18.60%  | 1001         |                  |
| MP19                   | Gas Borehole     | 1m           | 0.00%                             | 0.00%    | 18.80%  | 1001         |                  |

|                      |                       |
|----------------------|-----------------------|
| Ballaghveny Landfill | Waste Licence 0078-02 |
|----------------------|-----------------------|

**Gas Monitoring Locations as per DG152-02**

**November-08**

|                           |                                |                           |                                  |
|---------------------------|--------------------------------|---------------------------|----------------------------------|
| <b>Site Name :</b>        | <b>Operator :</b>              | <b>Site Address :</b>     | <b>National Grid Reference :</b> |
| Ballaghveny Landfill Site | North Tipperary County Council | Ballaghveny, Ballymackey, | 197040.85E, 182012.11N           |

**Instrument used :**  
Geotechnical Instruments GA2000 Infra Red Gas Analyser

**Date Of Next Calibration**

**Monitoring Personnel:**  
Sean Madigan

**Weather Conditions**  
Cold/dry

**Barometric Pressure**  
1011

**RESULTS**

| Sample Station ID      | Borehole / Vent | Survey Depth | CH4% v/v                           | CO2% v/v | O2% v/v | Bar Pressure | Comments       |
|------------------------|-----------------|--------------|------------------------------------|----------|---------|--------------|----------------|
| <b>Cell Wells</b>      |                 |              |                                    |          |         |              |                |
| IFG1                   | Gas Vent        | n/a          | 24.60%                             | 26.40%   | 49.00%  |              |                |
| IFG2                   | Gas Vent        | n/a          | 23.40%                             | 24.60%   | 49.20%  |              |                |
| IFG3                   | Gas Vent        | n/a          | 89.70%                             | 27.0%    | 0.30%   |              |                |
| IFG4                   | Gas Vent        | n/a          |                                    |          |         |              | No cap no seal |
| IFG5                   | Gas Vent        | n/a          | 63.00%                             | 21.90%   | 0.80%   |              |                |
| IFG6                   | Gas Vent        | n/a          | sealed as part of the fans systems |          |         |              |                |
| <b>Perimeter Wells</b> |                 |              |                                    |          |         |              |                |
| MP2                    | Gas Borehole    | 1m           | 0.00%                              | 0.00%    | 19.80%  |              |                |
| MP3                    | Gas Borehole    | 1m           | 0.00%                              | 0.00%    | 19.80%  |              |                |
| MP4                    | Gas Borehole    | 1m           | 0.00%                              | 0.00%    | 19.80%  |              |                |
| MP6                    | Gas Borehole    | 1m           | 0.00%                              | 0.00%    | 19.20%  |              |                |
| MP7                    | Gas Borehole    | 1m           | 0.00%                              | 0.20%    | 19.40%  |              |                |
| MP8                    | Gas Borehole    | 1m           | 0.00%                              | 0.10%    | 19.80%  |              |                |
| MP15                   | Gas Borehole    | 1m           | 0.00%                              | 0.00%    | 19.80%  |              |                |
| MP16                   | Gas Borehole    | 1m           | 0.00%                              | 0.00%    | 19.80%  |              |                |
| MP17                   | Gas Borehole    | 1m           | 0.00%                              | 0.00%    | 19.80%  |              |                |
| MP18                   | Gas Borehole    | 1m           | 0.00%                              | 0.00%    | 20.10%  |              |                |
| MP19                   | Gas Borehole    | 1m           | 0.00%                              | 0.10%    | 20.00%  |              |                |

|                      |                       |
|----------------------|-----------------------|
| Ballaghveny Landfill | Waste Licence 0078-02 |
|----------------------|-----------------------|

**Gas Monitoring Locations as per DG152-02**

**December-08**

|                           |                                |                           |                                  |
|---------------------------|--------------------------------|---------------------------|----------------------------------|
| <b>Site Name :</b>        | <b>Operator :</b>              | <b>Site Address :</b>     | <b>National Grid Reference :</b> |
| Ballaghveny Landfill Site | North Tipperary County Council | Ballaghveny, Ballymackey, | 197040.85E, 182012.11N           |

**Instrument used :**  
Geotechnical Instruments GA2000 Infra Red Gas Analyser

**Date Of Next Calibration**  
\_\_\_\_\_

**Monitoring Personnel:**  
Sean Madigan

**Weather Conditions**  
Dry

**Barometric Pressure**  
1020

**RESULTS**

| Sample Station ID      | Borehole / Vent | Survey Depth | CH4% v/v                           | CO2% v/v | O2% v/v | Bar Pressure | Comments        |
|------------------------|-----------------|--------------|------------------------------------|----------|---------|--------------|-----------------|
| <b>Cell Wells</b>      |                 |              |                                    |          |         |              |                 |
| IFG1                   | Gas Vent        | n/a          | 76.10%                             | 27.30%   | 0.00%   |              |                 |
| IFG2                   | Gas Vent        | n/a          | 77.30%                             | 25.90%   | 0.10%   |              |                 |
| IFG3                   | Gas Vent        | n/a          | 72.40%                             | 28.40%   | 0.10%   |              |                 |
| IFG4                   | Gas Vent        | n/a          |                                    |          |         |              | No cap not seal |
| IFG5                   | Gas Vent        | n/a          | 65.70%                             | 32.10%   | 0.20%   |              |                 |
| IFG6                   | Gas Vent        | n/a          | sealed as part of the flare system |          |         |              |                 |
| <b>Perimeter Wells</b> |                 |              |                                    |          |         |              |                 |
| MP2                    | Gas Borehole    | 1m           | 0.00%                              | 0.00%    | 20.10%  |              |                 |
| MP3                    | Gas Borehole    | 1m           | 0.00%                              | 0.00%    | 19.80%  |              |                 |
| MP4                    | Gas Borehole    | 1m           | 0.00%                              | 0.00%    | 19.11%  |              |                 |
| MP6                    | Gas Borehole    | 1m           | 0.00%                              | 0.00%    | 18.70%  |              |                 |
| MP7                    | Gas Borehole    | 1m           | 0.00%                              | 0.10%    | 18.60%  |              |                 |
| MP8                    | Gas Borehole    | 1m           | 0.00%                              | 0.10%    | 18.10%  |              |                 |
| MP15A                  | Gas Borehole    | 1m           | 0.00%                              | 0.00%    | 19.40%  |              |                 |
| MP16                   | Gas Borehole    | 1m           | 0.00%                              | 0.00%    | 19.10%  |              |                 |
| MP17                   | Gas Borehole    | 1m           | 0.00%                              | 0.10%    | 19.20%  |              |                 |
| MP18                   | Gas Borehole    | 1m           | 0.00%                              | 0.00%    | 17.30%  |              |                 |
| MP19                   | Gas Borehole    | 1m           | 0.00%                              | 0.00%    | 20.70%  |              |                 |

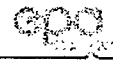
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# **Appendix 10**

## **Water standards**

WATER QUALITY STANDARDS - A SYNOPSIS

Environmental Protection Agency  
Regional Water Laboratory, Kilkenny



Synopsis only - for details refer to the EU Directives and Irish Statutory Instruments.

| PARAMETERS                          | UNITS                                | SURFACE ABSTRACTION               |         | DRINKING WATER                   |                       | FRESHWATER FISH                  |                         |          |                                  |            |
|-------------------------------------|--------------------------------------|-----------------------------------|---------|----------------------------------|-----------------------|----------------------------------|-------------------------|----------|----------------------------------|------------|
|                                     |                                      | Directive 75/440/EEC A1-Treatment |         | Irish Standard SI.No.294 of 1989 | EC Directive 98/83/EC | Irish Standard SI.No.439 of 2000 | EC Directive 78/859/EEC |          | Irish Standard SI.No.293 of 1988 |            |
|                                     |                                      | Guide                             | M.A.C.* |                                  |                       |                                  | SALMONID                | CYPRINID |                                  |            |
|                                     |                                      |                                   |         |                                  |                       | Guide                            | M.A.C.*                 | Guide    | M.A.C.*                          |            |
| Temperature                         | °C                                   | 22                                | 25      | 25                               | —                     | —                                | —                       | —        | —                                | 21.5       |
| Dissolved Oxygen                    | mg/l O <sub>2</sub>                  | —                                 | —       | —                                | —                     | —                                | 21.5 (a)                | —        | 28 (a)                           | 21.5       |
| Dissolved Oxygen                    | mg/l O <sub>2</sub>                  | —                                 | —       | —                                | —                     | 50% > 9                          | 50% > 9                 | 50% > 8  | 50% > 7                          | 50% > 9    |
| Dissolved Oxygen                    | % Sat                                | > 70%                             | —       | > 60%                            | —                     | 100% > 7                         | —                       | 100% > 5 | —                                | —          |
| BOD                                 | mg/l O <sub>2</sub>                  | 3                                 | —       | 5                                | —                     | 3                                | —                       | 6        | —                                | 95% < 5    |
| Conductivity                        | µS/cm                                | 1000                              | —       | 1000                             | 2500                  | 2500                             | —                       | —        | —                                | —          |
| pH                                  |                                      | 6.5-8.5                           | —       | 5.5-8.5                          | 6.5-9.5               | 6.5-9.5                          | 6-9                     | —        | 6-9                              | 6-9        |
| Colour                              | Hazen                                | 10                                | 20      | 20                               | Acceptable            | Acceptable                       | —                       | —        | —                                | —          |
| Turbidity                           | NTU                                  | —                                 | —       | —                                | Acceptable            | Acceptable                       | —                       | —        | —                                | —          |
| Phosphorous                         | mg/l P                               | 0.17                              | —       | 0.22                             | —                     | —                                | 0.065 (c)               | —        | 0.13                             | —          |
| Nitrate                             | mg/l N                               | 5.65                              | 11.3    | 11.3                             | 11.3                  | 11.3                             | —                       | —        | —                                | —          |
| Nitrite                             | mg/l NO <sub>2</sub>                 | —                                 | —       | —                                | 0.5                   | 0.5                              | 0.01                    | —        | 0.03                             | 95% < 0.05 |
| Sulphate                            | mg/l SO <sub>4</sub>                 | 150                               | 250     | 200                              | 250                   | 250                              | —                       | —        | —                                | —          |
| Suspended Solids                    | mg/l                                 | 25                                | —       | 50                               | —                     | —                                | —                       | 25       | —                                | 25         |
| Odour                               | Dilution                             | 3 @ 25°C                          | —       | 5 @ 25°C                         | Acceptable            | Acceptable                       | —                       | —        | —                                | —          |
| Taste                               | Dilution                             | —                                 | —       | —                                | Acceptable            | Acceptable                       | —                       | —        | —                                | —          |
| Fluoride                            | mg/l F                               | 0.7-1.0                           | 1.5     | 1                                | 1.5                   | 1.0 (d)                          | —                       | —        | —                                | —          |
| Chloride                            | mg/l Cl                              | 200                               | —       | 250                              | 250                   | 250                              | —                       | —        | —                                | —          |
| Cyanide                             | mg/l CN                              | —                                 | 0.05    | 0.05                             | 0.05                  | 0.05                             | —                       | —        | —                                | —          |
| Sulphide                            | mg/l S                               | —                                 | —       | —                                | —                     | —                                | —                       | —        | —                                | —          |
| Ammonia (Total)                     | mg/l NH <sub>4</sub>                 | 0.05                              | —       | 0.2                              | 0.5                   | 0.3                              | 0.04                    | 1        | 0.2                              | 1          |
| Non-ionised                         | mg/l NH <sub>3</sub>                 | —                                 | —       | —                                | —                     | —                                | 0.005                   | 0.025    | 0.005                            | 0.03       |
| Nitrogen (Kjeldahl)                 | mg/l N                               | 1                                 | —       | 1                                | —                     | —                                | —                       | —        | —                                | 0.02       |
| Residual Chlorine                   | mg/l Cl <sub>2</sub>                 | —                                 | —       | —                                | —                     | —                                | —                       | —        | —                                | —          |
| Oxidisability (KMnO <sub>4</sub> )  | mg/l O <sub>2</sub>                  | —                                 | —       | —                                | 5.0                   | 5.0                              | —                       | —        | 0.01                             | 0.005      |
| TOC                                 | mg/l C                               | —                                 | —       | —                                | No change             | No change                        | —                       | —        | —                                | —          |
| Bromate                             | µg/l                                 | —                                 | —       | —                                | 10                    | 10                               | —                       | —        | —                                | —          |
| Acrylamide                          | µg/l                                 | —                                 | —       | —                                | 0.10                  | 0.10                             | —                       | —        | —                                | —          |
| Benzene                             | µg/l                                 | —                                 | —       | —                                | 1.0                   | 1.0                              | —                       | —        | —                                | —          |
| Benzo(a)pyrene                      | µg/l                                 | —                                 | —       | —                                | 0.01                  | 0.01                             | —                       | —        | —                                | —          |
| 1,2-dichloroethane                  | µg/l                                 | —                                 | —       | —                                | 3.0                   | 3.0                              | —                       | —        | —                                | —          |
| Epichlorohydrin                     | µg/l                                 | —                                 | —       | —                                | 0.1                   | 0.1                              | —                       | —        | —                                | —          |
| THMs total                          | µg/l                                 | —                                 | —       | —                                | 100                   | 100                              | —                       | —        | —                                | —          |
| Vinyl chloride                      | µg/l                                 | —                                 | —       | —                                | 0.5                   | 0.5                              | —                       | —        | —                                | —          |
| Tetrachloroethene & Trichloroethane | µg/l                                 | —                                 | —       | —                                | 10                    | —                                | —                       | —        | —                                | —          |
| Detergents (MBAS)                   | mg/l                                 | 0.2                               | —       | 0.2                              | —                     | —                                | —                       | —        | —                                | —          |
| Phenol                              | mg/l C <sub>6</sub> H <sub>5</sub> O | —                                 | 0.001   | 0.0005                           | —                     | —                                | No taste                | —        | No taste                         | No taste   |
| Hydrocarbons                        | mg/l                                 | —                                 | 0.05    | 0.01                             | —                     | —                                | (e)                     | —        | (e)                              | (e)        |
| Aromatics (PAH)                     | mg/l                                 | —                                 | 0.0002  | 0.0002                           | 0.0001                | 0.0001                           | —                       | —        | —                                | —          |
| Pesticides (total)                  | mg/l                                 | —                                 | 0.001   | 0.0005                           | 0.0005                | 0.0005                           | —                       | —        | —                                | —          |
| Pesticides (single)                 | mg/l                                 | —                                 | —       | —                                | 0.0001                | 0.0001                           | —                       | —        | —                                | —          |
| CHCl <sub>3</sub> Extract           | mg/l                                 | 0.1                               | —       | 0.2                              | —                     | —                                | —                       | —        | —                                | —          |
| Total Coliforms                     | /100ml                               | 50                                | —       | 5000                             | 0                     | 0                                | —                       | —        | —                                | —          |
| Fecal Coliforms                     | /100ml                               | 20                                | —       | 1000                             | 0                     | 0                                | —                       | —        | —                                | —          |
| Fecal Streptococci                  | /100ml                               | 20                                | —       | 200                              | —                     | —                                | —                       | —        | —                                | —          |
| Salmonella                          | /5000ml                              | Nil                               | —       | Nil/500ml                        | —                     | —                                | —                       | —        | —                                | —          |
| Enterococci                         | /100ml                               | —                                 | —       | —                                | 0                     | 0                                | —                       | —        | —                                | —          |
| Clostridia                          | /100ml                               | —                                 | —       | —                                | 0                     | 0                                | —                       | —        | —                                | —          |
| Total Bacteria                      | /ml @ 22°C                           | —                                 | —       | —                                | No change             | No change                        | —                       | —        | —                                | —          |
| Calcium                             | mg/l Ca                              | —                                 | —       | —                                | —                     | —                                | —                       | —        | —                                | —          |
| Magnesium                           | mg/l Mg                              | —                                 | —       | —                                | —                     | —                                | —                       | —        | —                                | —          |
| Sodium                              | mg/l Na                              | —                                 | —       | —                                | 200                   | 200                              | —                       | —        | —                                | —          |
| Potassium                           | mg/l K                               | —                                 | —       | —                                | —                     | —                                | —                       | —        | —                                | —          |
| Iron                                | mg/l Fe                              | 0.1                               | 0.3     | 0.2                              | 0.2                   | 0.2                              | —                       | —        | —                                | —          |
| Copper                              | mg/l Cu                              | 0.02                              | 0.05    | 0.05                             | 0.002                 | 0.002                            | 0.04 (f)                | —        | 0.04 (f)                         | 0.04 (f)   |
| Manganese                           | mg/l Mn                              | 0.05                              | —       | 0.05                             | 0.05                  | 0.05                             | —                       | —        | —                                | —          |
| Zinc                                | mg/l Zn                              | 0.5                               | 3       | 3                                | —                     | —                                | 0.3 (f)                 | —        | 1.0 (f)                          | 0.3 (f)    |
| Chromium                            | mg/l Cr                              | —                                 | 0.05    | 0.05                             | 0.05                  | 0.05                             | —                       | —        | —                                | —          |
| Lead                                | mg/l Pb                              | —                                 | 0.05    | 0.05                             | 0.01                  | 0.01                             | —                       | —        | —                                | —          |
| Nickel                              | mg/l Ni                              | —                                 | —       | —                                | 0.02                  | 0.02                             | —                       | —        | —                                | —          |
| Aluminium                           | mg/l Al                              | —                                 | —       | —                                | 0.2                   | 0.2                              | —                       | —        | —                                | —          |
| Cadmium                             | mg/l Cd                              | 0.001                             | 0.005   | 0.005                            | 0.005                 | 0.005                            | —                       | —        | —                                | —          |
| Arsenic                             | mg/l As                              | 0.01                              | 0.05    | 0.05                             | 0.01                  | 0.01                             | —                       | —        | —                                | —          |
| Mercury                             | mg/l Hg                              | 0.0005                            | 0.001   | 0.001                            | 0.001                 | 0.001                            | —                       | —        | —                                | —          |
| Boron                               | mg/l B                               | 1                                 | —       | 2                                | 1.0                   | 1.0                              | —                       | —        | —                                | —          |
| Silver                              | mg/l Ag                              | —                                 | —       | —                                | —                     | —                                | —                       | —        | —                                | —          |
| Antimony                            | mg/l Sb                              | —                                 | —       | —                                | 0.005                 | 0.005                            | —                       | —        | —                                | —          |
| Selenium                            | mg/l Se                              | —                                 | 0.01    | 0.01                             | 0.01                  | 0.01                             | —                       | —        | —                                | —          |
| Barium                              | mg/l Ba                              | —                                 | 0.1     | 0.1                              | —                     | —                                | —                       | —        | —                                | —          |

NOTES:

(a) 10° Limit for certain periods - See Directive.

(b) 10°C Limit - November to April inclusive.

(c) Indicative level - in order to reduce eutrophication - for lake water see formula in the Directive.

(d) Max level of 1.5 mg/l F allowed where fluoride is naturally

(e) None Visible.

(f) Standards for Copper and Zinc vary with Hardness.

\* M.A.C. = Maximum Admissible Concentration.

# **Appendix 1**

## **Leachate Composition**

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

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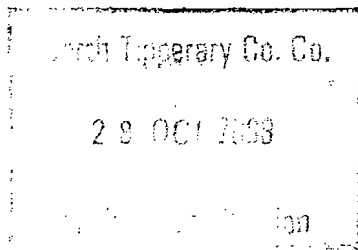
Report of: Analysis of landfill site sample(s)  
Report to: Environmental Management And Planning Division, EPA.  
Report date: 12/09/08

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Licensee: North Tipperary County Council  
Facility: Ballaghveny Landfill  
Ballymackey, Co. Tipperary,  
Reference No: W0078-01

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Date collected: 17/07/2008      Date received: 17/07/2008



|                                |          |        | Laboratory Ref:                | 2803677          | 2803678          | 2803679          | 2803680            | 2803681          | 2803682                 |
|--------------------------------|----------|--------|--------------------------------|------------------|------------------|------------------|--------------------|------------------|-------------------------|
|                                |          |        | Type of sample:                | Leachate         | Leachate         | Leachate         | Leachate           | Leachate         | Leachate                |
|                                |          |        | Location code:                 | WST-W0078-01-LM8 | WST-W0078-01-LL2 | WST-W0078-01-LM1 | WST-W0078-01-LM3   | WST-W0078-01-LM5 | WST-W0078-01-LM7        |
|                                |          |        | Sampling point:                | Not available    | Black colour     | Clear sample     | Light brown colour | Black colour     | Location dry- no sample |
|                                |          |        | Sampled by:                    | Jim McGarry      | Jim McGarry      | Jim McGarry      | Jim McGarry        | Jim McGarry      | Jim McGarry             |
|                                |          |        | Time Sampled:                  | 14:30            | 14:40            | 13:20            | 13:45              | 14:07            | 14:20                   |
|                                |          |        | Start/End - Dates of Analysis: | /                |                  |                  |                    |                  | /                       |
|                                |          |        | Status of results:             | Final Report     | Final Report     | Final Report     | Final Report       | Final Report     | Final Report            |
| Parameter                      | Units    | Limits |                                |                  |                  |                  |                    |                  |                         |
| pH                             | pH       |        | -                              | 7.8              | 7.2              | 7.4              | 7.5                | -                |                         |
| Conductivity @25°C             | µS/cm    |        | -                              | 5500             | 5770             | 11400            | 15790              | -                |                         |
| Ammonia                        | mg/l N   |        | -                              | 290              | 380              | 820              | 1000               | -                |                         |
| Chloride                       | mg/l Cl  |        | -                              | 526              | 720              | 1106             | 1194               | -                |                         |
| Nitrite (as N)                 | mg/l N   |        | -                              | <0.001           | 0.023            | 0.33             | <0.001             | -                |                         |
| ortho-Phosphate (as P)         | mg/l P   |        | -                              | 0.11             | 2.6              | 1.8              | 1.1                | -                |                         |
| Total Oxidised Nitrogen (as N) | mg/l N   |        | -                              | <0.1             | 0.1              | 0.3              | 0.5                | -                |                         |
| Chemical Oxygen Demand         | mg/l O2  |        | -                              | 755              | 276              | 1061             | 1427               | -                |                         |
| Biochemical Oxygen Demand      | mg/l O2  |        | -                              | 116.0            | 16.0             | 35.0             | 68.0               | -                |                         |
| Fluoride                       | mg/l F   |        | -                              | 5.8              | 0.8              | 1.86             | 3.3                | -                |                         |
| Sulphate                       | mg/l SO4 |        | -                              | 426.3            | 2.0              | 702.8            | 1798.1             | -                |                         |
| 1,1,1,2-Tetrachloroethane      | µg/l     |        | -                              | <0.5             | <0.5             | <0.5             | <0.5               | -                |                         |
| 1,1,1-Trichloroethane          | µg/l     |        | -                              | <0.5             | <0.5             | <0.5             | <0.5               | -                |                         |
| 1,1,2,2-Tetrachloroethane      | µg/l     |        | -                              | <0.5             | <0.5             | <0.5             | <0.5               | -                |                         |
| 1,1,2-Trichloroethane          | µg/l     |        | -                              | <0.5             | <0.5             | <0.5             | <0.5               | -                |                         |
| 1,1-Dichloroethane             | µg/l     |        | -                              | <0.5             | <0.5             | <0.5             | 1.7                | -                |                         |
| 1,1-Dichloroethene             | µg/l     |        | -                              | <0.5             | <0.5             | <0.5             | <0.5               | -                |                         |
| 1,1-Dichloropropene            | µg/l     |        | -                              | <0.5             | <0.5             | <0.5             | <0.5               | -                |                         |
| 1,2,3-Trichlorobenzene         | µg/l     |        | -                              | <0.5             | <0.5             | <0.5             | <0.5               | -                |                         |
| 1,2,3-Trichloropropane         | µg/l     |        | -                              | <0.5             | <0.5             | <0.5             | <0.5               | -                |                         |
| 1,2,4-Trichlorobenzene         | µg/l     |        | -                              | <0.5             | <0.5             | <0.5             | <0.5               | -                |                         |
| 1,2,4-Trimethylbenzene         | µg/l     |        | -                              | 1.5              | 0.7              | 7.5              | 30.5               | -                |                         |

|                             |       |        | Laboratory Ref:                | 2803677          | 2803678          | 2803679          | 2803680            | 2803681          | 2803682                 |  |
|-----------------------------|-------|--------|--------------------------------|------------------|------------------|------------------|--------------------|------------------|-------------------------|--|
|                             |       |        | Type of sample:                | Leachate         | Leachate         | Leachate         | Leachate           | Leachate         | Leachate                |  |
|                             |       |        | Location code:                 | WST-W0078-01-LM8 | WST-W0078-01-LL2 | WST-W0078-01-LM1 | WST-W0078-01-LM3   | WST-W0078-01-LM5 | WST-W0078-01-LM7        |  |
|                             |       |        | Sampling point:                | Not available    | Black colour     | Clear sample     | Light brown colour | Black colour     | Location dry- no sample |  |
|                             |       |        | Sampled by:                    | Jim McGarry      | Jim McGarry      | Jim McGarry      | Jim McGarry        | Jim McGarry      | Jim McGarry             |  |
|                             |       |        | Time Sampled:                  | 14:30            | 14:40            | 13:20            | 13:45              | 14:07            | 14:20                   |  |
|                             |       |        | Start/End - Dates of Analysis: | /                |                  |                  |                    |                  | /                       |  |
|                             |       |        | Status of results:             | Final Report     | Final Report     | Final Report     | Final Report       | Final Report     | Final Report            |  |
| Parameter                   | Units | Limits |                                |                  |                  |                  |                    |                  |                         |  |
| 1,2-Dibromo-3-Chloropropane | µg/l  |        | -                              | <0.5             | <0.5             | <0.5             | <0.5               | <0.5             | -                       |  |
| 1,2-Dibromoethene           | µg/l  |        | -                              | <0.5             | <0.5             | <0.5             | <0.5               | <0.5             | -                       |  |
| 1,2-Dichlorobenzene         | µg/l  |        | -                              | 0.8              | <0.5             | <0.5             | <0.5               | <0.5             | -                       |  |
| 1,2-Dichloroethane          | µg/l  |        | -                              | <0.5             | <0.5             | <0.5             | <0.5               | <0.5             | -                       |  |
| 1,2-Dichloropropane         | µg/l  |        | -                              | <0.5             | <0.5             | <0.5             | <0.5               | <0.5             | -                       |  |
| 1,3,5-Trimethylbenzene      | µg/l  |        | -                              | <0.5             | <0.5             | 3.9              | 18.8               | -                | -                       |  |
| 1,3-Dichlorobenzene         | µg/l  |        | -                              | <0.5             | <0.5             | <0.5             | <0.5               | <0.5             | -                       |  |
| 1,3-Dichloropropane         | µg/l  |        | -                              | <0.5             | <0.5             | <0.5             | <0.5               | <0.5             | -                       |  |
| 1,4-Dichlorobenzene         | µg/l  |        | -                              | <0.5             | <0.5             | 8.7              | 23.8               | -                | -                       |  |
| 2,2-Dichloropropane         | µg/l  |        | -                              | <0.5             | <0.5             | <0.5             | <0.5               | <0.5             | -                       |  |
| 2-Chlorotoluene             | µg/l  |        | -                              | <0.5             | <0.5             | <0.5             | <0.5               | <0.5             | -                       |  |
| 4-Chlorotoluene             | µg/l  |        | -                              | <0.5             | <0.5             | <0.5             | <0.5               | <0.5             | -                       |  |
| 4-Isopropyltoluene          | µg/l  |        | -                              | <0.5             | <0.5             | 0.7              | 5.0                | -                | -                       |  |
| Benzene                     | µg/l  |        | -                              | 0.6              | <0.5             | <0.5             | 0.8                | -                | -                       |  |
| Bromobenzene                | µg/l  |        | -                              | <0.5             | <0.5             | <0.5             | <0.5               | <0.5             | -                       |  |
| Bromochloromethane          | µg/l  |        | -                              | <0.5             | <0.5             | <0.5             | <0.5               | <0.5             | -                       |  |
| Bromodichloromethane        | µg/l  |        | -                              | <0.5             | <0.5             | <0.5             | <0.5               | <0.5             | -                       |  |
| Bromoform                   | µg/l  |        | -                              | <0.5             | <0.5             | <0.5             | <0.5               | <0.5             | -                       |  |
| Bromomethane                | µg/l  |        | -                              | <0.5             | <0.5             | <0.5             | <0.5               | <0.5             | -                       |  |
| c-1,2-Dichloroethene        | µg/l  |        | -                              | <0.5             | <0.5             | <0.5             | <0.5               | <0.5             | -                       |  |
| c-1,3-Dichloropropene       | µg/l  |        | -                              | <0.5             | <0.5             | <0.5             | <0.5               | <0.5             | -                       |  |
| Carbon Tetrachloride        | µg/l  |        | -                              | <0.5             | <0.5             | <0.5             | <0.5               | <0.5             | -                       |  |
| Chlorobenzene               | µg/l  |        | -                              | <0.5             | <0.5             | 2.3              | 14.9               | -                | -                       |  |

|                         |       |        | Laboratory Ref:                | 2803677          | 2803678          | 2803679          | 2803680            | 2803681          | 2803682                 |
|-------------------------|-------|--------|--------------------------------|------------------|------------------|------------------|--------------------|------------------|-------------------------|
|                         |       |        | Type of sample:                | Leachate         | Leachate         | Leachate         | Leachate           | Leachate         | Leachate                |
|                         |       |        | Location code:                 | WST-W0078-01-LM8 | WST-W0078-01-LL2 | WST-W0078-01-LM1 | WST-W0078-01-LM3   | WST-W0078-01-LM5 | WST-W0078-01-LM7        |
|                         |       |        | Sampling point:                | Not available    | Black colour     | Clear sample     | Light brown colour | Black colour     | Location dry- no sample |
|                         |       |        | Sampled by:                    | Jim McGarry      | Jim McGarry      | Jim McGarry      | Jim McGarry        | Jim McGarry      | Jim McGarry             |
|                         |       |        | Time Sampled:                  | 14:30            | 14:40            | 13:20            | 13:45              | 14:07            | 14:20                   |
|                         |       |        | Start/End - Dates of Analysis: | /                | /                | /                | /                  | /                | /                       |
|                         |       |        | Status of results:             | Final Report     | Final Report     | Final Report     | Final Report       | Final Report     | Final Report            |
| Parameter               | Units | Limits |                                |                  |                  |                  |                    |                  |                         |
| Chloroform              | µg/l  |        | -                              | <0.5             | <0.5             | <0.5             | <0.5               | <0.5             | -                       |
| Dibromochloromethane    | µg/l  |        | -                              | <0.5             | <0.5             | <0.5             | <0.5               | <0.5             | -                       |
| Dibromomethane          | µg/l  |        | -                              | <0.5             | <0.5             | <0.5             | <0.5               | <0.5             | -                       |
| Dichlorodifluoromethane | µg/l  |        | -                              | <0.5             | <0.5             | <0.5             | <0.5               | <0.5             | -                       |
| Ethylbenzene            | µg/l  |        | -                              | 4.2              | <0.5             | 3.4              | 20.5               | -                | -                       |
| Hexachlorobutadiene     | µg/l  |        | -                              | <0.5             | <0.5             | <0.5             | <0.5               | <0.5             | -                       |
| Isopropylbenzene        | µg/l  |        | -                              | <0.5             | <0.5             | <0.5             | 1.6                | -                | -                       |
| m,p-Xylene              | µg/l  |        | -                              | 12.2             | 0.5              | 20.7             | 57.4               | -                | -                       |
| Methylene Chloride      | µg/l  |        | -                              | <0.5             | <0.5             | <0.5             | <0.5               | <0.5             | -                       |
| Naphthalene             | µg/l  |        | -                              | 3.5              | <0.5             | 14.1             | 27.6               | -                | -                       |
| n-Butylbenzene          | µg/l  |        | -                              | <0.5             | <0.5             | <0.5             | 0.8                | -                | -                       |
| n-Propylbenzene         | µg/l  |        | -                              | <0.5             | <0.5             | <0.5             | 3.4                | -                | -                       |
| o-Xylene                | µg/l  |        | -                              | 5.5              | <0.5             | 9.3              | 35.4               | -                | -                       |
| 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             | -                       |
| t-1,2-Dichloroethene    | µg/l  |        | -                              | <0.5             | <0.5             | <0.5             | <0.5               | <0.5             | -                       |
| t-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             | -                       |
| Toluene                 | µg/l  |        | -                              | 6.8              | <0.5             | 0.9              | 2.0                | -                | -                       |
| Trichloroethene         | µg/l  |        | -                              | <0.5             | <0.5             | <0.5             | <0.5               | <0.5             | -                       |
| Trichlorofluoromethane  | µg/l  |        | -                              | <0.5             | <0.5             | <0.5             | <0.5               | <0.5             | -                       |
| Vinyl Chloride          | µg/l  |        | -                              | <0.5             | <0.5             | <0.5             | <0.5               | <0.5             | -                       |
| Aluminium               | ug/l  |        | -                              | 447              | <250             | <250             | <250               | <250             | -                       |

|                                       |                  |                  |                  |                    |                  |                         |
|---------------------------------------|------------------|------------------|------------------|--------------------|------------------|-------------------------|
| <b>Laboratory Ref:</b>                | 2803677          | 2803678          | 2803679          | 2803680            | 2803681          | 2803682                 |
| <b>Type of sample:</b>                | Leachate         | Leachate         | Leachate         | Leachate           | Leachate         | Leachate                |
| <b>Location code:</b>                 | WST-W0078-01-LM8 | WST-W0078-01-LL2 | WST-W0078-01-LM1 | WST-W0078-01-LM3   | WST-W0078-01-LM5 | WST-W0078-01-LM7        |
| <b>Sampling point:</b>                | Not available    | Black colour     | Clear sample     | Light brown colour | Black colour     | Location dry- no sample |
| <b>Sampled by:</b>                    | Jim McGarry      | Jim McGarry      | Jim McGarry      | Jim McGarry        | Jim McGarry      | Jim McGarry             |
| <b>Time Sampled:</b>                  | 14:30            | 14:40            | 13:20            | 13:45              | 14:07            | 14:20                   |
| <b>Start/End - Dates of Analysis:</b> | /                |                  |                  |                    |                  | /                       |
| <b>Status of results:</b>             | Final Report     | Final Report     | Final Report     | Final Report       | Final Report     | Final Report            |


| Parameter  | Units | Limits | 2803677 | 2803678 | 2803679 | 2803680 | 2803681 | 2803682 |
|------------|-------|--------|---------|---------|---------|---------|---------|---------|
| Antimony   | ug/l  |        | -       | <10     | <10     | <10     | <10     | -       |
| Arsenic    | ug/l  |        | -       | 49.9    | <10     | 19.8    | 26.3    | -       |
| Barium     | ug/l  |        | -       | 405     | 145     | 156     | 73.4    | -       |
| Beryllium  | ug/l  |        | -       | <10     | <10     | <10     | <10     | -       |
| Boron      | ug/l  |        | -       | 1790    | 2410    | 2840    | 3560    | -       |
| Cadmium    | ug/l  |        | -       | <10     | <10     | <10     | <10     | -       |
| Calcium    | mg/l  |        | -       | 142     | 139     | 132     | 92.5    | -       |
| Chromium   | ug/l  |        | -       | <10     | <10     | <10     | <10     | -       |
| Cobalt     | ug/l  |        | -       | <10     | <10     | 11.8    | 26.3    | -       |
| Copper     | ug/l  |        | -       | <10     | <10     | <10     | <10     | -       |
| Iron       | ug/l  |        | -       | 7560    | 24100   | 9730    | 3200    | -       |
| Lead       | ug/l  |        | -       | <10     | <10     | <10     | <10     | -       |
| Magnesium  | mg/l  |        | -       | 110     | 183     | 247     | 284     | -       |
| Manganese  | ug/l  |        | -       | 1960    | 509     | 625     | 440     | -       |
| Mercury    | ug/l  |        | -       | <5      | <5      | <5      | <5      | -       |
| Molybdenum | ug/l  |        | -       | <10     | <10     | <10     | <10     | -       |
| Nickel     | ug/l  |        | -       | <10     | <10     | <10     | 160     | -       |
| Potassium  | mg/l  |        | -       | 262     | 221     | 624     | 862     | -       |
| Selenium   | ug/l  |        | -       | 10.5    | 10.4    | 25.1    | 39.1    | -       |
| Sodium     | mg/l  |        | -       | 487     | 504     | 936     | 1380    | -       |
| Thallium   | ug/l  |        | -       | <10     | <10     | <10     | <10     | -       |
| Tin        | ug/l  |        | -       | <10     | <10     | <10     | <10     | -       |
| Uranium    | ug/l  |        | -       | <10     | <10     | <10     | <10     | -       |

| Parameter | Units | Limits | 2803677 | 2803678 | 2803679 | 2803680 | 2803681 | 2803682 |
|-----------|-------|--------|---------|---------|---------|---------|---------|---------|
| Vanadium  | ug/l  |        | -       | 17.7    | <10     | 10.5    | 16      | -       |
| Zinc      | ug/l  |        | -       | 110     | <60     | <60     | 134     | -       |

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:

12/9/08



Michael Neill, Regional Chemist

# **Appendix 2**

## **Leachate Levels**



## Leachate Extraction & Monitoring Points as per DG0152-02

Ballaghveny Landfill

Waste Licence 0078-02

July-08

|                           |                                |   |                                  |
|---------------------------|--------------------------------|---|----------------------------------|
| <b>Site Name :</b>        | <b>Operator :</b>              | <b>Site Address :</b>                           | <b>National Grid Reference :</b> |
| Ballaghveny Landfill Site | North Tipperary County Council | Ballaghveny, Ballymackey, Nenagh, Co. Tipperary | 197040.85E, 182012.11N           |

**Instrument used :**

Geotechnical Instruments EA 450/010 Borehole Dipper

**Sampling Points:** Leachate Lagoon

LM01, LM02, LM03, LM04, LM05, LM06, LM07, LM08, LM09,

**Monitoring Personnel:**

Sean Madigan (Site Technician)

### RESULTS

| Date      | Time  | Site Status | Weather            | Leachate Levels Monitoring Point                            | Leachate Monitoring Total Borehole depth (in Meters) | Depth at which Leachate reached (in meters) | Height of Leachate (in Meters) |
|-----------|-------|-------------|--------------------|---|--|---|--------------------------------|
| 3-Jul-08  | 14:00 | Open        | dry sunny          | Leachate Lagoon   |  |   |                                |
|           |       |             |                    | LM1   | 10.00  | 6.25  | 3.75                           |
|           |       |             |                    | LM2   | 11.00  | 6.80  | 4.20                           |
|           |       |             |                    | LM3   | 12.00  | 6.65  | 5.35                           |
|           |       |             |                    | LM4   | 11.30  | 6.80  | 4.50                           |
|           |       |             |                    | LM5   | 11.20  | 6.60  | 4.60                           |
|           |       |             |                    | LM6   | 13.00  | 10.85                                       | 2.15                           |
|           |       |             |                    | LM7   | 13.50  | 10.25                                       | 3.25                           |
|           |       |             |                    | LM8   | 13.30  | 10.25                                       | 3.05                           |
|           |       |             |                    | LM9   | 13.00  | 11.05                                       | 1.95                           |
| 10-Jul-08 | 11:00 | Open        | overcast           | Leachate Lagoon   | Empty  |   |                                |
|           |       |             |                    | LM1   | 10.00  | 6.00  | 4.00                           |
|           |       |             |                    | LM2   | 11.00  | 6.70  | 4.30                           |
|           |       |             |                    | LM3   | 12.00  | 6.74  | 5.26                           |
|           |       |             |                    | LM4   | 11.80  | 6.80  | 5.00                           |
|           |       |             |                    | LM5   | 11.20  | 6.60  | 4.60                           |
|           |       |             |                    | LM6   | 13.00  | 10.78                                       | 2.22                           |
|           |       |             |                    | LM7   | 13.50  | 10.40                                       | 3.10                           |
|           |       |             |                    | LM8   | 13.30  | 10.25                                       | 3.05                           |
|           |       |             |                    | LM9   | 13.00  | 11.15                                       | 1.85                           |
| 15-Jul-08 | 11:00 | Open        | showery / overcast | Leachate Lagoon   |  |   |                                |
|           |       |             |                    | LM1   | 10.00  | 7.20  | 2.80                           |
|           |       |             |                    | LM2   | 11.00  | 7.40  | 3.60                           |
|           |       |             |                    | LM3   | 12.00  | 6.93  | 5.07                           |
|           |       |             |                    | LM4   | 11.80  | 6.80  | 5.00                           |
|           |       |             |                    | LM5   | 11.20  | 6.70  | 4.50                           |
|           |       |             |                    | LM6   | 13.00  | 13.69                                       | -0.69                          |
|           |       |             |                    | LM7   | 13.50  | 14.30                                       | -0.80                          |
|           |       |             |                    | LM8   | 13.30  | 14.30                                       | -1.00                          |
|           |       |             |                    | LM9   | 13.00  | 13.00                                       | 0.00                           |
|           |       |             |                    | Monitoring points sealed as part of Gas collection network. |  |   |                                |
| 25-Jul-08 | 11:00 | Open        | overcast           | Leachate Lagoon   |  |   |                                |
|           |       |             |                    | LM1   | 10.00  | 7.00  | 3.00                           |
|           |       |             |                    | LM2   | 11.00  | 7.35  | 3.65                           |
|           |       |             |                    | LM3   | 12.00  | 7.80  | 4.20                           |
|           |       |             |                    | LM4   | 11.30  | 7.80  | 3.50                           |
|           |       |             |                    | LM5   | 11.20  | 6.75  | 4.45                           |
|           |       |             |                    | LM6   | 13.00  | 13.40                                       | -0.40                          |
|           |       |             |                    | LM7   | 13.50  | 14.56                                       | -1.06                          |
|           |       |             |                    | LM8   | 13.30  | 13.30                                       | 0.00                           |
|           |       |             |                    | LM9   | 13.00  | 13.00                                       | 0.00                           |
|           |       |             |                    | Monitoring points sealed as part of Gas collection network. |  |   |                                |
| 30-Jul-08 | 11:00 | Open        | showery / overcast | Leachate Lagoon   |  |   |                                |
|           |       |             |                    | LM1   | 10.00  | 6.65  | 3.35                           |
|           |       |             |                    | LM2   | 11.00  | 6.90  | 4.10                           |
|           |       |             |                    | LM3   | 12.00  | 6.80  | 5.20                           |
|           |       |             |                    | LM4   | 11.30  | 6.75  | 4.55                           |
|           |       |             |                    | LM5   | 11.20  | 6.80  | 4.40                           |
|           |       |             |                    | LM6   | 13.00  | 13.60                                       | -0.60                          |
|           |       |             |                    | LM7   | 13.50  | 14.50                                       | -1.00                          |
|           |       |             |                    | LM8   | 13.30  | 13.30                                       | 0.00                           |
|           |       |             |                    | LM9   | 13.00  | 13.00                                       | 0.00                           |
|           |       |             |                    | Monitoring points sealed as part of Gas collection network. |  |   |                                |



**Leachate Extraction & Monitoring Points as per DG0152-02**

Ballaghveny Landfill Waste Licence 0078-02

**August-08**

|                           |                                |   |                                  |
|---------------------------|--------------------------------|---|----------------------------------|
| <b>Site Name :</b>        | <b>Operator :</b>              | <b>Site Address :</b>                           | <b>National Grid Reference :</b> |
| Ballaghveny Landfill Site | North Tipperary County Council | Ballaghveny, Ballymackey, Nenagh, Co. Tipperary | 197040.85E, 182012.11N           |

**Instrument used :**  
Geotechnical Instruments EA 450/010 Borehole Dipper

**Sampling Points: Leachate Lagoon**  
LM01, LM02, LM03, LM04, LM05, LM06, LM07, LM08, LM09,

**Monitoring Personnel:**  
Sean Madigan (Site Technician)

**RESULTS**

| Date | Time | Site Status | Weather | Leachate Levels Monitoring Point | Leachate Monitoring Total Borehole depth (in Meters) | Depth at which Leachate reached (in meters) | Height of Leachate (in Meters) |
|------|------|-------------|---------|----------------------------------|--|---|--------------------------------|
|------|------|-------------|---------|----------------------------------|--|---|--------------------------------|

|          |       |      |  |                 |       |      |       |
|----------|-------|------|--|-----------------|-------|------|-------|
| 8-Aug-08 | 14:00 | Open | overcast   | Leachate Lagoon |       |      |       |
|          |       |      |  | LM1             | 10.00 | 6.85 | 3.15  |
|          |       |      |  | LM2             | 11.00 | 9.90 | 1.10  |
|          |       |      |  | LM3             | 12.00 | 9.70 | 2.30  |
|          |       |      |  | LM4             | 11.50 | 9.60 | 1.90  |
|          |       |      |  | LM5             | 11.20 | 8.70 | 2.50  |
|          |       |      | Monitoring points sealed as part of Gas collection network | LM6             | 13.00 |      | 13.00 |
|          |       |      |  | LM7             | 14.00 |      | 14.00 |
|          |       |      |  | LM8             | 13.00 |      | 13.00 |
|          |       |      |  | LM9             | 13.00 |      | 13.00 |

|           |       |      |  |                 |       |      |       |
|-----------|-------|------|--|-----------------|-------|------|-------|
| 15-Aug-08 | 11:00 | Open | windy wet  | Leachate Lagoon | Empty |      |       |
|           |       |      |  | LM1             | 10.00 | 6.70 | 3.30  |
|           |       |      |  | LM2             | 11.00 | 9.40 | 1.60  |
|           |       |      |  | LM3             | 12.00 | 9.60 | 2.40  |
|           |       |      |  | LM4             | 11.00 | 8.80 | 2.20  |
|           |       |      |  | LM5             | 11.70 | 8.65 | 3.05  |
|           |       |      | Monitoring points sealed as part of Gas collection network | LM6             | 13.00 |      | 13.00 |
|           |       |      |  | LM7             | 14.00 |      | 14.00 |
|           |       |      |  | LM8             | 13.00 |      | 13.00 |
|           |       |      |  | LM9             | 13.00 |      | 13.00 |

|           |       |      |  |                 |       |      |       |
|-----------|-------|------|--|-----------------|-------|------|-------|
| 23-Aug-08 | 11:00 | Open | showery / overcast   | Leachate Lagoon |       |      |       |
|           |       |      |  | LM1             | 10.00 | 7.00 | 3.00  |
|           |       |      |  | LM2             | 11.00 | 9.40 | 1.60  |
|           |       |      |  | LM3             | 12.00 | 9.60 | 2.40  |
|           |       |      |  | LM4             | 11.00 | 8.80 | 2.20  |
|           |       |      |  | LM5             | 11.20 | 8.70 | 2.50  |
|           |       |      | Monitoring points sealed as part of Gas collection network | LM6             | 13.00 |      | 13.00 |
|           |       |      |  | LM7             | 14.00 |      | 14.00 |
|           |       |      |  | LM8             | 13.00 |      | 13.00 |
|           |       |      |  | LM9             | 13.00 |      | 13.00 |

|           |       |      |  |                 |       |      |       |
|-----------|-------|------|--|-----------------|-------|------|-------|
| 27-Aug-08 | 11:00 | Open | overcast   | Leachate Lagoon |       |      |       |
|           |       |      |  | LM1             | 10.00 | 7.10 | 2.90  |
|           |       |      |  | LM2             | 11.00 | 9.50 | 1.50  |
|           |       |      |  | LM3             | 12.00 | 9.60 | 2.40  |
|           |       |      |  | LM4             | 11.50 | 8.90 | 2.60  |
|           |       |      |  | LM5             | 11.20 | 8.70 | 2.50  |
|           |       |      | Monitoring points sealed as part of Gas collection network | LM6             | 13.00 |      | 13.00 |
|           |       |      |  | LM7             | 14.00 |      | 14.00 |
|           |       |      |  | LM8             | 13.00 |      | 13.00 |
|           |       |      |  | LM9             | 13.00 |      | 13.00 |

# Leachate Extraction & Monitoring Points as per DG0152-02

Ballaghveny Landfill Waste Licence 0078-02

September-08

|                           |                                |   |                                  |
|---------------------------|--------------------------------|---|----------------------------------|
| <b>Site Name :</b>        | <b>Operator :</b>              | <b>Site Address :</b>                           | <b>National Grid Reference :</b> |
| Ballaghveny Landfill Site | North Tipperary County Council | Ballaghveny, Ballymackey, Nenagh, Co. Tipperary | 197040.85E, 182012.11N           |

**Instrument used :**  
Geotechnical Instruments EA 450/010 Borehole Dipper

**Sampling Points:** Leachate Lagoon  
LM01, LM02, LM03, LM04, LM05, LM06, LM07, LM08, LM09,

**Monitoring Personnel:**  
Sean Madigan (Site Technician)

## RESULTS

| Date | Time | Site Status | Weather | Leachate Levels Monitoring Point | Leachate Monitoring Total Borehole depth (in Meters) | Depth at which Leachate reached (in meters) | Height of Leachate (in Meters) |
|------|------|-------------|---------|----------------------------------|--|---|--------------------------------|
|------|------|-------------|---------|----------------------------------|--|---|--------------------------------|

|           |       |      |          |  |       |       |      |
|-----------|-------|------|----------|--|-------|-------|------|
| 13-Sep-08 | 11:00 | Open | overcast | Leachate Lagoon  |       |       |      |
|           |       |      |          | LM01   | 10.00 | 7.50  | 2.50 |
|           |       |      |          | LM2  | 10.00 | 9.50  | 2.40 |
|           |       |      |          | LM3  | 10.00 | 9.60  | 2.50 |
|           |       |      |          | LM4  | 10.00 | 10.00 | 2.40 |
|           |       |      |          | LM5  | 10.00 | 9.70  | 2.50 |
|           |       |      |          | Monitoring points sealed as part of Gas Collection network |       |       |      |
|           |       |      |          | LM6  | 10.00 |       |      |
|           |       |      |          | LM7  | 10.00 |       |      |
|           |       |      |          | LM8  | 10.00 |       |      |
|           |       |      |          | LM9  | 10.00 |       |      |

|           |       |      |     |  |       |      |      |
|-----------|-------|------|-----|--|-------|------|------|
| 16-Sep-08 | 11:00 | Open | dry | Leachate Lagoon  | Empty |      |      |
|           |       |      |     | LM1  | 10.00 | 7.55 | 2.45 |
|           |       |      |     | LM2  | 10.00 | 9.00 | 2.50 |
|           |       |      |     | LM3  | 10.00 | 9.80 | 2.50 |
|           |       |      |     | LM4  | 10.00 | 9.75 | 2.45 |
|           |       |      |     | Monitoring points sealed as part of Gas Collection network |       |      |      |
|           |       |      |     | LM6  | 10.00 |      |      |
|           |       |      |     | LM7  | 10.00 |      |      |
|           |       |      |     | LM8  | 10.00 |      |      |
|           |       |      |     | LM9  | 10.00 |      |      |

|           |       |      |           |  |       |      |      |
|-----------|-------|------|-----------|--|-------|------|------|
| 27-Sep-08 | 11:00 | Open | dry/sunny | Leachate Lagoon  | Empty |      |      |
|           |       |      |           | LM1  | 10.00 | 7.80 | 2.20 |
|           |       |      |           | LM2  | 11.00 | 9.70 | 2.20 |
|           |       |      |           | LM3  | 12.30 | 9.20 | 2.80 |
|           |       |      |           | LM4  | 13.70 | 8.90 | 2.40 |
|           |       |      |           | LM5  | 12.20 | 8.70 | 2.50 |
|           |       |      |           | Monitoring points sealed as part of Gas Collection network |       |      |      |
|           |       |      |           | LM6  | 10.80 |      |      |
|           |       |      |           | LM7  | 11.50 |      |      |
|           |       |      |           | LM8  | 16.90 |      |      |
|           |       |      |           | LM9  | 13.00 |      |      |

## **Appendix 3**

# **Leachate Visual Inspection**

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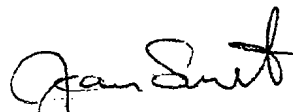
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|           |       |        | Laboratory Ref:                | 2803677             | 2803678             | 2803679             | 2803680             | 2803681             | 2803682                 |  |
|-----------|-------|--------|--------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|-------------------------|--|
|           |       |        | Type of sample:                | Leachate            | Leachate            | Leachate            | Leachate            | Leachate            | Leachate                |  |
|           |       |        | Location code:                 | WST-W0078-01-LM8    | WST-W0078-01-LL2    | WST-W0078-01-LM1    | WST-W0078-01-LM3    | WST-W0078-01-LM5    | WST-W0078-01-LM7        |  |
|           |       |        | Sampling point:                | Not available       | Black colour        | Clear sample        | Light brown colour  | Black colour        | Location dry- no sample |  |
|           |       |        | Sampled by:                    | Jim McGarry         | Jim McGarry         | Jim McGarry         | Jim McGarry         | Jim McGarry         | Jim McGarry             |  |
|           |       |        | Time Sampled:                  | 14:30               | 14:40               | 13:20               | 13:45               | 14:07               | 14:20                   |  |
|           |       |        | Start/End - Dates of Analysis: | /                   |                     |                     |                     |                     | /                       |  |
|           |       |        | Status of results:             | <b>Final Report</b> | <b>Final Report</b> | <b>Final Report</b> | <b>Final Report</b> | <b>Final Report</b> | <b>Final Report</b>     |  |
| Parameter | Units | Limits |                                |                     |                     |                     |                     |                     |                         |  |
| Vanadium  | ug/l  |        | -                              | 17.7                | <10                 | 10.5                | 16                  | -                   |                         |  |
| Zinc      | ug/l  |        | -                              | 110                 | <60                 | <60                 | 134                 | -                   |                         |  |
|           |       |        |                                |                     |                     |                     |                     |                     |                         |  |

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:

  
 Michael Neill, Regional  
 Chemist

Date:

12/5/08

## **Appendix 4**

# **Surface water composition**

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

Environmental Protection  
Agency  
15 SEP 2008

Report of: Analysis of landfill site sample(s)  
Report to: Environmental Management And Planning Division, EPA.  
Report date: 12/09/08

Licensee: North Tipperary County Council  
Facility: Ballaghveny Landfill  
Ballymackey, Co. Tipperary,  
Reference No: W0078-01

Date collected: 15/07/2008      Date received: 15/07/2008

The Environmental Protection  
Agency  
17 SEP 2008  
CORK

North Tipperary Co. Co.  
28 OCT 2008  
Environment Section

|                                |              |        | Laboratory Ref:                | 2803592          | 2803593          | 2803594          | 2803595                          | 2803596          | 2803597  |  |
|--------------------------------|--------------|--------|--------------------------------|------------------|------------------|------------------|----------------------------------|------------------|--|--|
|                                |              |        | Type of sample:                | Surface Water    | Surface Water    | Surface Water    | Surface Water                    | Surface Water    | Surface Water                                      |  |
|                                |              |        | Location code:                 | WST-W0078-01-SW1 | WST-W0078-01-SW2 | WST-W0078-01-SW3 | WST-W0078-01-SW4                 | WST-W0078-01-SW6 | WST-W0078-01-SWD                                   |  |
|                                |              |        | Sampling point:                | Clear sample     | Clear sample     | Clear sample     | Light brown colour with sediment | Clear sample     | Discharge to surface water- Not running, no sample |  |
|                                |              |        | Sampled by:                    | Jim McGarry      | Jim McGarry      | Jim McGarry      | Jim McGarry                      | Jim McGarry      | Jim McGarry  |  |
|                                |              |        | Time Sampled:                  | 17:10            | 16:30            | 16:45            | 15:17                            | 15:51            | 15:00  |  |
|                                |              |        | Start/End - Dates of Analysis: |                  |                  |                  |                                  |                  | /  |  |
|                                |              |        | Status of results:             | Final Report     | Final Report     | Final Report     | Final Report                     | Final Report     | Final Report                                       |  |
| Parameter                      | Units        | Limits |                                |                  |                  |                  |                                  |                  |  |  |
| F Temperature                  | °C           |        | 14.7                           | 16.8             | 17.7             | 15.4             | 16.7                             | -                |  |  |
| F Dissolved Oxygen (as %Sat)   | % Saturation |        | 47.1                           | 88.0             | 104.3            | 58.2             | 102.1                            | -                |  |  |
| pH                             | pH           |        | 7.6                            | 7.8              | 8.3              | 7.4              | 8.3                              | -                |  |  |
| Conductivity @25°C             | µS/cm        |        | 860                            | 838              | 420              | 752              | 469                              | -                |  |  |
| Ammonia                        | mg/l N       |        | 0.084                          | 0.031            | 0.015            | 0.01             | 0.024                            | -                |  |  |
| Chloride                       | mg/l Cl      |        | 28                             | 26               | 16               | 16               | 17                               | -                |  |  |
| Nitrite (as N)                 | mg/l N       |        | 0.062                          | 0.024            | 0.008            | <0.001           | 0.011                            | -                |  |  |
| ortho-Phosphate (as P)         | mg/l P       |        | 0.015                          | 0.015            | 0.017            | <0.006           | 0.013                            | -                |  |  |
| Total Oxidised Nitrogen (as N) | mg/l N       |        | 2.2                            | 5.8              | 3                | 0.2              | 3.1                              | -                |  |  |
| Chemical Oxygen Demand         | mg/l O2      |        | 26                             | 8                | <8               | 40               | <8                               | -                |  |  |
| Biochemical Oxygen Demand      | mg/l O2      |        | 0.9                            | 0.6              | 1.2              | 2.7              | 0.9                              | -                |  |  |
| Fluoride                       | mg/l F       |        | <0.10                          | <0.10            | <0.10            | 0.1              | <0.10                            | -                |  |  |
| Sulphate                       | mg/l SO4     |        | 25.8                           | 28.1             | 9.6              | 21.9             | 11.5                             | -                |  |  |
| Suspended Solids               | mg/l         |        | <6.7                           | <6.7             | <6.7             | 2020             | <6.0                             | -                |  |  |
| E Coli                         | per 100ml    |        | 20                             | 406              | 1136             | 554              | 1300                             | -                |  |  |
| Total coliforms                | No/100 ml    |        | 6896                           | 17328            | 4494             | >48384           | 4494                             | -                |  |  |
| 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         |        | <0.5                           | <0.5             | <0.5             | <0.5             | <0.5                             | -                |  |  |
| 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                             | -                |  |  |

|                             |       |        | Laboratory Ref:                | 2803592          | 2803593          | 2803594          | 2803595                          | 2803596          | 2803597  |  |
|-----------------------------|-------|--------|--------------------------------|------------------|------------------|------------------|----------------------------------|------------------|--|--|
|                             |       |        | Type of sample:                | Surface Water    | Surface Water    | Surface Water    | Surface Water                    | Surface Water    | Surface Water                                      |  |
|                             |       |        | Location code:                 | WST-W0078-01-SW1 | WST-W0078-01-SW2 | WST-W0078-01-SW3 | WST-W0078-01-SW4                 | WST-W0078-01-SW6 | WST-W0078-01-SWD                                   |  |
|                             |       |        | Sampling point:                | Clear sample     | Clear sample     | Clear sample     | Light brown colour with sediment | Clear sample     | Discharge to surface water- Not running, no sample |  |
|                             |       |        | Sampled by:                    | Jim McGarry      | Jim McGarry      | Jim McGarry      | Jim McGarry                      | Jim McGarry      | Jim McGarry  |  |
|                             |       |        | Time Sampled:                  | 17:10            | 16:30            | 16:45            | 15:17                            | 15:51            | 15:00  |  |
|                             |       |        | Start/End - Dates of Analysis: |                  |                  |                  |                                  |                  | /  |  |
|                             |       |        | Status of results:             | Final Report     | Final Report     | Final Report     | Final Report                     | Final Report     | Final Report                                       |  |
| Parameter                   | Units | Limits |                                |                  |                  |                  |                                  |                  |  |  |
| 1,1-Dichloropropene         | µg/l  |        | <0.5                           | <0.5             | <0.5             | <0.5             | <0.5                             | <0.5             | -  |  |
| 1,2,3-Trichlorobenzene      | µg/l  |        | <0.5                           | <0.5             | <0.5             | <0.5             | <0.5                             | <0.5             | -  |  |
| 1,2,3-Trichloropropane      | µg/l  |        | <0.5                           | <0.5             | <0.5             | <0.5             | <0.5                             | <0.5             | -  |  |
| 1,2,4-Trichlorobenzene      | µg/l  |        | <0.5                           | <0.5             | <0.5             | <0.5             | <0.5                             | <0.5             | -  |  |
| 1,2,4-Trimethylbenzene      | µg/l  |        | 0.6                            | 0.6              | <0.5             | <0.5             | <0.5                             | <0.5             | -  |  |
| 1,2-Dibromo-3-Chloropropane | µg/l  |        | <0.5                           | <0.5             | <0.5             | <0.5             | <0.5                             | <0.5             | -  |  |
| 1,2-Dibromoethene           | µg/l  |        | <0.5                           | <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                             | <0.5             | -  |  |
| 1,2-Dichloroethane          | µg/l  |        | <0.5                           | <0.5             | <0.5             | <0.5             | <0.5                             | <0.5             | -  |  |
| 1,2-Dichloropropane         | µg/l  |        | <0.5                           | <0.5             | <0.5             | <0.5             | <0.5                             | <0.5             | -  |  |
| 1,3,5-Trimethylbenzene      | µg/l  |        | <0.5                           | <0.5             | <0.5             | <0.5             | <0.5                             | <0.5             | -  |  |
| 1,3-Dichlorobenzene         | µg/l  |        | <0.5                           | <0.5             | <0.5             | <0.5             | <0.5                             | <0.5             | -  |  |
| 1,3-Dichloropropane         | µg/l  |        | <0.5                           | <0.5             | <0.5             | <0.5             | <0.5                             | <0.5             | -  |  |
| 1,4-Dichlorobenzene         | µg/l  |        | <0.5                           | <0.5             | <0.5             | <0.5             | <0.5                             | <0.5             | -  |  |
| 2,2-Dichloropropane         | µg/l  |        | <0.5                           | <0.5             | <0.5             | <0.5             | <0.5                             | <0.5             | -  |  |
| 2-Chlorotoluene             | µg/l  |        | <0.5                           | <0.5             | <0.5             | <0.5             | <0.5                             | <0.5             | -  |  |
| 4-Chlorotoluene             | µg/l  |        | <0.5                           | <0.5             | <0.5             | <0.5             | <0.5                             | <0.5             | -  |  |
| 4-Isopropyltoluene          | µg/l  |        | <0.5                           | <0.5             | <0.5             | <0.5             | <0.5                             | <0.5             | -  |  |
| Benzene                     | µg/l  |        | <0.5                           | <0.5             | <0.5             | <0.5             | <0.5                             | <0.5             | -  |  |
| Bromobenzene                | µg/l  |        | <0.5                           | <0.5             | <0.5             | <0.5             | <0.5                             | <0.5             | -  |  |
| Bromochloromethane          | µg/l  |        | <0.5                           | <0.5             | <0.5             | <0.5             | <0.5                             | <0.5             | -  |  |
| Bromodichloromethane        | µg/l  |        | <0.5                           | <0.5             | <0.5             | <0.5             | <0.5                             | <0.5             | -  |  |
| Bromoform                   | µg/l  |        | <0.5                           | <0.5             | <0.5             | <0.5             | <0.5                             | <0.5             | -  |  |



|                         |       |        | Laboratory Ref:                | 2803592          | 2803593          | 2803594          | 2803595                          | 2803596          | 2803597  |  |
|-------------------------|-------|--------|--------------------------------|------------------|------------------|------------------|----------------------------------|------------------|--|--|
|                         |       |        | Type of sample:                | Surface Water    | Surface Water    | Surface Water    | Surface Water                    | Surface Water    | Surface Water                                      |  |
|                         |       |        | Location code:                 | WST-W0078-01-SW1 | WST-W0078-01-SW2 | WST-W0078-01-SW3 | WST-W0078-01-SW4                 | WST-W0078-01-SW6 | WST-W0078-01-SWD                                   |  |
|                         |       |        | Sampling point:                | Clear sample     | Clear sample     | Clear sample     | Light brown colour with sediment | Clear sample     | Discharge to surface water- Not running, no sample |  |
|                         |       |        | Sampled by:                    | Jim McGarry      | Jim McGarry      | Jim McGarry      | Jim McGarry                      | Jim McGarry      | Jim McGarry  |  |
|                         |       |        | Time Sampled:                  | 17:10            | 16:30            | 16:45            | 15:17                            | 15:51            | 15:00  |  |
|                         |       |        | Start/End - Dates of Analysis: |                  |                  |                  |                                  |                  | /  |  |
|                         |       |        | Status of results:             | Final Report     | Final Report     | Final Report     | Final Report                     | Final Report     | Final Report                                       |  |
| Parameters              | Units | Limits |                                |                  |                  |                  |                                  |                  |  |  |
| Bromomethane            | µg/l  |        | <0.5                           | <0.5             | <0.5             | <0.5             | <0.5                             | <0.5             | -  |  |
| c-1,2-Dichloroethene    | µg/l  |        | <0.5                           | <0.5             | <0.5             | <0.5             | <0.5                             | <0.5             | -  |  |
| c-1,3-Dichloropropene   | µg/l  |        | <0.5                           | <0.5             | <0.5             | <0.5             | <0.5                             | <0.5             | -  |  |
| Carbon Tetrachloride    | µg/l  |        | <0.5                           | <0.5             | <0.5             | <0.5             | <0.5                             | <0.5             | -  |  |
| Chlorobenzene           | µg/l  |        | <0.5                           | <0.5             | <0.5             | <0.5             | <0.5                             | <0.5             | -  |  |
| Chloroform              | µg/l  |        | <0.5                           | <0.5             | <0.5             | <0.5             | <0.5                             | <0.5             | -  |  |
| Dibromochloromethane    | µg/l  |        | <0.5                           | <0.5             | <0.5             | <0.5             | <0.5                             | <0.5             | -  |  |
| Dibromomethane          | µg/l  |        | <0.5                           | <0.5             | <0.5             | <0.5             | <0.5                             | <0.5             | -  |  |
| Dichlorodifluoromethane | µg/l  |        | <0.5                           | <0.5             | <0.5             | <0.5             | <0.5                             | <0.5             | -  |  |
| Ethylbenzene            | µg/l  |        | <0.5                           | <0.5             | <0.5             | <0.5             | <0.5                             | <0.5             | -  |  |
| Hexachlorobutadiene     | µg/l  |        | <0.5                           | <0.5             | <0.5             | <0.5             | <0.5                             | <0.5             | -  |  |
| Isopropylbenzene        | µg/l  |        | <0.5                           | <0.5             | <0.5             | <0.5             | <0.5                             | <0.5             | -  |  |
| m,p-Xylene              | µg/l  |        | <0.5                           | <0.5             | <0.5             | <0.5             | <0.5                             | <0.5             | -  |  |
| Methylene Chloride      | µg/l  |        | <0.5                           | <0.5             | <0.5             | <0.5             | <0.5                             | <0.5             | -  |  |
| Naphthalene             | µg/l  |        | <0.5                           | <0.5             | <0.5             | <0.5             | <0.5                             | <0.5             | -  |  |
| n-Butylbenzene          | µg/l  |        | <0.5                           | <0.5             | <0.5             | <0.5             | <0.5                             | <0.5             | -  |  |
| n-Propylbenzene         | µg/l  |        | <0.5                           | <0.5             | <0.5             | <0.5             | <0.5                             | <0.5             | -  |  |
| o-Xylene                | µg/l  |        | <0.5                           | <0.5             | <0.5             | <0.5             | <0.5                             | <0.5             | -  |  |
| sec-Butylbenzene        | µg/l  |        | <0.5                           | <0.5             | <0.5             | <0.5             | <0.5                             | <0.5             | -  |  |
| Styrene                 | µg/l  |        | <0.5                           | <0.5             | <0.5             | <0.5             | <0.5                             | <0.5             | -  |  |
| t-1,2-Dichloroethene    | µg/l  |        | <0.5                           | <0.5             | <0.5             | <0.5             | <0.5                             | <0.5             | -  |  |
| t-1,3-Dichloropropene   | µg/l  |        | <0.5                           | <0.5             | <0.5             | <0.5             | <0.5                             | <0.5             | -  |  |
| tert-Butylbenzene       | µg/l  |        | <0.5                           | <0.5             | <0.5             | <0.5             | <0.5                             | <0.5             | -  |  |

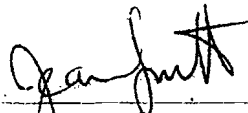
|                        |       |       | Laboratory Ref:                | 2803592          | 2803593          | 2803594          | 2803595                          | 2803596          | 2803597  |  |
|------------------------|-------|-------|--------------------------------|------------------|------------------|------------------|----------------------------------|------------------|--|--|
|                        |       |       | Type of sample:                | Surface Water    | Surface Water    | Surface Water    | Surface Water                    | Surface Water    | Surface Water                                      |  |
|                        |       |       | Location code:                 | WST-W0078-01-SW1 | WST-W0078-01-SW2 | WST-W0078-01-SW3 | WST-W0078-01-SW4                 | WST-W0078-01-SW6 | WST-W0078-01-SWD                                   |  |
|                        |       |       | Sampling point:                | Clear sample     | Clear sample     | Clear sample     | Light brown colour with sediment | Clear sample     | Discharge to surface water- Not running, no sample |  |
|                        |       |       | Sampled by:                    | Jim McGarry      | Jim McGarry      | Jim McGarry      | Jim McGarry                      | Jim McGarry      | Jim McGarry  |  |
|                        |       |       | Time Sampled:                  | 17:10            | 16:30            | 16:45            | 15:17                            | 15:51            | 15:00  |  |
|                        |       |       | Start/End - Dates of Analysis: |                  |                  |                  |                                  |                  | /  |  |
|                        |       |       | Status of results:             | Final Report     | Final Report     | Final Report     | Final Report                     | Final Report     | Final Report                                       |  |
| Parameter              | Units | Limit |                                |                  |                  |                  |                                  |                  |  |  |
| Toluene                | µg/l  |       | <0.5                           | <0.5             | <0.5             | <0.5             | <0.5                             | <0.5             | -  |  |
| Trichloroethene        | µg/l  |       | <0.5                           | <0.5             | <0.5             | <0.5             | <0.5                             | <0.5             | -  |  |
| Trichlorofluoromethane | µg/l  |       | <0.5                           | <0.5             | <0.5             | <0.5             | <0.5                             | <0.5             | -  |  |
| Vinyl Chloride         | µg/l  |       | <0.5                           | <0.5             | <0.5             | <0.5             | <0.5                             | <0.5             | -  |  |
| Aluminium              | ug/l  |       | 7.75                           | <5.0             | 24.5             | 10.5             | 30                               | 30               | -  |  |
| Antimony               | ug/l  |       | <1.0                           | <1.0             | <1.0             | <1.0             | <1.0                             | <1.0             | -  |  |
| Arsenic                | ug/l  |       | 1.28                           | <1.0             | <1.0             | 1.37             | <1.0                             | <1.0             | -  |  |
| Barium                 | ug/l  |       | 20.6                           | 38.7             | 36.1             | 16               | 38.2                             | 38.2             | -  |  |
| Beryllium              | ug/l  |       | <1.0                           | <1.0             | <1.0             | <1.0             | <1.0                             | <1.0             | -  |  |
| Boron                  | ug/l  |       | 28.9                           | 27               | 12.1             | 15.7             | 13                               | 13               | -  |  |
| Cadmium                | ug/l  |       | <1.0                           | <1.0             | <1.0             | <1.0             | <1.0                             | <1.0             | -  |  |
| Calcium                | mg/l  |       | 169                            | 160              | 70.5             | 163              | 80.8                             | 80.8             | -  |  |
| Chromium               | ug/l  |       | <1.0                           | <1.0             | <1.0             | <1.0             | <1.0                             | <1.0             | -  |  |
| Cobalt                 | ug/l  |       | <1.0                           | <1.0             | <1.0             | 1.26             | <1.0                             | <1.0             | -  |  |
| Copper                 | ug/l  |       | <1.0                           | <1.0             | <1.0             | <1.0             | <1.0                             | <1.0             | -  |  |
| Iron                   | ug/l  |       | 188                            | 133              | 113              | 892              | 152                              | 152              | -  |  |
| Lead                   | ug/l  |       | <1.0                           | <1.0             | <1.0             | <1.0             | <1.0                             | <1.0             | -  |  |
| Magnesium              | mg/l  |       | 10.6                           | 12               | 8.4              | 6.34             | 8.59                             | 8.59             | -  |  |
| Manganese              | ug/l  |       | 73.7                           | 33.7             | 14.7             | 266              | 25.2                             | 25.2             | -  |  |
| Mercury                | ug/l  |       | <0.50                          | <0.50            | <0.50            | <0.50            | <0.50                            | <0.50            | -  |  |
| Molybdenum             | ug/l  |       | <1.0                           | <1.0             | <1.0             | <1.0             | <1.0                             | <1.0             | -  |  |
| Nickel                 | ug/l  |       | <1.0                           | <1.0             | <1.0             | 1                | <1.0                             | <1.0             | -  |  |
| Potassium              | mg/l  |       | 7.69                           | 9.2              | 2.98             | 1.48             | 3.37                             | 3.37             | -  |  |

|           |       |        | Laboratory Ref:                | 2803592          | 2803593          | 2803594          | 2803595                          | 2803596          | 2803597  |
|-----------|-------|--------|--------------------------------|------------------|------------------|------------------|----------------------------------|------------------|--|
|           |       |        | Type of sample:                | Surface Water    | Surface Water    | Surface Water    | Surface Water                    | Surface Water    | Surface Water                                      |
|           |       |        | Location code:                 | WST-W0078-01-SW1 | WST-W0078-01-SW2 | WST-W0078-01-SW3 | WST-W0078-01-SW4                 | WST-W0078-01-SW6 | WST-W0078-01-SWD                                   |
|           |       |        | Sampling point:                | Clear sample     | Clear sample     | Clear sample     | Light brown colour with sediment | Clear sample     | Discharge to surface water- Not running, no sample |
|           |       |        | Sampled by:                    | Jim McGarry      | Jim McGarry      | Jim McGarry      | Jim McGarry                      | Jim McGarry      | Jim McGarry  |
|           |       |        | Time Sampled:                  | 17:10            | 16:30            | 16:45            | 15:17                            | 15:51            | 15:00  |
|           |       |        | Start/End - Dates of Analysis: |                  |                  |                  |                                  |                  | /  |
|           |       |        | Status of results:             | Final Report     | Final Report     | Final Report     | Final Report                     | Final Report     | Final Report                                       |
| Parameter | Units | Limits |                                |                  |                  |                  |                                  |                  |  |
| Selenium  | ug/l  |        | <1.0                           | <1.0             | <1.0             | <1.0             | <1.0                             | <1.0             | -  |
| Sodium    | mg/l  |        | 20.8                           | 14               | 8.71             | 8.26             | 8.99                             | 8.99             | -  |
| Thallium  | ug/l  |        | <1.0                           | <1.0             | <1.0             | <1.0             | <1.0                             | <1.0             | -  |
| Tin       | ug/l  |        | <2.0                           | <2.0             | <2.0             | <2.0             | <2.0                             | <2.0             | -  |
| Uranium   | ug/l  |        | 1.98                           | 1.98             | <1.0             | 1.28             | <1.0                             | <1.0             | -  |
| Vanadium  | ug/l  |        | <1.0                           | <1.0             | <1.0             | <1.0             | <1.0                             | <1.0             | -  |
| Zinc      | ug/l  |        | 9.74                           | 7.33             | <6.0             | 8.13             | 45.2                             | 45.2             | -  |

Comments: The watercourse at location SW4 is completely overgrown and difficult to sample.

- 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:



Date:

12/5/08

Michael Neill, Regional  
Chemist

## **Appendix 5**

# **Surface water visual inspection**

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Ballaghveny Landfill Waste Licence 0078-02

**Weekly Surface Water Monitoring Results**

**July-08**

|                           |                                |   |                           |
|---------------------------|--------------------------------|---|---------------------------|
| Site Name :               | Operator :                     | Site Address :                                  | National Grid Reference : |
| Ballaghveny Landfill Site | North Tipperary County Council | Ballaghveny, Ballymackey, Nenagh, Co. Tipperary | 197040.85E, 182012.11N    |

Monitoring Personnel:

Michael Haverty

**RESULTS**

| Date | Time | Site Status | Weather | Surfacewater Monitoring Stations | Visual Inspection | Odour Inspection | Suspended Solids(mg/L) |
|------|------|-------------|---------|----------------------------------|-------------------|------------------|------------------------|
|------|------|-------------|---------|----------------------------------|-------------------|------------------|------------------------|

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COMMENTS

|                      |                       |
|----------------------|-----------------------|
| Ballaghveny Landfill | Waste Licence 0078-02 |
|----------------------|-----------------------|

**Weekly Surfacewater Monitoring Results**

**August-08**

|                           |                                |   |                                  |
|---------------------------|--------------------------------|---|----------------------------------|
| <b>Site Name :</b>        | <b>Operator :</b>              | <b>Site Address :</b>                           | <b>National Grid Reference :</b> |
| Ballaghveny Landfill Site | North Tipperary County Council | Ballaghveny, Ballymackey, Nenagh, Co. Tipperary | 197040.85E, 182012.11N           |

**Monitoring Personnel:**  
Michael Havery / Sean Madigan

**RESULTS**

| Date | Time | Site Status | Weather | Surfacewater Monitoring Stations | Visual Inspection | Odour Inspection | Suspended Solids (mg/L) |
|------|------|-------------|---------|----------------------------------|-------------------|------------------|-------------------------|
|------|------|-------------|---------|----------------------------------|-------------------|------------------|-------------------------|

|          |       |      |               |                          |  |  |  |
|----------|-------|------|---------------|--------------------------|--|--|--|
| 21-08-08 | 14:00 | Open | Partly Cloudy | SW1 (Ballymackey Stream) |  |  |  |
|          |       |      |               | SW2 (Ballymackey Stream) |  |  |  |
|          |       |      |               | SW3 (Ballymackey Stream) |  |  |  |
|          |       |      |               | SW4 (Ballymackey Stream) |  |  |  |
|          |       |      |               | SW5 (Ballymackey Stream) |  |  |  |

|          |       |      |               |                          |  |  |  |
|----------|-------|------|---------------|--------------------------|--|--|--|
| 22-08-08 | 14:00 | Open | Partly Cloudy | SW1 (Ballymackey Stream) |  |  |  |
|          |       |      |               | SW2 (Ballymackey Stream) |  |  |  |
|          |       |      |               | SW3 (Ballymackey Stream) |  |  |  |
|          |       |      |               | SW4 (Ballymackey Stream) |  |  |  |
|          |       |      |               | SW5 (Ballymackey Stream) |  |  |  |

|          |       |      |               |                          |  |  |  |
|----------|-------|------|---------------|--------------------------|--|--|--|
| 23-08-08 | 14:00 | Open | Partly Cloudy | SW1 (Ballymackey Stream) |  |  |  |
|          |       |      |               | SW2 (Ballymackey Stream) |  |  |  |
|          |       |      |               | SW3 (Ballymackey Stream) |  |  |  |
|          |       |      |               | SW4 (Ballymackey Stream) |  |  |  |
|          |       |      |               | SW5 (Ballymackey Stream) |  |  |  |

|          |       |      |               |                          |  |  |  |
|----------|-------|------|---------------|--------------------------|--|--|--|
| 29-08-08 | 14:00 | Open | Partly Cloudy | SW1 (Ballymackey Stream) |  |  |  |
|          |       |      |               | SW2 (Ballymackey Stream) |  |  |  |
|          |       |      |               | SW3 (Ballymackey Stream) |  |  |  |
|          |       |      |               | SW4 (Ballymackey Stream) |  |  |  |
|          |       |      |               | SW5 (Ballymackey Stream) |  |  |  |

**COMMENTS**

|                      |                       |
|----------------------|-----------------------|
| Ballaghveny Landfill | Waste Licence 0078-02 |
|----------------------|-----------------------|

**Weekly Surfacewater Monitoring Results**

**September-08**

|                           |                                |   |                                  |
|---------------------------|--------------------------------|---|----------------------------------|
| <b>Site Name :</b>        | <b>Operator :</b>              | <b>Site Address :</b>                           | <b>National Grid Reference :</b> |
| Ballaghveny Landfill Site | North Tipperary County Council | Ballaghveny, Ballymackey, Nenagh, Co. Tipperary | 197040.85E, 182012.11N           |

**Monitoring Personnel:**  
Michael Haverty / Sean Madigan

**RESULTS**

| Date | Time | Site Status | Weather | Surfacewater Monitoring Stations | Visual Inspection | Odour Inspection | Suspended Solids(mg/L) |
|------|------|-------------|---------|----------------------------------|-------------------|------------------|------------------------|
|------|------|-------------|---------|----------------------------------|-------------------|------------------|------------------------|

|           |       |      |          |      |  |  |  |
|-----------|-------|------|----------|------|--|--|--|
| 05-Sep-08 | 14:00 | Open | Overcast | SWP1 |  |  |  |
|           |       |      |          | SWP2 |  |  |  |
|           |       |      |          | SWP3 |  |  |  |
|           |       |      |          | SWP4 |  |  |  |

|           |       |      |          |      |  |  |  |
|-----------|-------|------|----------|------|--|--|--|
| 05-Sep-08 | 14:00 | Open | Overcast | SWP1 |  |  |  |
|           |       |      |          | SWP2 |  |  |  |
|           |       |      |          | SWP3 |  |  |  |
|           |       |      |          | SWP4 |  |  |  |

|           |       |      |          |      |  |  |  |
|-----------|-------|------|----------|------|--|--|--|
| 05-Sep-08 | 14:00 | Open | Overcast | SWP1 |  |  |  |
|           |       |      |          | SWP2 |  |  |  |
|           |       |      |          | SWP3 |  |  |  |
|           |       |      |          | SWP4 |  |  |  |

|           |       |      |          |      |  |  |  |
|-----------|-------|------|----------|------|--|--|--|
| 05-Sep-08 | 14:00 | Open | Overcast | SWP1 |  |  |  |
|           |       |      |          | SWP2 |  |  |  |
|           |       |      |          | SWP3 |  |  |  |
|           |       |      |          | SWP4 |  |  |  |

**COMMENTS**

# **Appendix 6**

## **Groundwater composition**

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

Report of: Analysis of landfill site sample(s)  
 Report to: Environmental Management And Planning Division, EPA.  
 Report date: 12/09/08

Licensee: **North Tipperary County Council**  
 Facility: **Ballaghveny Landfill**  
 Ballymackey, Co. Tipperary,  
 Reference No: **W0078-01**

Tipperary Co. Co.  
 29 Oct 2008

Date collected: 15/07/2008 Date received: 15/07/2008

Final Section

|                                |              |        |  | Laboratory Ref:                | 2803601             | 2803602                |  |
|--------------------------------|--------------|--------|--|--------------------------------|---------------------|------------------------|--|
|                                |              |        |  | Type of sample:                | Groundwater         | Groundwater            |  |
|                                |              |        |  | Location code:                 | WST-W0078-01-GW3    | WST-W0078-01-GW5new    |  |
|                                |              |        |  | Sampling point:                | Brown colour        | slightly cloudy sample |  |
|                                |              |        |  | Sampled by:                    | Jim McGarry         | Jim McGarry            |  |
|                                |              |        |  | Time Sampled:                  | 14:51               | 14:21                  |  |
|                                |              |        |  | Start/End - Dates of Analysis: |                     |                        |  |
|                                |              |        |  | Status of results:             | <b>Final Report</b> | <b>Final Report</b>    |  |
| Parameter                      | Units        | Limits |  |                                |                     |                        |  |
| F Depth of Borehole            | m            |        |  | 17.7                           | 14                  |                        |  |
| F Water Level                  | m            |        |  | 14.4                           | 12.1                |                        |  |
| F Temperature                  | °C           |        |  | 10.8                           | 11.2                |                        |  |
| F Dissolved Oxygen (as %Sat)   | % Saturation |        |  | 16.2                           | 14.9                |                        |  |
| pH                             | pH           |        |  | 7.2                            | 7.1                 |                        |  |
| Conductivity @25°C             | µS/cm        |        |  | 867                            | 676                 |                        |  |
| Ammonia                        | mg/l N       |        |  | 0.022                          | 0.5                 |                        |  |
| Chloride                       | mg/l Cl      |        |  | 43                             | 10                  |                        |  |
| Nitrite (as N)                 | mg/l N       |        |  | <0.001                         | <0.001              |                        |  |
| ortho-Phosphate (as P)         | mg/l P       |        |  | <0.006                         | <0.006              |                        |  |
| Total Oxidised Nitrogen (as N) | mg/l N       |        |  | 12                             | <0.1                |                        |  |
| Fluoride                       | mg/l F       |        |  | <0.10                          | <0.10               |                        |  |
| Sulphate                       | mg/l SO4     |        |  | 32.0                           | 27.3                |                        |  |
| E Coli                         | per 100ml    |        |  | <10                            | <10                 |                        |  |
| Total coliforms                | No/100 ml    |        |  | 74                             | 20                  |                        |  |
| 1,1,1,2-Tetrachloroethane      | µg/l         |        |  | <0.5                           | <0.5                |                        |  |
| 1,1,1-Trichloroethane          | µg/l         |        |  | <0.5                           | <0.5                |                        |  |
| 1,1,2,2-Tetrachloroethane      | µg/l         |        |  | <0.5                           | <0.5                |                        |  |
| 1,1,2-Trichloroethane          | µg/l         |        |  | <0.5                           | <0.5                |                        |  |
| 1,1-Dichloroethane             | µg/l         |        |  | <0.5                           | <0.5                |                        |  |
| 1,1-Dichloroethene             | µg/l         |        |  | <0.5                           | <0.5                |                        |  |
| 1,1-Dichloropropene            | µg/l         |        |  | <0.5                           | <0.5                |                        |  |
| 1,2,3-Trichlorobenzene         | µg/l         |        |  | <0.5                           | <0.5                |                        |  |

Laboratory Ref:  
 Type of sample:  
 Location code:  
 Sampling point:  
 Sampled by:  
 Time Sampled:  
 Start/End - Dates of Analysis:  
 Status of results:

2803601  
 Groundwater  
 WST-W0078-01-  
 GW3  
 Brown colour  
 Jim McGarry  
 14:51  
 Final Report

2803602  
 Groundwater  
 WST-W0078-01-  
 GW5new  
 slightly cloudy sample  
 Jim McGarry  
 14:21  
 Final Report

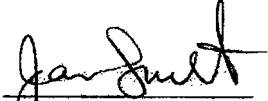
| Parameter                   | Units | Limits |      |      |
|-----------------------------|-------|--------|------|------|
| 1,2,3-Trichloropropane      | µg/l  |        | <0.5 | <0.5 |
| 1,2,4-Trichlorobenzene      | µg/l  |        | <0.5 | <0.5 |
| 1,2,4-Trimethylbenzene      | µg/l  |        | <0.5 | <0.5 |
| 1,2-Dibromo-3-Chloropropane | µg/l  |        | <0.5 | <0.5 |
| 1,2-Dibromoethene           | µg/l  |        | <0.5 | <0.5 |
| 1,2-Dichlorobenzene         | µg/l  |        | <0.5 | <0.5 |
| 1,2-Dichloroethane          | µg/l  |        | <0.5 | <0.5 |
| 1,2-Dichloropropane         | µg/l  |        | <0.5 | <0.5 |
| 1,3,5-Trimethylbenzene      | µg/l  |        | <0.5 | <0.5 |
| 1,3-Dichlorobenzene         | µg/l  |        | <0.5 | <0.5 |
| 1,3-Dichloropropane         | µg/l  |        | <0.5 | <0.5 |
| 1,4-Dichlorobenzene         | µg/l  |        | <0.5 | <0.5 |
| 2,2-Dichloropropane         | µg/l  |        | <0.5 | <0.5 |
| 2-Chlorotoluene             | µg/l  |        | <0.5 | <0.5 |
| 4-Chlorotoluene             | µg/l  |        | <0.5 | <0.5 |
| 4-Isopropyltoluene          | µg/l  |        | <0.5 | <0.5 |
| Benzene                     | µg/l  |        | <0.5 | <0.5 |
| Bromobenzene                | µg/l  |        | <0.5 | <0.5 |
| Bromochloromethane          | µg/l  |        | <0.5 | <0.5 |
| Bromodichloromethane        | µg/l  |        | <0.5 | <0.5 |
| Bromoform                   | µg/l  |        | <0.5 | <0.5 |
| Bromomethane                | µg/l  |        | <0.5 | <0.5 |
| c-1,2-Dichloroethene        | µg/l  |        | <0.5 | <0.5 |
| c-1,3-Dichloropropene       | µg/l  |        | <0.5 | <0.5 |
| Carbon Tetrachloride        | µg/l  |        | <0.5 | <0.5 |
| Chlorobenzene               | µg/l  |        | <0.5 | <0.5 |
| Chloroform                  | µg/l  |        | <0.5 | <0.5 |
| Dibromochloromethane        | µg/l  |        | <0.5 | <0.5 |
| Dibromomethane              | µg/l  |        | <0.5 | <0.5 |
| Dichlorodifluoromethane     | µg/l  |        | <0.5 | <0.5 |
| Ethylbenzene                | µg/l  |        | <0.5 | <0.5 |
| Hexachlorobutadiene         | µg/l  |        | <0.5 | <0.5 |
| Isopropylbenzene            | µg/l  |        | <0.5 | <0.5 |
| m,p-Xylene                  | µg/l  |        | <0.5 | <0.5 |
| Methylene Chloride          | µg/l  |        | <0.5 | <0.5 |
| Naphthalene                 | µg/l  |        | <0.5 | <0.5 |
| n-Butylbenzene              | µg/l  |        | <0.5 | <0.5 |
| n-Propylbenzene             | µg/l  |        | <0.5 | <0.5 |
| o-Xylene                    | µg/l  |        | <0.5 | <0.5 |
| sec-Butylbenzene            | µg/l  |        | <0.5 | <0.5 |

|                        |       |        | Laboratory Ref:                | 2803601          | 2803602                |  |
|------------------------|-------|--------|--------------------------------|------------------|------------------------|--|
|                        |       |        | Type of sample:                | Groundwater      | Groundwater            |  |
|                        |       |        | Location code:                 | WST-W0078-01-GW3 | WST-W0078-01-GW5new    |  |
|                        |       |        | Sampling point:                | Brown colour     | slightly cloudy sample |  |
|                        |       |        | Sampled by:                    | Jim McGarry      | Jim McGarry            |  |
|                        |       |        | Time Sampled:                  | 14:51            | 14:21                  |  |
|                        |       |        | Start/End - Dates of Analysis: |                  |                        |  |
|                        |       |        | Status of results:             | Final Report     | Final Report           |  |
| Parameter              | Units | Limits |                                |                  |                        |  |
| Styrene                | µg/l  |        | <0.5                           | <0.5             |                        |  |
| t-1,2-Dichloroethene   | µg/l  |        | <0.5                           | <0.5             |                        |  |
| t-1,3-Dichloropropene  | µg/l  |        | <0.5                           | <0.5             |                        |  |
| tert-Butylbenzene      | µg/l  |        | <0.5                           | <0.5             |                        |  |
| Toluene                | µg/l  |        | <0.5                           | <0.5             |                        |  |
| Trichloroethene        | µg/l  |        | <0.5                           | <0.5             |                        |  |
| Trichlorofluoromethane | µg/l  |        | <0.5                           | <0.5             |                        |  |
| Vinyl Chloride         | µg/l  |        | <0.5                           | <0.5             |                        |  |
| Aluminium              | ug/l  |        | 424                            | 125              |                        |  |
| Antimony               | ug/l  |        | <1.0                           | <1.0             |                        |  |
| Arsenic                | ug/l  |        | <1.0                           | 4.37             |                        |  |
| Barium                 | ug/l  |        | 51.7                           | 18               |                        |  |
| Beryllium              | ug/l  |        | <1.0                           | <1.0             |                        |  |
| Boron                  | ug/l  |        | 17.2                           | 10.3             |                        |  |
| Cadmium                | ug/l  |        | <1.0                           | <1.0             |                        |  |
| Calcium                | mg/l  |        | 159                            | 148              |                        |  |
| Chromium               | ug/l  |        | <1.0                           | <1.0             |                        |  |
| Cobalt                 | ug/l  |        | <1.0                           | <1.0             |                        |  |
| Copper                 | ug/l  |        | <1.0                           | <1.0             |                        |  |
| Iron                   | ug/l  |        | 757                            | 3050             |                        |  |
| Lead                   | ug/l  |        | 2.86                           | <1.0             |                        |  |
| Magnesium              | mg/l  |        | 12.2                           | 6.13             |                        |  |
| Manganese              | ug/l  |        | 91.8                           | 323              |                        |  |
| Mercury                | ug/l  |        | <0.50                          | <0.50            |                        |  |
| Molybdenum             | ug/l  |        | <1.0                           | <1.0             |                        |  |
| Nickel                 | ug/l  |        | <1.0                           | <1.0             |                        |  |
| Potassium              | mg/l  |        | 16.1                           | 1.47             |                        |  |
| Selenium               | ug/l  |        | <1.0                           | <1.0             |                        |  |
| Sodium                 | mg/l  |        | 24.1                           | 7.37             |                        |  |
| Thallium               | ug/l  |        | <1.0                           | <1.0             |                        |  |
| Tin                    | ug/l  |        | <2.0                           | <2.0             |                        |  |
| Uranium                | ug/l  |        | <1.0                           | 1.09             |                        |  |
| Vanadium               | ug/l  |        | <1.0                           | <1.0             |                        |  |
| Zinc                   | ug/l  |        | 14.4                           | 11.9             |                        |  |

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

Signed:

  
Michael Neill, Regional  
Chemist

Date:

12/9/08



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

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Report of: Analysis of landfill site sample(s)  
Report to: Environmental Management And Planning Division, EPA.  
Report date: 12/09/08

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Licensee: **North Tipperary County Council**  
Facility: **Ballaghveny Landfill**  
Ballymackey, Co. Tipperary,  
Reference No: W0078-01

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Date collected: 17/07/2008      Date received: 17/07/2008

North Tipperary Co. Co.  
28 OCT 2008  
Environment Section

|                                |              |        | Laboratory Ref:                | 2803673             | 2803674              | 2803675           | 2803676             |  |
|--------------------------------|--------------|--------|--------------------------------|---------------------|----------------------|-------------------|---------------------|--|
|                                |              |        | Type of sample:                | Groundwater         | Groundwater          | Groundwater       | Groundwater         |  |
|                                |              |        | Location code:                 | WST-W0078-01-GW9new | WST-W0078-01-GW10new | WST-W0078-01-GW12 | WST-W0078-01-BH3new |  |
|                                |              |        | Sampling point:                | Clear sample        | Clear sample         | Clear sample      | Cloudy sample       |  |
|                                |              |        | Sampled by:                    | Jim McGarry         | Jim McGarry          | Jim McGarry       | Jim McGarry         |  |
|                                |              |        | Time Sampled:                  | 16:21               | 15:47                | 15:22             | 16:48               |  |
|                                |              |        | Start/End - Dates of Analysis: |                     |                      |                   |                     |  |
|                                |              |        | Status of results:             | Final Report        | Final Report         | Final Report      | Final Report        |  |
| Parameter                      | Units        | Limits |                                |                     |                      |                   |                     |  |
| F Depth of Borehole            | m            |        | 13.3                           | 13.4                | nm                   | 12.2              |                     |  |
| F Water Level                  | m            |        | 8.4                            | 9.8                 | nm                   | 6.6               |                     |  |
| F Temperature                  | °C           |        | 12.1                           | 11.5                | 11.8                 | 11.2              |                     |  |
| F Dissolved Oxygen (as %Sat)   | % Saturation |        | 25.2                           | 53.6                | 86.8                 | 13.7              |                     |  |
| pH                             | pH           |        | 7.2                            | 7.2                 | 7.3                  | 7.1               |                     |  |
| Conductivity @25°C             | µS/cm        |        | 1457                           | 929                 | 797                  | 1031              |                     |  |
| Ammonia                        | mg/l N       |        | 9.9                            | 0.031               | 0.021                | 0.62              |                     |  |
| Chloride                       | mg/l Cl      |        | 147                            | 41                  | 38                   | 49                |                     |  |
| Nitrite (as N)                 | mg/l N       |        | 0.001                          | <0.001              | 0.007                | <0.001            |                     |  |
| ortho-Phosphate (as P)         | mg/l P       |        | <0.006                         | <0.006              | 0.01                 | <0.006            |                     |  |
| Total Oxidised Nitrogen (as N) | mg/l N       |        | 4.5                            | 18                  | 6.4                  | 11                |                     |  |
| Fluoride                       | mg/l F       |        | 0.16                           | <0.10               | <0.10                | <0.10             |                     |  |
| Sulphate                       | mg/l SO4     |        | 31.8                           | 17.0                | 14.6                 | 20.6              |                     |  |
| E Coli                         | per 100ml    |        | <10                            | <10                 | <10                  | <10               |                     |  |
| Total coliforms                | No/100 ml    |        | <10                            | <10                 | 8164                 | <10               |                     |  |
| 1,1,1,2-Tetrachloroethane      | µg/l         |        | <0.5                           | <0.5                | <0.5                 | <0.5              |                     |  |
| 1,1,1-Trichloroethane          | µg/l         |        | <0.5                           | 0.7                 | 1.2                  | <0.5              |                     |  |
| 1,1,2,2-Tetrachloroethane      | µg/l         |        | <0.5                           | <0.5                | <0.5                 | <0.5              |                     |  |
| 1,1,2-Trichloroethane          | µg/l         |        | <0.5                           | <0.5                | <0.5                 | <0.5              |                     |  |
| 1,1-Dichloroethane             | µg/l         |        | <0.5                           | 3.6                 | 2.5                  | <0.5              |                     |  |
| 1,1-Dichloroethene             | µg/l         |        | <0.5                           | <0.5                | <0.5                 | <0.5              |                     |  |
| 1,1-Dichloropropene            | µg/l         |        | <0.5                           | <0.5                | <0.5                 | <0.5              |                     |  |
| 1,2,3-Trichlorobenzene         | µg/l         |        | <0.5                           | <0.5                | <0.5                 | <0.5              |                     |  |

|                             |       |        | Laboratory Ref:                | 2803673             | 2803674              | 2803675           | 2803676             |  |
|-----------------------------|-------|--------|--------------------------------|---------------------|----------------------|-------------------|---------------------|--|
|                             |       |        | Type of sample:                | Groundwater         | Groundwater          | Groundwater       | Groundwater         |  |
|                             |       |        | Location code:                 | WST-W0078-01-GW9new | WST-W0078-01-GW10new | WST-W0078-01-GW12 | WST-W0078-01-BH3new |  |
|                             |       |        | Sampling point:                | Clear sample        | Clear sample         | Clear sample      | Cloudy sample       |  |
|                             |       |        | Sampled by:                    | Jim McGarry         | Jim McGarry          | Jim McGarry       | Jim McGarry         |  |
|                             |       |        | Time Sampled:                  | 16:21               | 15:47                | 15:22             | 16:48               |  |
|                             |       |        | Start/End - Dates of Analysis: |                     |                      |                   |                     |  |
|                             |       |        | Status of results:             | Final Report        | Final Report         | Final Report      | Final Report        |  |
| Parameter                   | Units | Limits |                                |                     |                      |                   |                     |  |
| 1,2,3-Trichloropropane      | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| 1,2,4-Trichlorobenzene      | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| 1,2,4-Trimethylbenzene      | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| 1,2-Dibromo-3-Chloropropane | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| 1,2-Dibromoethene           | 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                |  |
| 1,2-Dichloroethane          | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| 1,2-Dichloropropane         | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| 1,3,5-Trimethylbenzene      | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| 1,3-Dichlorobenzene         | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| 1,3-Dichloropropane         | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| 1,4-Dichlorobenzene         | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| 2,2-Dichloropropane         | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| 2-Chlorotoluene             | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| 4-Chlorotoluene             | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| 4-Isopropyltoluene          | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| Benzene                     | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| Bromobenzene                | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| Bromochloromethane          | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| Bromodichloromethane        | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| Bromoform                   | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| Bromomethane                | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| c-1,2-Dichloroethene        | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| c-1,3-Dichloropropene       | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |

|                         |       |        | Laboratory Ref:                | 2803673             | 2803674              | 2803675           | 2803676             |  |
|-------------------------|-------|--------|--------------------------------|---------------------|----------------------|-------------------|---------------------|--|
|                         |       |        | Type of sample:                | Groundwater         | Groundwater          | Groundwater       | Groundwater         |  |
|                         |       |        | Location code:                 | WST-W0078-01-GW9new | WST-W0078-01-GW10new | WST-W0078-01-GW12 | WST-W0078-01-BH3new |  |
|                         |       |        | Sampling point:                | Clear sample        | Clear sample         | Clear sample      | Cloudy sample       |  |
|                         |       |        | Sampled by:                    | Jim McGarry         | Jim McGarry          | Jim McGarry       | Jim McGarry         |  |
|                         |       |        | Time Sampled:                  | 16:21               | 15:47                | 15:22             | 16:48               |  |
|                         |       |        | Start/End - Dates of Analysis: |                     |                      |                   |                     |  |
|                         |       |        | Status of results:             | Final Report        | Final Report         | Final Report      | Final Report        |  |
| Parameter               | Units | Limits |                                |                     |                      |                   |                     |  |
| Carbon Tetrachloride    | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| Chlorobenzene           | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| Chloroform              | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| Dibromochloromethane    | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| Dibromomethane          | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| Dichlorodifluoromethane | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| Ethylbenzene            | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| Hexachlorobutadiene     | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| Isopropylbenzene        | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| m,p-Xylene              | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| Methylene Chloride      | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| Naphthalene             | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| n-Butylbenzene          | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| n-Propylbenzene         | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| o-Xylene                | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| 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                |  |
| t-1,2-Dichloroethene    | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| t-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                |  |
| Toluene                 | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| Trichloroethene         | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| Trichlorofluoromethane  | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| Vinyl Chloride          | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |



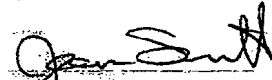
|                                       |                     |                      |                     |                     |
|---------------------------------------|---------------------|----------------------|---------------------|---------------------|
| <b>Laboratory Ref:</b>                | 2803673             | 2803674              | 2803675             | 2803676             |
| <b>Type of sample:</b>                | Groundwater         | Groundwater          | Groundwater         | Groundwater         |
| <b>Location code:</b>                 | WST-W0078-01-GW9new | WST-W0078-01-GW10new | WST-W0078-01-GW12   | WST-W0078-01-BH3new |
| <b>Sampling point:</b>                | Clear sample        | Clear sample         | Clear sample        | Cloudy sample       |
| <b>Sampled by:</b>                    | Jim McGarry         | Jim McGarry          | Jim McGarry         | Jim McGarry         |
| <b>Time Sampled:</b>                  | 16:21               | 15:47                | 15:22               | 16:48               |
| <b>Start/End - Dates of Analysis:</b> |                     |                      |                     |                     |
| <b>Status of results:</b>             | <b>Final Report</b> | <b>Final Report</b>  | <b>Final Report</b> | <b>Final Report</b> |

| meter      | Units | Limits |       |       |       |       |
|------------|-------|--------|-------|-------|-------|-------|
| Aluminum   | ug/l  |        | 91.7  | 51.1  | <5.0  | 69.7  |
| Antimony   | ug/l  |        | <1.0  | <1.0  | <1.0  | <1.0  |
| Arsenic    | ug/l  |        | 1.74  | <1.0  | <1.0  | <1.0  |
| Barium     | ug/l  |        | 49.1  | 18.3  | 12.4  | 27.8  |
| Beryllium  | ug/l  |        | <1.0  | <1.0  | <1.0  | <1.0  |
| Boron      | ug/l  |        | 185   | 40.1  | 21.6  | 126   |
| Cadmium    | ug/l  |        | <1.0  | <1.0  | <1.0  | <1.0  |
| Calcium    | mg/l  |        | 168   | 171   | 145   | 184   |
| Chromium   | ug/l  |        | <1.0  | <1.0  | <1.0  | <1.0  |
| Cobalt     | ug/l  |        | 3.77  | <1.0  | <1.0  | 1.65  |
| Copper     | ug/l  |        | <1.0  | <1.0  | <1.0  | <1.0  |
| Iron       | ug/l  |        | 453   | 238   | 111   | 258   |
| Lead       | ug/l  |        | 1.41  | <1.0  | <1.0  | <1.0  |
| Magnesium  | mg/l  |        | 31.1  | 14.1  | 11.2  | 19    |
| Manganese  | ug/l  |        | 344   | <10.0 | <10.0 | 241   |
| Mercury    | ug/l  |        | <0.50 | <0.50 | <0.50 | <0.50 |
| Molybdenum | ug/l  |        | <1.0  | <1.0  | <1.0  | <1.0  |
| Nickel     | ug/l  |        | 4.27  | <1.0  | <1.0  | <1.0  |
| Potassium  | mg/l  |        | 20.9  | 3.14  | 3.09  | 16.7  |
| Selenium   | ug/l  |        | 3.09  | 1.2   | 1.11  | 1     |
| Sodium     | mg/l  |        | 68.3  | 19.3  | 19    | 39.7  |
| Thallium   | ug/l  |        | <1.0  | <1.0  | <1.0  | <1.0  |
| Zinc       | ug/l  |        | <2.0  | <2.0  | <2.0  | <2.0  |
| Zinc       | ug/l  |        | <1.0  | <1.0  | <1.0  | <1.0  |

|                                       |              |               | 2803673             | 2803674              | 2803675             | 2803676             |  |
|---------------------------------------|--------------|---------------|---------------------|----------------------|---------------------|---------------------|--|
| <b>Laboratory Ref:</b>                |              |               | 2803673             | 2803674              | 2803675             | 2803676             |  |
| <b>Type of sample:</b>                |              |               | Groundwater         | Groundwater          | Groundwater         | Groundwater         |  |
| <b>Location code:</b>                 |              |               | WST-W0078-01-GW9new | WST-W0078-01-GW10new | WST-W0078-01-GW12   | WST-W0078-01-BH3new |  |
| <b>Sampling point:</b>                |              |               | Clear sample        | Clear sample         | Clear sample        | Cloudy sample       |  |
| <b>Sampled by:</b>                    |              |               | Jim McGarry         | Jim McGarry          | Jim McGarry         | Jim McGarry         |  |
| <b>Time Sampled:</b>                  |              |               | 16:21               | 15:47                | 15:22               | 16:48               |  |
| <b>Start/End - Dates of Analysis:</b> |              |               |                     |                      |                     |                     |  |
| <b>Status of results:</b>             |              |               | <b>Final Report</b> | <b>Final Report</b>  | <b>Final Report</b> | <b>Final Report</b> |  |
| <b>Parameter</b>                      | <b>Units</b> | <b>Limits</b> |                     |                      |                     |                     |  |
| Vanadium                              | ug/l         |               | <1.0                | <1.0                 | <1.0                | <1.0                |  |
| Zinc                                  | ug/l         |               | 9.59                | 7.36                 | 8.47                | 9.51                |  |
|                                       |              |               |                     |                      |                     |                     |  |

**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 Castletar, 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:   
 Michael Neill, Regional  
 Chemist

Date: 12/5/08



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

Report of: Analysis of landfill site sample(s)  
 Report to: Environmental Management And Planning Division, EPA.  
 Report date: 12/09/08

Licensee: North Tipperary County Council  
 Facility: Ballaghveny Landfill  
 Ballymackey, Co. Tipperary,  
 Reference No: W0078-01

North Tipperary C. Council  
 28 OCT 2008  
 Environmental Section

Date collected: 15/07/2008 Date received: 15/07/2008

|                                |              |                 | Laboratory Ref:                | 2803598               | 2803599                | 2803600                 |
|--------------------------------|--------------|-----------------|--------------------------------|-----------------------|------------------------|-------------------------|
|                                |              |                 | Type of sample:                | Drinking Water        | Drinking Water         | Drinking Water          |
|                                |              |                 | Location code:                 | WST-W0078-01-Bressons | WST-W0078-01-Cullinans | WST-W0078-01-Hogans     |
|                                |              |                 | Sampling point:                | Clear sample          | Clear sample           | not available-no sample |
|                                |              |                 | Sampled by:                    | Jim McGarry           | Jim McGarry            | Jim McGarry             |
|                                |              |                 | Time Sampled:                  | 17:10                 | 16:11                  | 17:10                   |
|                                |              |                 | Start/End - Dates of Analysis: |                       |                        | /                       |
|                                |              |                 | Status of results:             | Final Report          | Final Report           | Final Report            |
| Parameter                      | Units        | Limits          |                                |                       |                        |                         |
| F Temperature                  | °C           |                 | 14.6                           | 12.1                  | -                      |                         |
| F Dissolved Oxygen (as %Sat)   | % Saturation |                 | 55.0                           | 34.5                  | -                      |                         |
| pH                             | pH           | > 6.5 And < 9.5 | 7.3                            | 7.4                   | -                      |                         |
| Conductivity @25°C             | µS/cm        | < 2764          | 800                            | 796                   | -                      |                         |
| Turbidity                      | FTU          | < 1             | 0.1                            | 0.1                   | -                      |                         |
| Ammonia                        | mg/l N       | < 0.23          | <0.003                         | 0.01                  | -                      |                         |
| Chloride                       | mg/l Cl      |                 | 22                             | 46                    | -                      |                         |
| Nitrite (as N)                 | mg/l N       | < 0.15          | <0.001                         | 0.009                 | -                      |                         |
| ortho-Phosphate (as P)         | mg/l P       |                 | <0.006                         | <0.006                | -                      |                         |
| Total Oxidised Nitrogen (as N) | mg/l N       | < 11.3          | 6                              | 2.5                   | -                      |                         |
| Alkalinity-total (as CaCO3)    | mg/l CaCO3   |                 | 398                            | 350                   | -                      |                         |
| Total Organic Carbon           | mg/l C       |                 | 0.7                            | <0.5                  | -                      |                         |
| Fluoride                       | mg/l F       |                 | <0.10                          | 0.99                  | -                      |                         |
| Sulphate                       | mg/l SO4     |                 | 24.9                           | 33.9                  | -                      |                         |
| E Coli                         | per 100ml    | 0               | 0                              | 0                     | -                      |                         |
| Total coliforms                | No/100 ml    | 0               | 0                              | 0                     | -                      |                         |
| 1,1,1,2-Tetrachloroethane      | µg/l         |                 | <0.5                           | <0.5                  | -                      |                         |
| 1,1,1-Trichloroethane          | µg/l         |                 | <0.5                           | <0.5                  | -                      |                         |
| 1,1,2,2-Tetrachloroethane      | µg/l         |                 | <0.5                           | <0.5                  | -                      |                         |
| 1,1,2-Trichloroethane          | µg/l         |                 | <0.5                           | <0.5                  | -                      |                         |
| 1,1-Dichloroethane             | µg/l         |                 | <0.5                           | <0.5                  | -                      |                         |
| 1,1-Dichloroethene             | µg/l         |                 | <0.5                           | <0.5                  | -                      |                         |

**Laboratory Ref:**  
**Type of sample:**  
**Location code:**  
**Sampling point:**  
**Sampled by:**  
**Time Sampled:**  
**Start/End - Dates of Analysis:**  
**Status of results:**

2803598  
 Drinking Water  
 WST-W0078-01-  
 Bressons  
 Clear sample  
 Jim McGarry  
 17:10  
 Final Report

2803599  
 Drinking Water  
 WST-W0078-01-  
 Cullinans  
 Clear sample  
 Jim McGarry  
 16:11  
 Final Report

2803600  
 Drinking Water  
 WST-W0078-01-  
 Hogans  
 not available-no sample  
 Jim McGarry  
 17:10  
 Final Report

| Parameter                   | Units | Limits |      |      |   |
|-----------------------------|-------|--------|------|------|---|
| 1,2,3-Trichlorobenzene      | µg/l  |        | <0.5 | <0.5 | - |
| 1,2,3-Trichloropropane      | µg/l  |        | <0.5 | <0.5 | - |
| 1,2,4-Trichlorobenzene      | µg/l  |        | <0.5 | <0.5 | - |
| 1,2,4-Trimethylbenzene      | µg/l  |        | <0.5 | <0.5 | - |
| 1,2-Dibromo-3-Chloropropane | µg/l  |        | <0.5 | <0.5 | - |
| 1,2-Dibromoethene           | µg/l  |        | <0.5 | <0.5 | - |
| 1,2-Dichlorobenzene         | µg/l  |        | <0.5 | <0.5 | - |
| 1,2-Dichloroethane          | µg/l  |        | <0.5 | <0.5 | - |
| 1,2-Dichloropropane         | µg/l  |        | <0.5 | <0.5 | - |
| 1,3,5-Trimethylbenzene      | µg/l  |        | <0.5 | <0.5 | - |
| 1,3-Dichlorobenzene         | µg/l  |        | <0.5 | <0.5 | - |
| 1,3-Dichloropropane         | µg/l  |        | <0.5 | <0.5 | - |
| 1,4-Dichlorobenzene         | µg/l  |        | <0.5 | <0.5 | - |
| 2,2-Dichloropropane         | µg/l  |        | <0.5 | <0.5 | - |
| 2-Chlorotoluene             | µg/l  |        | <0.5 | <0.5 | - |
| 4-Chlorotoluene             | µg/l  |        | <0.5 | <0.5 | - |
| 4-Isopropyltoluene          | µg/l  |        | <0.5 | <0.5 | - |
| Benzene                     | µg/l  |        | <0.5 | <0.5 | - |
| Bromobenzene                | µg/l  |        | <0.5 | <0.5 | - |
| Bromochloromethane          | µg/l  |        | <0.5 | <0.5 | - |
| Bromodichloromethane        | µg/l  |        | 3.6  | <0.5 | - |
| Bromofom                    | µg/l  |        | 7.7  | <0.5 | - |
| Bromomethane                | µg/l  |        | <0.5 | <0.5 | - |
| c-1,2-Dichloroethene        | µg/l  |        | <0.5 | <0.5 | - |
| c-1,3-Dichloropropene       | µg/l  |        | <0.5 | <0.5 | - |
| Carbon Tetrachloride        | µg/l  |        | <0.5 | <0.5 | - |
| Chlorobenzene               | µg/l  |        | <0.5 | <0.5 | - |
| Chloroform                  | µg/l  |        | 0.6  | <0.5 | - |
| Dibromochloromethane        | µg/l  |        | 9.6  | <0.5 | - |
| Dibromomethane              | µg/l  |        | <0.5 | <0.5 | - |
| Dichlorodifluoromethane     | µg/l  |        | <0.5 | <0.5 | - |
| Ethylbenzene                | µg/l  |        | <0.5 | <0.5 | - |
| Hexachlorobutadiene         | µg/l  |        | <0.5 | <0.5 | - |
| Isopropylbenzene            | µg/l  |        | <0.5 | <0.5 | - |
| m,p-Xylene                  | µg/l  |        | <0.5 | <0.5 | - |
| Methylene Chloride          | µg/l  |        | <0.5 | <0.5 | - |
| Naphthalene                 | µg/l  |        | <0.5 | <0.5 | - |
| n-Butylbenzene              | µg/l  |        | <0.5 | <0.5 | - |
| n-Propylbenzene             | µg/l  |        | <0.5 | <0.5 | - |
| o-Xylene                    | µg/l  |        | <0.5 | <0.5 | - |

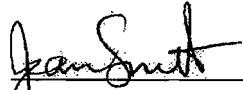
|                                       |                       |                        |                         |
|---------------------------------------|-----------------------|------------------------|-------------------------|
| <b>Laboratory Ref:</b>                | 2803598               | 2803599                | 2803600                 |
| <b>Type of sample:</b>                | Drinking Water        | Drinking Water         | Drinking Water          |
| <b>Location code:</b>                 | WST-W0078-01-Bressons | WST-W0078-01-Cullinans | WST-W0078-01-Hogans     |
| <b>Sampling point:</b>                | Clear sample          | Clear sample           | not available-no sample |
| <b>Sampled by:</b>                    | Jim McGarry           | Jim McGarry            | Jim McGarry             |
| <b>Time Sampled:</b>                  | 17:10                 | 16:11                  | 17:10                   |
| <b>Start/End - Dates of Analysis:</b> |                       |                        | /                       |
| <b>Status of results:</b>             | <b>Final Report</b>   | <b>Final Report</b>    | <b>Final Report</b>     |

| Parameter              | Units | Limits |       |       |   |
|------------------------|-------|--------|-------|-------|---|
| sec-Butylbenzene       | µg/l  |        | <0.5  | <0.5  | - |
| Styrene                | µg/l  |        | <0.5  | <0.5  | - |
| t-1,2-Dichloroethene   | µg/l  |        | <0.5  | <0.5  | - |
| t-1,3-Dichloropropene  | µg/l  |        | <0.5  | <0.5  | - |
| tert-Butylbenzene      | µg/l  |        | <0.5  | <0.5  | - |
| Toluene                | µg/l  |        | <0.5  | <0.5  | - |
| Trichloroethene        | µg/l  |        | <0.5  | <0.5  | - |
| Trichlorofluoromethane | µg/l  |        | <0.5  | <0.5  | - |
| Vinyl Chloride         | µg/l  |        | <0.5  | <0.5  | - |
| Aluminium              | ug/l  |        | <5.0  | <5.0  | - |
| Antimony               | ug/l  |        | <1.0  | <1.0  | - |
| Arsenic                | ug/l  |        | <1.0  | <1.0  | - |
| Barium                 | ug/l  |        | 20.2  | 28.4  | - |
| Beryllium              | ug/l  |        | <1.0  | <1.0  | - |
| Boron                  | ug/l  |        | 31    | 180   | - |
| Cadmium                | ug/l  |        | <1.0  | <1.0  | - |
| Calcium                | mg/l  |        | 160   | 96.3  | - |
| Chromium               | ug/l  |        | <1.0  | <1.0  | - |
| Cobalt                 | ug/l  |        | <1.0  | <1.0  | - |
| Copper                 | ug/l  |        | 18.4  | <1.0  | - |
| Iron                   | ug/l  |        | 92.2  | 45    | - |
| Lead                   | ug/l  |        | <1.0  | <1.0  | - |
| Magnesium              | mg/l  |        | 13.2  | 41.1  | - |
| Manganese              | ug/l  |        | <10.0 | <10.0 | - |
| Mercury                | ug/l  |        | <0.50 | <0.50 | - |
| Molybdenum             | ug/l  |        | <1.0  | <1.0  | - |
| Nickel                 | ug/l  |        | <1.0  | <1.0  | - |
| Potassium              | mg/l  |        | 5.64  | 4.24  | - |
| Selenium               | ug/l  |        | <1.0  | <1.0  | - |
| Sodium                 | mg/l  |        | 10.7  | 27.5  | - |
| Thallium               | ug/l  |        | <1.0  | <1.0  | - |
| Tin                    | ug/l  |        | <2.0  | <2.0  | - |
| Uranium                | ug/l  |        | <1.0  | <1.0  | - |
| Vanadium               | ug/l  |        | <1.0  | <1.0  | - |
| Zinc                   | ug/l  |        | 33.9  | 7.85  | - |

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:



PL

Michael Neill, Regional  
Chemist

Date:

12/9/08

# **Appendix 7**

## **Groundwater levels**

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## Quarterly Groundwater Monitoring Form

**Ballaghveny Landfill**      **Waste Licence 0078-02**

**Quarter 3 2008**

|                           |                                |   |                                  |
|---------------------------|--------------------------------|---|----------------------------------|
| <b>Site Name :</b>        | <b>Operator :</b>              | <b>Site Address :</b>                           | <b>National Grid Reference :</b> |
| Ballaghveny Landfill Site | North Tipperary County Council | Ballaghveny, Ballymackey, Nenagh, Co. Tipperary | 197040.85E, 182012.11N           |

**Instrument used :**  
Geotechnical Instruments EA 450/010 Borehole Dipper

**Monitoring Personnel:**  
Sean Madigan (Site Technician)

### RESULTS

| Date | Time | Site Status | Weather | Groundwater Monitoring Stations | Groundwater Monitoring Total Borehole depth (in Meters) | Depth at which Groundwater reached (in meters) | Height of Groundwater (in Meters) |
|------|------|-------------|---------|---------------------------------|---|--|-----------------------------------|
|------|------|-------------|---------|---------------------------------|---|--|-----------------------------------|

|           |       |      |           |                  |      |      |      |
|-----------|-------|------|-----------|------------------|------|------|------|
| 16-Jul-08 | 11:00 | Open | sunny/hot | SW5              | 1.80 | 1.5  | 1.25 |
|           |       |      |           | SW10             | 1.90 | 1.70 | 1.20 |
|           |       |      |           | SW9              | 1.80 | 1.6  | 1.20 |
|           |       |      |           | BRB1             | 1.80 | 1.6  | 1.20 |
|           |       |      |           | SW12             | 1.90 | 1.5  | 1.25 |
|           |       |      |           | SW11             | 1.80 | 1.6  | 1.20 |
|           |       |      |           | SW13             | 1.90 | 1.10 | 1.50 |
|           |       |      |           | WGB1/SW14 (comp) | 1.70 | 1.0  | 1.50 |
|           |       |      |           | BRB1/SW14 (comp) | 1.70 | 1.0  | 1.50 |

|           |       |      |          |                  |      |      |      |
|-----------|-------|------|----------|------------------|------|------|------|
| 26-Aug-08 | 14:00 | Open | overcast | SW5              | 1.80 | 1.5  | 1.25 |
|           |       |      |          | SW10             | 1.90 | 1.70 | 1.20 |
|           |       |      |          | SW9              | 1.80 | 1.6  | 1.20 |
|           |       |      |          | BRB1             | 1.80 | 1.6  | 1.20 |
|           |       |      |          | SW12             | 1.90 | 1.5  | 1.25 |
|           |       |      |          | SW11             | 1.80 | 1.6  | 1.20 |
|           |       |      |          | SW13             | 1.90 | 1.10 | 1.50 |
|           |       |      |          | WGB1/SW14 (comp) | 1.70 | 1.0  | 1.50 |
|           |       |      |          | BRB1/SW14 (comp) | 1.70 | 1.0  | 1.50 |

|           |       |      |          |                  |      |      |      |
|-----------|-------|------|----------|------------------|------|------|------|
| 27-Sep-08 | 11:00 | Open | overcast | SW5              | 1.80 | 1.5  | 1.25 |
|           |       |      |          | SW10             | 1.90 | 1.70 | 1.20 |
|           |       |      |          | SW9              | 1.80 | 1.6  | 1.20 |
|           |       |      |          | BRB1             | 1.80 | 1.6  | 1.20 |
|           |       |      |          | SW12             | 1.90 | 1.5  | 1.25 |
|           |       |      |          | SW11             | 1.80 | 1.6  | 1.20 |
|           |       |      |          | SW13             | 1.90 | 1.10 | 1.50 |
|           |       |      |          | WGB1/SW14 (comp) | 1.70 | 1.0  | 1.50 |
|           |       |      |          | BRB1/SW14 (comp) | 1.70 | 1.0  | 1.50 |



## **Appendix 8**

# **Quarterly groundwater visual inspection**

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Report of: Analysis of landfill site sample(s)  
Report to: Environmental Management And Planning Division, EPA.  
Report date: 12/09/08

Licensee: **North Tipperary County Council**  
Facility: **Ballaghveny Landfill**  
Ballymackey, Co. Tipperary,  
Reference No: **W0078-01**

Date collected: 15/07/2008 Date received: 15/07/2008

| Parameter                      |                                | Units        | Limits | 2803601          | 2803602                |
|--------------------------------|--------------------------------|--------------|--------|------------------|------------------------|
| Laboratory Ref:                |                                |              |        | 2803601          | 2803602                |
| Type of sample:                |                                |              |        | Groundwater      | Groundwater            |
| Location code:                 |                                |              |        | WST-W0078-01-GW3 | WST-W0078-01-GW5new    |
| Sampling point:                |                                |              |        | Brown colour     | slightly cloudy sample |
| Sampled by:                    |                                |              |        | Jim McGarry      | Jim McGarry            |
| Time Sampled:                  |                                |              |        | 14:51            | 14:21                  |
| Start/End - Dates of Analysis: |                                |              |        |                  |                        |
| Status of results:             |                                |              |        | Final Report     | Final Report           |
| F                              | Depth of Borehole              | m            |        | 17.7             | 14                     |
| F                              | Water Level                    | m            |        | 14.4             | 12.1                   |
| F                              | Temperature                    | °C           |        | 10.8             | 11.2                   |
| F                              | Dissolved Oxygen (as %Sat)     | % Saturation |        | 16.2             | 14.9                   |
|                                | pH                             | pH           |        | 7.2              | 7.1                    |
|                                | Conductivity @25°C             | µS/cm        |        | 867              | 676                    |
|                                | Ammonia                        | mg/l N       |        | 0.022            | 0.5                    |
|                                | Chloride                       | mg/l Cl      |        | 43               | 10                     |
|                                | Nitrite (as N)                 | mg/l N       |        | <0.001           | <0.001                 |
|                                | ortho-Phosphate (as P)         | mg/l P       |        | <0.006           | <0.006                 |
|                                | Total Oxidised Nitrogen (as N) | mg/l N       |        | 12               | <0.1                   |
|                                | Fluoride                       | mg/l F       |        | <0.10            | <0.10                  |
|                                | Sulphate                       | mg/l SO4     |        | 32.0             | 27.3                   |
|                                | E Coli                         | per 100ml    |        | <10              | <10                    |
|                                | Total coliforms                | No/100 ml    |        | 74               | 20                     |
|                                | 1,1,1,2-Tetrachloroethane      | µg/l         |        | <0.5             | <0.5                   |
|                                | 1,1,1-Trichloroethane          | µg/l         |        | <0.5             | <0.5                   |
|                                | 1,1,2,2-Tetrachloroethane      | µg/l         |        | <0.5             | <0.5                   |
|                                | 1,1,2-Trichloroethane          | µg/l         |        | <0.5             | <0.5                   |
|                                | 1,1-Dichloroethane             | µg/l         |        | <0.5             | <0.5                   |
|                                | 1,1-Dichloroethene             | µg/l         |        | <0.5             | <0.5                   |
|                                | 1,1-Dichloropropene            | µg/l         |        | <0.5             | <0.5                   |
|                                | 1,2,3-Trichlorobenzene         | µg/l         |        | <0.5             | <0.5                   |

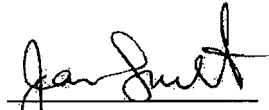
|                             |       |        | Laboratory Ref:                | 2803601          | 2803602                |  |
|-----------------------------|-------|--------|--------------------------------|------------------|------------------------|--|
|                             |       |        | Type of sample:                | Groundwater      | Groundwater            |  |
|                             |       |        | Location code:                 | WST-W0078-01-GW3 | WST-W0078-01-GW5new    |  |
|                             |       |        | Sampling point:                | Brown colour     | slightly cloudy sample |  |
|                             |       |        | Sampled by:                    | Jim McGarry      | Jim McGarry            |  |
|                             |       |        | Time Sampled:                  | 14:51            | 14:21                  |  |
|                             |       |        | Start/End - Dates of Analysis: |                  |                        |  |
|                             |       |        | Status of results:             | Final Report     | Final Report           |  |
| Parameter                   | Units | Limits |                                |                  |                        |  |
| 1,2,3-Trichloropropane      | µg/l  |        | <0.5                           | <0.5             |                        |  |
| 1,2,4-Trichlorobenzene      | µg/l  |        | <0.5                           | <0.5             |                        |  |
| 1,2,4-Trimethylbenzene      | µg/l  |        | <0.5                           | <0.5             |                        |  |
| 1,2-Dibromo-3-Chloropropane | µg/l  |        | <0.5                           | <0.5             |                        |  |
| 1,2-Dibromoethene           | µg/l  |        | <0.5                           | <0.5             |                        |  |
| 1,2-Dichlorobenzene         | µg/l  |        | <0.5                           | <0.5             |                        |  |
| 1,2-Dichloroethane          | µg/l  |        | <0.5                           | <0.5             |                        |  |
| 1,2-Dichloropropane         | µg/l  |        | <0.5                           | <0.5             |                        |  |
| 1,3,5-Trimethylbenzene      | µg/l  |        | <0.5                           | <0.5             |                        |  |
| 1,3-Dichlorobenzene         | µg/l  |        | <0.5                           | <0.5             |                        |  |
| 1,3-Dichloropropane         | µg/l  |        | <0.5                           | <0.5             |                        |  |
| 1,4-Dichlorobenzene         | µg/l  |        | <0.5                           | <0.5             |                        |  |
| 2,2-Dichloropropane         | µg/l  |        | <0.5                           | <0.5             |                        |  |
| 2-Chlorotoluene             | µg/l  |        | <0.5                           | <0.5             |                        |  |
| 4-Chlorotoluene             | µg/l  |        | <0.5                           | <0.5             |                        |  |
| 4-Isopropyltoluene          | µg/l  |        | <0.5                           | <0.5             |                        |  |
| Benzene                     | µg/l  |        | <0.5                           | <0.5             |                        |  |
| Bromobenzene                | µg/l  |        | <0.5                           | <0.5             |                        |  |
| Bromochloromethane          | µg/l  |        | <0.5                           | <0.5             |                        |  |
| Bromodichloromethane        | µg/l  |        | <0.5                           | <0.5             |                        |  |
| Bromoform                   | µg/l  |        | <0.5                           | <0.5             |                        |  |
| Bromomethane                | µg/l  |        | <0.5                           | <0.5             |                        |  |
| c-1,2-Dichloroethene        | µg/l  |        | <0.5                           | <0.5             |                        |  |
| c-1,3-Dichloropropene       | µg/l  |        | <0.5                           | <0.5             |                        |  |
| Carbon Tetrachloride        | µg/l  |        | <0.5                           | <0.5             |                        |  |
| Chlorobenzene               | µg/l  |        | <0.5                           | <0.5             |                        |  |
| Chloroform                  | µg/l  |        | <0.5                           | <0.5             |                        |  |
| Dibromochloromethane        | µg/l  |        | <0.5                           | <0.5             |                        |  |
| Dibromomethane              | µg/l  |        | <0.5                           | <0.5             |                        |  |
| Dichlorodifluoromethane     | µg/l  |        | <0.5                           | <0.5             |                        |  |
| Ethylbenzene                | µg/l  |        | <0.5                           | <0.5             |                        |  |
| Hexachlorobutadiene         | µg/l  |        | <0.5                           | <0.5             |                        |  |
| Isopropylbenzene            | µg/l  |        | <0.5                           | <0.5             |                        |  |
| m,p-Xylene                  | µg/l  |        | <0.5                           | <0.5             |                        |  |
| Methylene Chloride          | µg/l  |        | <0.5                           | <0.5             |                        |  |
| Naphthalene                 | µg/l  |        | <0.5                           | <0.5             |                        |  |
| n-Butylbenzene              | µg/l  |        | <0.5                           | <0.5             |                        |  |
| n-Propylbenzene             | µg/l  |        | <0.5                           | <0.5             |                        |  |
| o-Xylene                    | µg/l  |        | <0.5                           | <0.5             |                        |  |
| sec-Butylbenzene            | µg/l  |        | <0.5                           | <0.5             |                        |  |

|                        |       |        | Laboratory Ref:                | 2803601          | 2803602                |  |
|------------------------|-------|--------|--------------------------------|------------------|------------------------|--|
|                        |       |        | Type of sample:                | Groundwater      | Groundwater            |  |
|                        |       |        | Location code:                 | WST-W0078-01-GW3 | WST-W0078-01-GW5new    |  |
|                        |       |        | Sampling point:                | Brown colour     | slightly cloudy sample |  |
|                        |       |        | Sampled by:                    | Jim McGarry      | Jim McGarry            |  |
|                        |       |        | Time Sampled:                  | 14:51            | 14:21                  |  |
|                        |       |        | Start/End - Dates of Analysis: |                  |                        |  |
|                        |       |        | Status of results:             | Final Report     | Final Report           |  |
| Parameter              | Units | Limits |                                |                  |                        |  |
| Styrene                | µg/l  |        | <0.5                           | <0.5             |                        |  |
| t-1,2-Dichloroethene   | µg/l  |        | <0.5                           | <0.5             |                        |  |
| t-1,3-Dichloropropene  | µg/l  |        | <0.5                           | <0.5             |                        |  |
| tert-Butylbenzene      | µg/l  |        | <0.5                           | <0.5             |                        |  |
| Toluene                | µg/l  |        | <0.5                           | <0.5             |                        |  |
| Trichloroethene        | µg/l  |        | <0.5                           | <0.5             |                        |  |
| Trichlorofluoromethane | µg/l  |        | <0.5                           | <0.5             |                        |  |
| Vinyl Chloride         | µg/l  |        | <0.5                           | <0.5             |                        |  |
| Aluminium              | ug/l  |        | 424                            | 125              |                        |  |
| Antimony               | ug/l  |        | <1.0                           | <1.0             |                        |  |
| Arsenic                | ug/l  |        | <1.0                           | 4.37             |                        |  |
| Barium                 | ug/l  |        | 51.7                           | 18               |                        |  |
| Beryllium              | ug/l  |        | <1.0                           | <1.0             |                        |  |
| Boron                  | ug/l  |        | 17.2                           | 10.3             |                        |  |
| Cadmium                | ug/l  |        | <1.0                           | <1.0             |                        |  |
| Calcium                | mg/l  |        | 159                            | 148              |                        |  |
| Chromium               | ug/l  |        | <1.0                           | <1.0             |                        |  |
| Cobalt                 | ug/l  |        | <1.0                           | <1.0             |                        |  |
| Copper                 | ug/l  |        | <1.0                           | <1.0             |                        |  |
| Iron                   | ug/l  |        | 757                            | 3050             |                        |  |
| Lead                   | ug/l  |        | 2.86                           | <1.0             |                        |  |
| Magnesium              | mg/l  |        | 12.2                           | 6.13             |                        |  |
| Manganese              | ug/l  |        | 91.8                           | 323              |                        |  |
| Mercury                | ug/l  |        | <0.50                          | <0.50            |                        |  |
| Molybdenum             | ug/l  |        | <1.0                           | <1.0             |                        |  |
| Nickel                 | ug/l  |        | <1.0                           | <1.0             |                        |  |
| Potassium              | mg/l  |        | 16.1                           | 1.47             |                        |  |
| Selenium               | ug/l  |        | <1.0                           | <1.0             |                        |  |
| Sodium                 | mg/l  |        | 24.1                           | 7.37             |                        |  |
| Thallium               | ug/l  |        | <1.0                           | <1.0             |                        |  |
| Tin                    | ug/l  |        | <2.0                           | <2.0             |                        |  |
| Uranium                | ug/l  |        | <1.0                           | 1.09             |                        |  |
| Vanadium               | ug/l  |        | <1.0                           | <1.0             |                        |  |
| Zinc                   | ug/l  |        | 14.4                           | 11.9             |                        |  |
|                        |       |        |                                |                  |                        |  |

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

Signed:



 Michael Neill, Regional  
Chemist

Date:

12/9/98



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

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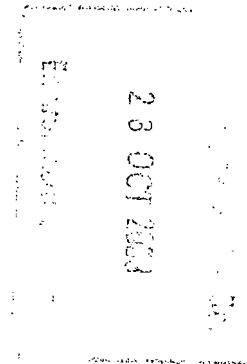
Report of: Analysis of landfill site sample(s)  
Report to: Environmental Management And Planning Division, EPA.  
Report date: 12/09/08

---

Licensee: **North Tipperary County Council**  
Facility: **Ballaghveny Landfill**  
Ballymackey, Co. Tipperary,  
Reference No: W0078-01

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Date collected: 17/07/2008      Date received: 17/07/2008



|                                |              |        | Laboratory Ref:                | 2803673             | 2803674              | 2803675           | 2803676             |  |
|--------------------------------|--------------|--------|--------------------------------|---------------------|----------------------|-------------------|---------------------|--|
|                                |              |        | Type of sample:                | Groundwater         | Groundwater          | Groundwater       | Groundwater         |  |
|                                |              |        | Location code:                 | WST-W0078-01-GW9new | WST-W0078-01-GW10new | WST-W0078-01-GW12 | WST-W0078-01-BH3new |  |
|                                |              |        | Sampling point:                | Clear sample        | Clear sample         | Clear sample      | Cloudy sample       |  |
|                                |              |        | Sampled by:                    | Jim McGarry         | Jim McGarry          | Jim McGarry       | Jim McGarry         |  |
|                                |              |        | Time Sampled:                  | 16:21               | 15:47                | 15:22             | 16:48               |  |
|                                |              |        | Start/End - Dates of Analysis: |                     |                      |                   |                     |  |
|                                |              |        | Status of results:             | Final Report        | Final Report         | Final Report      | Final Report        |  |
| Parameter                      | Units        | Limits |                                |                     |                      |                   |                     |  |
| F Depth of Borehole            | m            |        | 13.3                           | 13.4                | nm                   | 12.2              |                     |  |
| F Water Level                  | m            |        | 8.4                            | 9.8                 | nm                   | 6.6               |                     |  |
| F Temperature                  | °C           |        | 12.1                           | 11.5                | 11.8                 | 11.2              |                     |  |
| F Dissolved Oxygen (as %Sat)   | % Saturation |        | 25.2                           | 53.6                | 86.8                 | 13.7              |                     |  |
| pH                             | pH           |        | 7.2                            | 7.2                 | 7.3                  | 7.1               |                     |  |
| Conductivity @25°C             | µS/cm        |        | 1457                           | 929                 | 797                  | 1031              |                     |  |
| Ammonia                        | mg/l N       |        | 9.9                            | 0.031               | 0.021                | 0.62              |                     |  |
| Chloride                       | mg/l Cl      |        | 147                            | 41                  | 38                   | 49                |                     |  |
| Nitrite (as:N)                 | mg/l N       |        | 0.001                          | <0.001              | 0.007                | <0.001            |                     |  |
| ortho-Phosphate (as P)         | mg/l P       |        | <0.006                         | <0.006              | 0.01                 | <0.006            |                     |  |
| Total Oxidised Nitrogen (as N) | mg/l N       |        | 4.5                            | 18                  | 6.4                  | 11                |                     |  |
| Fluoride                       | mg/l F       |        | 0.16                           | <0.10               | <0.10                | <0.10             |                     |  |
| Sulphate                       | mg/l SO4     |        | 31.8                           | 17.0                | 14.6                 | 20.6              |                     |  |
| E Coli                         | per 100ml    |        | <10                            | <10                 | <10                  | <10               |                     |  |
| Total coliforms                | No/100 ml    |        | <10                            | <10                 | 8164                 | <10               |                     |  |
| 1,1,1,2-Tetrachloroethane      | µg/l         |        | <0.5                           | <0.5                | <0.5                 | <0.5              |                     |  |
| 1,1,1-Trichloroethane          | µg/l         |        | <0.5                           | 0.7                 | 1.2                  | <0.5              |                     |  |
| 1,1,2,2-Tetrachloroethane      | µg/l         |        | <0.5                           | <0.5                | <0.5                 | <0.5              |                     |  |
| 1,1,2-Trichloroethane          | µg/l         |        | <0.5                           | <0.5                | <0.5                 | <0.5              |                     |  |
| 1,1-Dichloroethane             | µg/l         |        | <0.5                           | 3.6                 | 2.5                  | <0.5              |                     |  |
| 1,1-Dichloroethene             | µg/l         |        | <0.5                           | <0.5                | <0.5                 | <0.5              |                     |  |
| 1,1-Dichloropropene            | µg/l         |        | <0.5                           | <0.5                | <0.5                 | <0.5              |                     |  |
| 1,2,3-Trichlorobenzene         | µg/l         |        | <0.5                           | <0.5                | <0.5                 | <0.5              |                     |  |

|                             |       |        | Laboratory Ref:                | 2803673             | 2803674              | 2803675           | 2803676             |  |
|-----------------------------|-------|--------|--------------------------------|---------------------|----------------------|-------------------|---------------------|--|
|                             |       |        | Type of sample:                | Groundwater         | Groundwater          | Groundwater       | Groundwater         |  |
|                             |       |        | Location code:                 | WST-W0078-01-GW9new | WST-W0078-01-GW10new | WST-W0078-01-GW12 | WST-W0078-01-BH3new |  |
|                             |       |        | Sampling point:                | Clear sample        | Clear sample         | Clear sample      | Cloudy sample       |  |
|                             |       |        | Sampled by:                    | Jim McGarry         | Jim McGarry          | Jim McGarry       | Jim McGarry         |  |
|                             |       |        | Time Sampled:                  | 16:21               | 15:47                | 15:22             | 16:48               |  |
|                             |       |        | Start/End - Dates of Analysis: |                     |                      |                   |                     |  |
|                             |       |        | Status of results:             | Final Report        | Final Report         | Final Report      | Final Report        |  |
| Parameter                   | Units | Limits |                                |                     |                      |                   |                     |  |
| 1,2,3-Trichloropropane      | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| 1,2,4-Trichlorobenzene      | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| 1,2,4-Trimethylbenzene      | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| 1,2-Dibromo-3-Chloropropane | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| 1,2-Dibromoethene           | 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                |  |
| 1,2-Dichloroethane          | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| 1,2-Dichloropropane         | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| 1,3,5-Trimethylbenzene      | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| 1,3-Dichlorobenzene         | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| 1,3-Dichloropropane         | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| 1,4-Dichlorobenzene         | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| 2,2-Dichloropropane         | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| 2-Chlorotoluene             | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| 4-Chlorotoluene             | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| 4-Isopropyltoluene          | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| Benzene                     | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| Bromobenzene                | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| Bromochloromethane          | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| Bromodichloromethane        | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| Bromoform                   | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| Bromomethane                | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| c-1,2-Dichloroethene        | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| c-1,3-Dichloropropene       | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |



|                         |       |        | Laboratory Ref:                | 2803673             | 2803674              | 2803675           | 2803676             |  |
|-------------------------|-------|--------|--------------------------------|---------------------|----------------------|-------------------|---------------------|--|
|                         |       |        | Type of sample:                | Groundwater         | Groundwater          | Groundwater       | Groundwater         |  |
|                         |       |        | Location code:                 | WST-W0078-01-GW9new | WST-W0078-01-GW10new | WST-W0078-01-GW12 | WST-W0078-01-BH3new |  |
|                         |       |        | Sampling point:                | Clear sample        | Clear sample         | Clear sample      | Cloudy sample       |  |
|                         |       |        | Sampled by:                    | Jim McGarry         | Jim McGarry          | Jim McGarry       | Jim McGarry         |  |
|                         |       |        | Time Sampled:                  | 16:21               | 15:47                | 15:22             | 16:48               |  |
|                         |       |        | Start/End - Dates of Analysis: |                     |                      |                   |                     |  |
|                         |       |        | Status of results:             | Final Report        | Final Report         | Final Report      | Final Report        |  |
| Parameter               | Units | Limits |                                |                     |                      |                   |                     |  |
| Carbon Tetrachloride    | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| Chlorobenzene           | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| Chloroform              | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| Dibromochloromethane    | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| Dibromomethane          | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| Dichlorodifluoromethane | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| Ethylbenzene            | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| Hexachlorobutadiene     | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| Isopropylbenzene        | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| m,p-Xylene              | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| Methylene Chloride      | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| Naphthalene             | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| n-Butylbenzene          | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| n-Propylbenzene         | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| o-Xylene                | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| 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                |  |
| t-1,2-Dichloroethene    | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| t-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                |  |
| Toluene                 | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| Trichloroethene         | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| Trichlorofluoromethane  | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |
| Vinyl Chloride          | µg/l  |        | <0.5                           | <0.5                | <0.5                 | <0.5              | <0.5                |  |

|            |       |        | Laboratory Ref:                | 2803673             | 2803674              | 2803675           | 2803676             |  |
|------------|-------|--------|--------------------------------|---------------------|----------------------|-------------------|---------------------|--|
|            |       |        | Type of sample:                | Groundwater         | Groundwater          | Groundwater       | Groundwater         |  |
|            |       |        | Location code:                 | WST-W0078-01-GW9new | WST-W0078-01-GW10new | WST-W0078-01-GW12 | WST-W0078-01-BH3new |  |
|            |       |        | Sampling point:                | Clear sample        | Clear sample         | Clear sample      | Cloudy sample       |  |
|            |       |        | Sampled by:                    | Jim McGarry         | Jim McGarry          | Jim McGarry       | Jim McGarry         |  |
|            |       |        | Time Sampled:                  | 16:21               | 15:47                | 15:22             | 16:48               |  |
|            |       |        | Start/End - Dates of Analysis: |                     |                      |                   |                     |  |
|            |       |        | Status of results:             | Final Report        | Final Report         | Final Report      | Final Report        |  |
| Parameter  | Units | Limits |                                |                     |                      |                   |                     |  |
| Aluminium  | ug/l  |        | 91.7                           | 51.1                | <5.0                 | 69.7              |                     |  |
| Antimony   | ug/l  |        | <1.0                           | <1.0                | <1.0                 | <1.0              |                     |  |
| Arsenic    | ug/l  |        | 1.74                           | <1.0                | <1.0                 | <1.0              |                     |  |
| Barium     | ug/l  |        | 49.1                           | 18.3                | 12.4                 | 27.8              |                     |  |
| Beryllium  | ug/l  |        | <1.0                           | <1.0                | <1.0                 | <1.0              |                     |  |
| Boron      | ug/l  |        | 185                            | 40.1                | 21.6                 | 126               |                     |  |
| Cadmium    | ug/l  |        | <1.0                           | <1.0                | <1.0                 | <1.0              |                     |  |
| Calcium    | mg/l  |        | 168                            | 171                 | 145                  | 184               |                     |  |
| Chromium   | ug/l  |        | <1.0                           | <1.0                | <1.0                 | <1.0              |                     |  |
| Cobalt     | ug/l  |        | 3.77                           | <1.0                | <1.0                 | 1.65              |                     |  |
| Copper     | ug/l  |        | <1.0                           | <1.0                | <1.0                 | <1.0              |                     |  |
| Iron       | ug/l  |        | 453                            | 238                 | 111                  | 258               |                     |  |
| Lead       | ug/l  |        | 1.41                           | <1.0                | <1.0                 | <1.0              |                     |  |
| Magnesium  | mg/l  |        | 31.1                           | 14.1                | 11.2                 | 19                |                     |  |
| Manganese  | ug/l  |        | 344                            | <10.0               | <10.0                | 241               |                     |  |
| Mercury    | ug/l  |        | <0.50                          | <0.50               | <0.50                | <0.50             |                     |  |
| Molybdenum | ug/l  |        | <1.0                           | <1.0                | <1.0                 | <1.0              |                     |  |
| Nickel     | ug/l  |        | 4.27                           | <1.0                | <1.0                 | <1.0              |                     |  |
| Potassium  | mg/l  |        | 20.9                           | 3.14                | 3.09                 | 16.7              |                     |  |
| Selenium   | ug/l  |        | 3.09                           | 1.2                 | 1.11                 | 1                 |                     |  |
| Sodium     | mg/l  |        | 68.3                           | 19.3                | 19                   | 39.7              |                     |  |
| Thallium   | ug/l  |        | <1.0                           | <1.0                | <1.0                 | <1.0              |                     |  |
| Tin        | ug/l  |        | <2.0                           | <2.0                | <2.0                 | <2.0              |                     |  |
| Uranium    | ug/l  |        | <1.0                           | <1.0                | <1.0                 | <1.0              |                     |  |

|           |       |        | Laboratory Ref:                | 2803673             | 2803674              | 2803675             | 2803676             |  |
|-----------|-------|--------|--------------------------------|---------------------|----------------------|---------------------|---------------------|--|
|           |       |        | Type of sample:                | Groundwater         | Groundwater          | Groundwater         | Groundwater         |  |
|           |       |        | Location code:                 | WST-W0078-01-GW9new | WST-W0078-01-GW10new | WST-W0078-01-GW12   | WST-W0078-01-BH3new |  |
|           |       |        | Sampling point:                | Clear sample        | Clear sample         | Clear sample        | Cloudy sample       |  |
|           |       |        | Sampled by:                    | Jim McGarry         | Jim McGarry          | Jim McGarry         | Jim McGarry         |  |
|           |       |        | Time Sampled:                  | 16:21               | 15:47                | 15:22               | 16:48               |  |
|           |       |        | Start/End - Dates of Analysis: |                     |                      |                     |                     |  |
|           |       |        | Status of results:             | <b>Final Report</b> | <b>Final Report</b>  | <b>Final Report</b> | <b>Final Report</b> |  |
| Parameter | Units | Limits |                                |                     |                      |                     |                     |  |
| Vanadium  | ug/l  |        | <1.0                           | <1.0                | <1.0                 | <1.0                | <1.0                |  |
| Zinc      | ug/l  |        | 9.59                           | 7.36                | 8.47                 | 9.51                | 9.51                |  |
|           |       |        |                                |                     |                      |                     |                     |  |

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:

  
Michael Neill, Regional  
Chemist

Date:

12/3/08

## **Appendix 9**

# **Gas monitoring results**

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|                      |                       |
|----------------------|-----------------------|
| Ballaghveny Landfill | Waste Licence 0078-02 |
|----------------------|-----------------------|

**Gas Monitoring Locations as per DG152-02**

**July-08**

|                           |                                |                           |                                  |
|---------------------------|--------------------------------|---------------------------|----------------------------------|
| <b>Site Name :</b>        | <b>Operator :</b>              | <b>Site Address :</b>     | <b>National Grid Reference :</b> |
| Ballaghveny Landfill Site | North Tipperary County Council | Ballaghveny, Ballymackey, | 197040.85E, 182012.11N           |

**Instrument used :**  
Geotechnical Instruments GA94 Infra Red Gas Analyser

**Date Of Next Calibration**  
May-09

**Monitoring Personnel:**  
Sean Madigan

**Weather Conditions**  
Dull/overcast

**Barometric Pressure**  
996

**RESULTS**

| Sample Station ID      | Borehole / Vent | Survey Depth | CH4% v/v | CO2% v/v | O2% v/v | Bar Pressure | Comments |
|------------------------|-----------------|--------------|----------|----------|---------|--------------|----------|
| <b>Cell Wells</b>      |                 |              |          |          |         |              |          |
| MB1                    | Gas Vent        | 1m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| MB2                    | Gas Vent        | 1m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| MB3                    | Gas Vent        | 1m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| MB4                    | Gas Vent        | 1m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| MB5                    | Gas Vent        | 1m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| MB6                    | Gas Vent        | 1m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| MB7                    | Gas Vent        | 1m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| MB8                    | Gas Vent        | 1m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| MB9                    | Gas Vent        | 1m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| MB10                   | Gas Vent        | 1m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| MB11                   | Gas Vent        | 1m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| MB12                   | Gas Vent        | 1m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| MB13                   | Gas Vent        | 1m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| MB14                   | Gas Vent        | 1m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| MB15                   | Gas Vent        | 1m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| MB16                   | Gas Vent        | 1m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| MB17                   | Gas Vent        | 1m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| MB18                   | Gas Vent        | 1m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| MB19                   | Gas Vent        | 1m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| MB20                   | Gas Vent        | 1m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| <b>Perimeter Wells</b> |                 |              |          |          |         |              |          |
| MP1                    | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| MP2                    | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| MP3                    | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| MP4                    | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| MP5                    | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| MP6                    | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| MP7                    | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| MP8                    | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| MP9                    | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| MP10                   | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| MP11                   | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| MP12                   | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| MP13                   | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| MP14                   | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| MP15                   | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| MP16                   | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| MP17                   | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| MP18                   | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| MP19                   | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| MP20                   | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 20.9%   |              |          |

|                      |                       |
|----------------------|-----------------------|
| Ballaghveny Landfill | Waste Licence 0078-02 |
|----------------------|-----------------------|

**Gas Monitoring Locations as per DG 152-02**

**August-08**

|                           |                                |                           |                                  |
|---------------------------|--------------------------------|---------------------------|----------------------------------|
| <b>Site Name :</b>        | <b>Operator :</b>              | <b>Site Address :</b>     | <b>National Grid Reference :</b> |
| Ballaghveny Landfill Site | North Tipperary County Council | Ballaghveny, Ballymackey, | 197040.85E, 182012.11N           |

**Instrument used :**  
Geotechnical Instruments GA94 Infra Red Gas Analyser

**Date Of Next Calibration:**  
May-09

**Monitoring Personnel:**  
Sean Madigan

**Weather Conditions**  
Dull/overcast

**Barometric Pressure**  
1000mb

**RESULTS**

| Sample Station ID      | Borehole / Vent | Survey Depth | CH4% v/v | CO2% v/v | O2% v/v | Bar Pressure | Comments |
|------------------------|-----------------|--------------|----------|----------|---------|--------------|----------|
| <b>Cell Wells</b>      |                 |              |          |          |         |              |          |
| BP01                   | Gas Vent        | 0m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| BP02                   | Gas Vent        | 0m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| BP03                   | Gas Vent        | 0m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| BP04                   | Gas Vent        | 0m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| BP05                   | Gas Vent        | 0m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| BP06                   | Gas Vent        | 0m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| <b>Perimeter Wells</b> |                 |              |          |          |         |              |          |
| MP01                   | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| MP02                   | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| MP03                   | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| MP04                   | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| MP05                   | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| MP06                   | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| MP07                   | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| MP08                   | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 20.9%   |              |          |
| MP09                   | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 20.9%   |              |          |

|                      |                       |
|----------------------|-----------------------|
| Ballaghveny Landfill | Waste Licence 0078-02 |
|----------------------|-----------------------|

**Gas Monitoring Locations as per DG152-02**

**September-08**

|                           |                                |                           |                                  |
|---------------------------|--------------------------------|---------------------------|----------------------------------|
| <b>Site Name :</b>        | <b>Operator :</b>              | <b>Site Address :</b>     | <b>National Grid Reference :</b> |
| Ballaghveny Landfill Site | North Tipperary County Council | Ballaghveny, Ballymackey, | 197040.85E, 182012.11N           |

**Instrument used :**  
Geotechnical Instruments GA94 Infra Red Gas Analyser

**Date Of Next Callibration**  
May-09

**Monitoring Personnel:**  
Sean Madigan

**Weather Conditions**  
Dry Sunny

**Barometric Pressure**  
1019

**RESULTS**

| Sample Station ID      | Borehole / Vent | Survey Depth | CH4% v/v | CO2% v/v | O2% v/v | Bar Pressure | Comments |
|------------------------|-----------------|--------------|----------|----------|---------|--------------|----------|
| <b>Cell Wells</b>      |                 |              |          |          |         |              |          |
| MP1                    | Gas Vent        | 1m           | 0.00%    | 0.00%    | 20.90%  | 1019         |          |
| MP2                    | Gas Vent        | 1m           | 0.00%    | 0.00%    | 20.90%  | 1019         |          |
| MP3                    | Gas Vent        | 1m           | 0.00%    | 0.00%    | 20.90%  | 1019         |          |
| MP4                    | Gas Vent        | 1m           | 0.00%    | 0.00%    | 20.90%  | 1019         |          |
| MP5                    | Gas Vent        | 1m           | 0.00%    | 0.00%    | 20.90%  | 1019         |          |
| MP6                    | Gas Vent        | 1m           | 0.00%    | 0.00%    | 20.90%  | 1019         |          |
| <b>Perimeter Wells</b> |                 |              |          |          |         |              |          |
| MP7                    | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 20.90%  | 1019         |          |
| MP8                    | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 20.90%  | 1019         |          |
| MP9                    | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 20.90%  | 1019         |          |
| MP10                   | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 20.90%  | 1019         |          |
| MP11                   | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 20.90%  | 1019         |          |
| MP12                   | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 20.90%  | 1019         |          |
| MP13                   | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 20.90%  | 1019         |          |
| MP14                   | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 20.90%  | 1019         |          |
| MP15                   | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 20.90%  | 1019         |          |
| MP16                   | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 20.90%  | 1019         |          |
| MP17                   | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 20.90%  | 1019         |          |
| MP18                   | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 20.90%  | 1019         |          |

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# **Appendix 10**

## **Water standards**



WATER QUALITY STANDARDS - A SYNOPSIS

Environmental Protection Agency  
Regional Water Laboratory, Kilkenny

990

Synopsis only - for details refer to the EU Directives and Irish Statutory Instruments

| PARAMETERS                          | UNITS                                | SURFACE ABSTRACTION  |         | DRINKING WATER                   |                       | FRESHWATER FISH                  |                         |          |          |  |
|-------------------------------------|--------------------------------------|----------------------|---------|----------------------------------|-----------------------|----------------------------------|-------------------------|----------|----------|--|
|                                     |                                      | Directive 75/440/EEC |         | Irish Standard SI No.294 of 1989 | EC Directive 98/83/EC | Irish Standard SI No.439 of 2000 | EC Directive 78/855/EEC |          |          |  |
|                                     |                                      | A1-Treatment         |         |                                  |                       |                                  | SALMONID                |          | CYPRINID |  |
|                                     |                                      | Guide                | M.A.C.* | Guide                            | M.A.C.*               | Guide                            | M.A.C.*                 |          |          |  |
| Temperature                         | °C                                   | 22                   | 25      | 25                               | —                     | —                                | 21.5(a)                 | 28(b)    | 21.5(b)  |  |
| Dissolved Oxygen                    | mg/l O <sub>2</sub>                  | —                    | —       | —                                | —                     | 50%>9                            | 50%>9                   | 50%>7    | 50%>9    |  |
| Dissolved Oxygen                    | mg/l O <sub>2</sub>                  | —                    | —       | —                                | —                     | 100%>7                           | —                       | 100%>5   | —        |  |
| Dissolved Oxygen                    | % Sat                                | >70%                 | —       | >60%                             | —                     | —                                | —                       | —        | —        |  |
| BOD                                 | mg/l O <sub>2</sub>                  | 3                    | —       | 5                                | —                     | 3                                | —                       | 6        | 95%<5    |  |
| Conductivity                        | uS/cm                                | 1000                 | —       | 1000                             | 2500                  | 2500                             | —                       | —        | —        |  |
| pH                                  | —                                    | 6.5 - 8.5            | —       | 5.5 - 8.5                        | 6.5 - 9.5             | 6.5 - 9.5                        | 6 - 9                   | 6 - 9    | 6 - 9    |  |
| Colour                              | Hazen                                | 10                   | 20      | 20                               | Acceptable            | Acceptable                       | —                       | —        | —        |  |
| Turbidity                           | NTU                                  | —                    | —       | 20                               | Acceptable            | Acceptable                       | —                       | —        | —        |  |
| Phosphorous                         | mg/l P                               | 0.17                 | —       | 0.22                             | —                     | —                                | 0.065 (c)               | 0.13     | —        |  |
| Nitrate                             | mg/l N                               | 5.65                 | 11.3    | 11.3                             | 11.3                  | 11.3                             | —                       | —        | —        |  |
| Nitrite                             | mg/l NO <sub>2</sub>                 | —                    | —       | —                                | 0.5                   | 0.5                              | 0.01                    | 0.03     | 95%<0.05 |  |
| Sulphate                            | mg/l SO <sub>4</sub>                 | 150                  | 250     | 200                              | 250                   | 250                              | —                       | —        | —        |  |
| Suspended Solids                    | mg/l                                 | 25                   | —       | 50                               | —                     | —                                | 25                      | 25       | 25       |  |
| Odour                               | Dilution                             | 3@25°C               | —       | 5@25°C                           | Acceptable            | Acceptable                       | —                       | —        | —        |  |
| Taste                               | Dilution                             | —                    | —       | —                                | Acceptable            | Acceptable                       | —                       | —        | —        |  |
| Fluoride                            | mg/l F                               | 0.7-1.0              | 1.5     | 1                                | 1.5                   | 1.0 (d)                          | —                       | —        | —        |  |
| Chloride                            | mg/l Cl                              | 200                  | —       | 250                              | 250                   | 250                              | —                       | —        | —        |  |
| Cyanide                             | mg/l CN                              | —                    | 0.05    | 0.05                             | 0.05                  | 0.05                             | —                       | —        | —        |  |
| Sulphide                            | mg/l S                               | —                    | —       | —                                | —                     | —                                | —                       | —        | —        |  |
| Ammonia (Total)                     | mg/l NH <sub>4</sub>                 | 0.05                 | —       | 0.2                              | 0.5                   | 0.3                              | 0.04                    | 0.2      | 1        |  |
| Non-ionised                         | mg/l NH <sub>3</sub>                 | —                    | —       | —                                | —                     | —                                | 0.005                   | 0.005    | 0.03     |  |
| Nitrogen (Kjeldahl)                 | mg/l N                               | 1                    | —       | 1                                | —                     | —                                | —                       | —        | 0.02     |  |
| Residual Chlorine                   | mg/l Cl <sub>2</sub>                 | —                    | —       | —                                | —                     | —                                | 0.005                   | —        | 0.005    |  |
| Oxidisability (KMnO <sub>4</sub> )  | mg/l O <sub>2</sub>                  | —                    | —       | —                                | 5.0                   | 5.0                              | —                       | —        | —        |  |
| TOC                                 | mg/l C                               | —                    | —       | —                                | No change             | No change                        | —                       | —        | —        |  |
| Bromate                             | µg/l                                 | —                    | —       | —                                | 10                    | 10                               | —                       | —        | —        |  |
| Acrylamide                          | µg/l                                 | —                    | —       | —                                | 0.10                  | 0.10                             | —                       | —        | —        |  |
| Benzene                             | µg/l                                 | —                    | —       | —                                | 1.0                   | 1.0                              | —                       | —        | —        |  |
| Benzo(a)pyrene                      | µg/l                                 | —                    | —       | —                                | 0.01                  | 0.01                             | —                       | —        | —        |  |
| 1,2-dichloroethane                  | µg/l                                 | —                    | —       | —                                | 3.0                   | 3.0                              | —                       | —        | —        |  |
| Epichlorohydrin                     | µg/l                                 | —                    | —       | —                                | 0.1                   | 0.1                              | —                       | —        | —        |  |
| THMs total                          | µg/l                                 | —                    | —       | —                                | 100                   | 100                              | —                       | —        | —        |  |
| Vinyl chloride                      | µg/l                                 | —                    | —       | —                                | 0.5                   | 0.5                              | —                       | —        | —        |  |
| Tetrachloroethene & Trichloroethene | µg/l                                 | —                    | —       | —                                | 10                    | —                                | —                       | —        | —        |  |
| Detergents (MBAS)                   | mg/l                                 | 0.2                  | —       | 0.2                              | —                     | —                                | —                       | —        | —        |  |
| Phenol                              | mg/l C <sub>6</sub> H <sub>5</sub> O | —                    | 0.001   | 0.0005                           | —                     | —                                | No taste                | No taste | No taste |  |
| Hydrocarbons                        | mg/l                                 | —                    | 0.05    | 0.01                             | —                     | —                                | (e)                     | (e)      | (e)      |  |
| Aromatics (PAH)                     | mg/l                                 | —                    | 0.0002  | 0.0002                           | 0.0001                | 0.0001                           | —                       | —        | —        |  |
| Pesticides (total)                  | mg/l                                 | —                    | 0.001   | 0.0005                           | 0.0005                | 0.0005                           | —                       | —        | —        |  |
| Pesticides (single)                 | mg/l                                 | —                    | —       | —                                | 0.0001                | 0.0001                           | —                       | —        | —        |  |
| CHCl <sub>3</sub> Extract           | mg/l                                 | 0.1                  | —       | 0.2                              | —                     | —                                | —                       | —        | —        |  |
| Total Coliforms                     | /100ml                               | 50                   | —       | 5000                             | 0                     | 0                                | —                       | —        | —        |  |
| Fecal Coliforms                     | /100ml                               | 20                   | —       | 1000                             | 0                     | 0                                | —                       | —        | —        |  |
| Fecal Streptococci                  | /100ml                               | 20                   | —       | 200                              | —                     | —                                | —                       | —        | —        |  |
| Salmonella                          | /5000ml                              | NR                   | —       | NR/500ml                         | —                     | —                                | —                       | —        | —        |  |
| Enterococci                         | /100ml                               | —                    | —       | —                                | 0                     | 0                                | —                       | —        | —        |  |
| Clostridia                          | /100ml                               | —                    | —       | —                                | 0                     | 0                                | —                       | —        | —        |  |
| Total Bacteria                      | /ml @ 22°C                           | —                    | —       | —                                | No change             | No change                        | —                       | —        | —        |  |
| Calcium                             | mg/l Ca                              | —                    | —       | —                                | —                     | —                                | —                       | —        | —        |  |
| Magnesium                           | mg/l Mg                              | —                    | —       | —                                | —                     | —                                | —                       | —        | —        |  |
| Sodium                              | mg/l Na                              | —                    | —       | —                                | 200                   | 200                              | —                       | —        | —        |  |
| Potassium                           | mg/l K                               | —                    | —       | —                                | —                     | —                                | —                       | —        | —        |  |
| Iron                                | mg/l Fe                              | 0.1                  | 0.3     | 0.2                              | 0.2                   | 0.2                              | —                       | —        | —        |  |
| Copper                              | mg/l Cu                              | 0.02                 | 0.05    | 0.05                             | 0.002                 | 0.002                            | 0.04 (f)                | 0.04 (f) | 0.04 (f) |  |
| Manganese                           | mg/l Mn                              | 0.05                 | —       | 0.05                             | 0.05                  | 0.05                             | —                       | —        | —        |  |
| Zinc                                | mg/l Zn                              | 0.5                  | 3       | 3                                | —                     | —                                | 0.3 (f)                 | —        | —        |  |
| Chromium                            | mg/l Cr                              | —                    | 0.05    | 0.05                             | 0.05                  | 0.05                             | —                       | —        | —        |  |
| Lead                                | mg/l Pb                              | —                    | 0.05    | 0.05                             | 0.01                  | 0.01                             | —                       | —        | —        |  |
| Nickel                              | mg/l Ni                              | —                    | —       | —                                | 0.02                  | 0.02                             | —                       | —        | —        |  |
| Aluminium                           | mg/l Al                              | —                    | —       | —                                | 0.2                   | 0.2                              | —                       | —        | —        |  |
| Cadmium                             | mg/l Cd                              | 0.001                | 0.005   | 0.005                            | 0.005                 | 0.005                            | —                       | —        | —        |  |
| Arsenic                             | mg/l As                              | 0.01                 | 0.05    | 0.05                             | 0.01                  | 0.01                             | —                       | —        | —        |  |
| Mercury                             | mg/l Hg                              | 0.0005               | 0.001   | 0.001                            | 0.001                 | 0.001                            | —                       | —        | —        |  |
| Boron                               | mg/l B                               | 1                    | —       | 2                                | 1.0                   | 1.0                              | —                       | —        | —        |  |
| Silver                              | mg/l Ag                              | —                    | —       | —                                | —                     | —                                | —                       | —        | —        |  |
| Antimony                            | mg/l Sb                              | —                    | —       | —                                | 0.005                 | 0.005                            | —                       | —        | —        |  |
| Selenium                            | mg/l Se                              | —                    | 0.01    | 0.01                             | 0.01                  | 0.01                             | —                       | —        | —        |  |

# **Appendix 1**

## **Leachate Composition**

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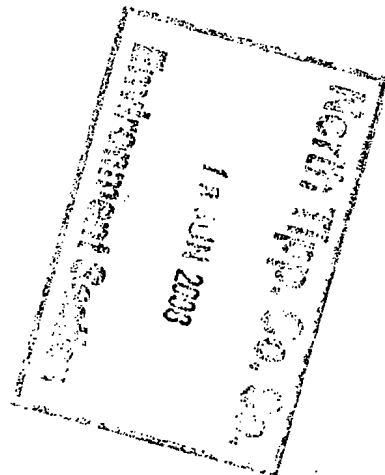
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Environmental Protection Agency  
Regional Inspectorate  
Seville Lodge, Callan Road, Kilkenny

Report of: Analysis of landfill site sample(s)  
Report to: North Tipperary County Council  
Report date: 13/06/08

Facility: **Ballaghveny Landfill**  
Ballymackey, Co. Tipperary,  
Reference No: W0078-01

Date collected: 11/03/2008      Date received: 11/03/2008



Laboratory Ref: 2801401      2801402      2801403      2801404      2801405      2801406  
 Type of sample: Leachate      Leachate      Leachate      Leachate      Leachate      Leachate  
 Location code: WST-W0078-01-LMWST-W0078-01-LMWST-W0078-01-LMWST-W0078-01-LMWST-W0078-01-LMWST-W0078-01-LL2  
 Sampling point: 1      3      5      7      8  
 Sampled by: Jim McGarry      Jim McGarry      Jim McGarry      Jim McGarry      Jim McGarry      Jim McGarry  
 Time Sampled: 14:00      14:30      14:50      14:40      14:50      15:02  
 Start/End - Dates of Analysis:

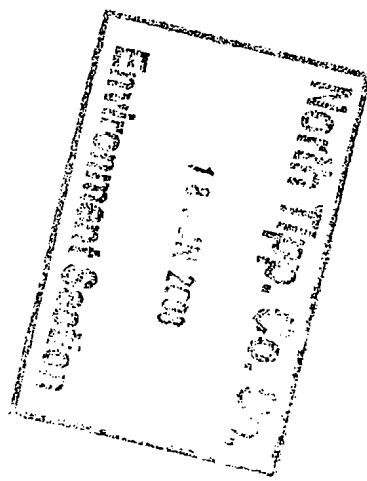
Status of results: Final Report      Final Report      Final Report      Final Report      Final Report      Final Report

| Parameter                 | Units   | Limits | Final Report | Final Report | Final Report | Final Report | Final Report | Final Report |
|---------------------------|---------|--------|--------------|--------------|--------------|--------------|--------------|--------------|
| F Temperature             | °C      |        | 9.0          | 14.0         | 13.0         | -            | 18.0         | 9.0          |
| Biochemical Oxygen Demand | mg/l O2 |        | 25.6         | 43.8         | 73.0         | -            | 256.0        | 429.0        |
| Chemical Oxygen Demand    | mg/l O2 |        | 361          | 1414         | 2115         | -            | 6630         | 1226         |
| pH                        | pH      |        | 7.0          | 7.4          | 7.6          | -            | 7.9          | 7.7          |
| Conductivity              | µS/cm   |        | 5740         | 12830        | 15680        | -            | 28400        | 6770         |

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:



## **Appendix 2**

### **Leachate Levels**



## Leachate Extraction & Monitoring Points as per DG0152-02

Ballaghveny Landfill      Waste Licence 0078-02

January-08

|                           |                                |   |                                  |
|---------------------------|--------------------------------|---|----------------------------------|
| <b>Site Name :</b>        | <b>Operator :</b>              | <b>Site Address :</b>                           | <b>National Grid Reference :</b> |
| Ballaghveny Landfill Site | North Tipperary County Council | Ballaghveny, Ballymackey, Nenagh, Co. Tipperary | 197040.85E, 182012.11N           |

**Instrument used :**

Geotechnical Instruments EA 450/010 Borehole Dipper

**Sampling Points: Leachate Lagoon**

LM01, LM02, LM03, LM04, LM05, LM06, LM07, LM08, LM09,

**Monitoring Personnel:**

Rita McGrath

### RESULTS

| Date      | Time  | Site Status | Weather      | Leachate Levels Monitoring Point | Leachate Monitoring Total Borehole depth (in Meters) | Depth at which Leachate reached (in meters) | Height of Leachate (in Meters) |
|-----------|-------|-------------|--------------|----------------------------------|--|---|--------------------------------|
| 11-Jan-08 | 11:00 | Open        | Dry Calm     | Leachate Lagoon                  |  |   |                                |
|           |       |             |              | LM1                              | 10.00  | 4.81  | 5.19                           |
|           |       |             |              | LM2                              | 11.90  | 9.00  | 2.90                           |
|           |       |             |              | LM3                              | 12.30  | 9.50  | 2.80                           |
|           |       |             |              | LM4                              | 11.30  |   | 11.30                          |
|           |       |             |              | LM5                              | 11.20  |   | 11.20                          |
|           |       |             |              | LM6                              | 13.60  | 6.41  | 7.19                           |
|           |       |             |              | LM7                              | 14.50  |   | 14.50                          |
|           |       |             |              | LM8                              | 13.30  | 10.60                                       | 2.70                           |
|           |       |             |              | LM9                              | 13.00  | 10.94                                       | 2.06                           |
| 17-Jan-08 | 11:00 | Open        | Overcast wet | Leachate Lagoon                  |  |   |                                |
|           |       |             |              | LM1                              | 10.00  | 4.82  | 5.18                           |
|           |       |             |              | LM2                              | 11.90  | 9.05  | 2.85                           |
|           |       |             |              | LM3                              | 12.30  | 9.52  | 2.78                           |
|           |       |             |              | LM4                              | 11.30  |   | 11.30                          |
|           |       |             |              | LM5                              | 11.20  |   | 11.20                          |
|           |       |             |              | LM6                              | 13.60  | 6.75  | 6.85                           |
|           |       |             |              | LM7                              | 14.50  | 8.25  | 6.25                           |
|           |       |             |              | LM8                              | 13.30  | 10.65                                       | 2.65                           |
|           |       |             |              | LM9                              | 13.00  | 11.01                                       | 1.99                           |
| 26-Jan-08 | 11:00 | Open        | Damp windy   | Leachate Lagoon                  | Empty  |   |                                |
|           |       |             |              | LM1                              | 10.00  | 4.85  | 5.15                           |
|           |       |             |              | LM2                              | 11.90  | 9.10  | 2.80                           |
|           |       |             |              | LM3                              | 12.30  | 9.55  | 2.75                           |
|           |       |             |              | LM4                              | 11.30  |   | 11.30                          |
|           |       |             |              | LM5                              | 11.20  |   | 11.20                          |
|           |       |             |              | LM6                              | 13.60  | 7.00  | 6.60                           |
|           |       |             |              | LM7                              | 14.50  | 8.31  | 6.19                           |
|           |       |             |              | LM8                              | 13.30  | 10.71                                       | 2.59                           |
|           |       |             |              | LM9                              | 13.00  | 11.12                                       | 1.88                           |

## Leachate Extraction & Monitoring Points as per DG0152-02

Ballaghveny Landfill

Waste Licence 0078-02

February-08

| Site Name :               | Operator :                     | Site Address :                                  | National Grid Reference : |
|---------------------------|--------------------------------|---|---------------------------|
| Ballaghveny Landfill Site | North Tipperary County Council | Ballaghveny, Ballymackey, Nenagh, Co. Tipperary | 197040.85E, 182012.11N    |

**Instrument used :**

Geotechnical Instruments EA 450/010 Borehole Dipper

**Sampling Points: Leachate Lagoon**

LM01, LM02, LM03, LM04, LM05, LM06, LM07, LM08, LM09,

**Monitoring Personnel:**

Sean Madigan (Site Technician)

### RESULTS

| Date      | Time     | Site Status | Weather       | Leachate Levels Monitoring Point | Leachate Monitoring Total Borehole depth (in Meters) | Depth at which Leachate reached (in meters) | Height of Leachate (in Meters) |
|-----------|----------|-------------|---------------|----------------------------------|--|---|--------------------------------|
| 12-Feb-08 | 11:00:00 | Open        | Dry sunny     | Leachate Lagoon                  |  |   |                                |
|           |          |             |               | LM1                              | 10.00  | 4.97  | 5.03                           |
|           |          |             |               | LM2                              | 11.90  | 9.00  | 2.90                           |
|           |          |             |               | LM3                              | 12.30  | 9.30  | 3.00                           |
|           |          |             |               | LM4                              | 11.30  | 9.50  | 1.80                           |
|           |          |             |               | LM5                              | 11.20  | 10.00                                       | 1.20                           |
|           |          |             |               | LM6                              | 13.60  | 10.27                                       | 3.33                           |
|           |          |             |               | LM7                              | 14.50  | 7.95  | 6.55                           |
|           |          |             |               | LM8                              | 13.30  | 10.50                                       | 2.80                           |
|           |          |             |               | LM9                              | 13.00  | 10.80                                       | 2.20                           |
| 29-Feb-08 | 11:00    | Open        | Dry/ overcast | Leachate Lagoon                  |  |   |                                |
|           |          |             |               | LM1                              | 10.00  | 4.97  | 5.03                           |
|           |          |             |               | LM2                              | 11.90  | 8.90  | 3.00                           |
|           |          |             |               | LM3                              | 12.30  | 9.14  | 3.16                           |
|           |          |             |               | LM4                              | 11.30  | 9.50  | 1.80                           |
|           |          |             |               | LM5                              | 11.20  | 8.96  | 2.24                           |
|           |          |             |               | LM6                              | 13.60  | 6.70  | 6.90                           |
|           |          |             |               | LM7                              | 14.50  | 7.62  | 6.88                           |
|           |          |             |               | LM8                              | 13.30  | 10.00                                       | 3.30                           |
|           |          |             |               | LM9                              | 13.00  | 10.80                                       | 2.20                           |

## Leachate Extraction & Monitoring Points as per DG0152-02

Ballaghveny Landfill

Waste Licence 0078-02

March-08

|                           |                                |   |                                  |
|---------------------------|--------------------------------|---|----------------------------------|
| <b>Site Name :</b>        | <b>Operator :</b>              | <b>Site Address :</b>                           | <b>National Grid Reference :</b> |
| Ballaghveny Landfill Site | North Tipperary County Council | Ballaghveny, Ballymackey, Nenagh, Co. Tipperary | 197040.85E, 182012.11N           |

**Instrument used :**

Geotechnical Instruments EA 450/010 Borehole Dipper

**Sampling Points: Leachate Lagoon**

LM01, LM02, LM03, LM04, LM05, LM06, LM07, LM08, LM09,

**Monitoring Personnel:**

Sean Madigan (Site Technician)

### RESULTS

| Date      | Time  | Site Status | Weather         | Leachate Levels Monitoring Point | Leachate Monitoring Total Borehole depth (in Meters) | Depth at which Leachate reached (in meters) | Height of Leachate (in Meters) |
|-----------|-------|-------------|-----------------|----------------------------------|--|---|--------------------------------|
| 6-Mar-08  | 00:00 | Open        | Dry Calm        | Leachate Lagoon                  |  |   |                                |
|           |       |             |                 | LM1                              | 10.00  | 6.70  | 3.30                           |
|           |       |             |                 | LM2                              | 11.90  | 8.85  | 3.05                           |
|           |       |             |                 | LM3                              | 12.30  | 9.05  | 3.25                           |
|           |       |             |                 | LM4                              | 11.30  | 11.30                                       | 0.00                           |
|           |       |             |                 | LM5                              | 11.20  | 9.50  | 1.70                           |
|           |       |             |                 | LM6                              | 13.60  | 7.20  | 6.40                           |
|           |       |             |                 | LM7                              | 14.50  | 8.00  | 6.50                           |
|           |       |             |                 | LM8                              | 13.30  | 10.00                                       | 3.30                           |
|           |       |             |                 | LM9                              | 13.00  | 11.11                                       | 1.89                           |
| 12-Mar-08 | 00:00 | Open        | Windy / Showery | Leachate Lagoon                  |  |   |                                |
|           |       |             |                 | LM1                              | 10.00  | 6.50  | 3.50                           |
|           |       |             |                 | LM2                              | 11.90  | 8.40  | 3.50                           |
|           |       |             |                 | LM3                              | 12.30  | 9.30  | 3.00                           |
|           |       |             |                 | LM4                              | 11.30  | 8.90  | 2.40                           |
|           |       |             |                 | LM5                              | 11.20  | 9.60  | 1.60                           |
|           |       |             |                 | LM6                              | 13.60  | 10.35                                       | 3.25                           |
|           |       |             |                 | LM7                              | 14.50  | 7.90  | 6.60                           |
|           |       |             |                 | LM8                              | 13.30  | 9.73  | 3.57                           |
|           |       |             |                 | LM9                              | 13.00  | 10.95                                       | 2.05                           |
| 19-Mar-08 | 14:00 | Open        | Dry Sunny       | Leachate Lagoon                  | Empty  |   |                                |
|           |       |             |                 | LM1                              | 10.00  | 6.60  | 3.40                           |
|           |       |             |                 | LM2                              | 11.90  | 8.90  | 3.00                           |
|           |       |             |                 | LM3                              | 12.30  | 9.30  | 3.00                           |
|           |       |             |                 | LM4                              | 11.30  | 8.90  | 2.40                           |
|           |       |             |                 | LM5                              | 11.20  | 9.60  | 1.60                           |
|           |       |             |                 | LM6                              | 13.60  | 10.80                                       | 2.80                           |
|           |       |             |                 | LM7                              | 14.50  | 10.40                                       | 4.10                           |
|           |       |             |                 | LM8                              | 13.30  | 10.10                                       | 3.20                           |
|           |       |             |                 | LM9                              | 13.00  | 11.10                                       | 1.90                           |
| 29-Mar-08 | 14:00 | Open        | showery         | Leachate Lagoon                  |  |   |                                |
|           |       |             |                 | LM1                              | 10.00  | 6.70  | 3.30                           |
|           |       |             |                 | LM2                              | 11.90  | 9.00  | 2.90                           |
|           |       |             |                 | LM3                              | 12.30  | 9.15  | 3.15                           |
|           |       |             |                 | LM4                              | 11.30  | 8.90  | 2.40                           |
|           |       |             |                 | LM5                              | 11.20  | 9.55  | 1.65                           |
|           |       |             |                 | LM6                              | 13.60  | 10.30                                       | 3.30                           |
|           |       |             |                 | LM7                              | 14.50  | 10.02                                       | 4.48                           |
|           |       |             |                 | LM8                              | 13.30  | 9.95  | 3.35                           |
|           |       |             |                 | LM9                              | 13.00  | 11.12                                       | 1.88                           |



## **Appendix 3**

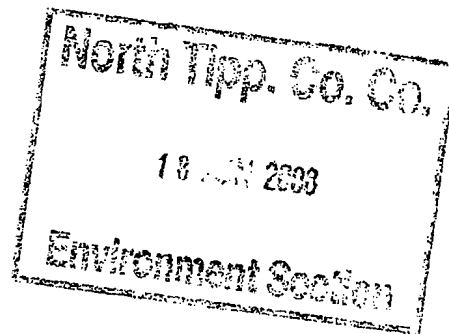
# **Leachate Visual Inspection**

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

Report of: Analysis of landfill site sample(s)  
Report to: North Tipperary County Council  
Report date: 13/06/08

Facility: **Ballaghveny Landfill**  
Ballymackey, Co. Tipperary,  
Reference No: W0078-01

Date collected: 11/03/2008      Date received: 11/03/2008



|                                       |   |                     |                     |                     |                     |                     |
|---------------------------------------|---|---------------------|---------------------|---------------------|---------------------|---------------------|
| <b>Laboratory Ref:</b>                | 2801401   | 2801402             | 2801403             | 2801404             | 2801405             | 2801406             |
| <b>Type of sample:</b>                | Leachate  | Leachate            | Leachate            | Leachate            | Leachate            | Leachate            |
| <b>Location code:</b>                 | WST-W0078-01-LMWST-W0078-01-LMWST-W0078-01-LMWST-W0078-01-LMWST-W0078-01-LMWST-W0078-01-LL2 |                     |                     |                     |                     |                     |
|                                       | 1   | 3                   | 5                   | 7                   | 8                   |                     |
| <b>Sampling point:</b>                | Light brown colour  | Brown colour        | Black colour        | Borehole dry        | Dark amber colour   | Black colour        |
| <b>Sampled by:</b>                    | Jim McGarry   | Jim McGarry         | Jim McGarry         | Jim McGarry         | Jim McGarry         | Jim McGarry         |
| <b>Time Sampled:</b>                  | 14:00   | 14:30               | 14:50               | 14:40               | 14:50               | 15:02               |
| <b>Start/End - Dates of Analysis:</b> |   |                     |                     | /                   |                     |                     |
| <b>Status of results:</b>             | <b>Final Report</b>   | <b>Final Report</b> | <b>Final Report</b> | <b>Final Report</b> | <b>Final Report</b> | <b>Final Report</b> |

| Parameter                 | Units   | Limits |      |       |       |   |       |       |
|---------------------------|---------|--------|------|-------|-------|---|-------|-------|
| F Temperature             | °C      |        | 9.0  | 14.0  | 13.0  | - | 18.0  | 9.0   |
| Biochemical Oxygen Demand | mg/l O2 |        | 25.6 | 43.8  | 73.0  | - | 256.0 | 429.0 |
| Chemical Oxygen Demand    | mg/l O2 |        | 361  | 1414  | 2115  | - | 6630  | 1226  |
| pH                        | pH      |        | 7.0  | 7.4   | 7.6   | - | 7.9   | 7.7   |
| Conductivity              | µS/cm   |        | 5740 | 12830 | 15680 | - | 28400 | 6770  |

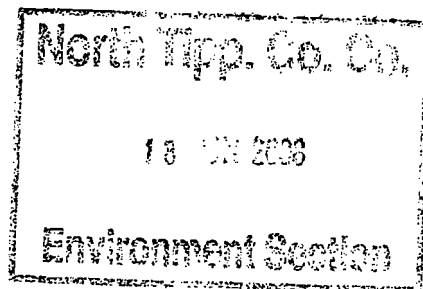
Comments:

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

Signed

Date:

Michael Neill, Regional Chemist



## **Appendix 4**

# **Surface water composition**

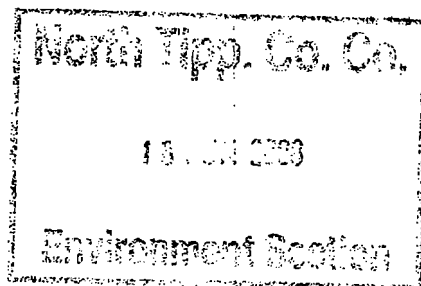
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Environmental Protection Agency  
Regional Inspectorate  
Seville Lodge, Callan Road, Kilkenny

Report of: Analysis of landfill site sample(s)  
Report to: North Tipperary County Council  
Report date: 13/06/08

Facility: **Ballaghveny Landfill**  
Ballymackey, Co. Tipperary,  
Reference No: W0078-01

Date collected: 07/01/2008      Date received: 07/01/2008



|                                |  |               |               |                   |               |                                      |
|--------------------------------|--|---------------|---------------|-------------------|---------------|--------------------------------------|
| Laboratory Ref:                | 2800117  | 2800118       | 2800119       | 2800120           | 2800121       | 2800122                              |
| Type of sample:                | Surface Water  | Surface Water | Surface Water | Surface Water     | Surface Water | Surface Water                        |
| Location code:                 | WST-W0078-01-SWWST-W0078-01-SWWST-W0078-01-SWWST-W0078-01-SWWST-W0078-01-SWWST-W0078-01-SW |               |               |                   |               |                                      |
| Sampling point:                | 1  | 2             | 3             | 4                 | 6             | D                                    |
|                                | light peaty brown  | clear         | clear         | light peaty brown | clear         | landfill closed- no access-no sample |
| Sampled by:                    | Jim McGarry  | Jim McGarry   | Jim McGarry   | Jim McGarry       | Jim McGarry   | Jim McGarry                          |
| Time Sampled:                  | 15:05  | 12:53         | 13:02         | 15:30             | 12:25         | 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 Temperature             | °C           |        | 6.9  | 6.6   | 7.0   | 7.0   | 6.5   | - |
| F Dissolved Oxygen        | % Saturation |        | 80.3 | 85.3  | 103.0 | 80.0  | 100.9 | - |
| pH                        | pH           |        | 7.4  | 7.6   | 7.9   | 7.4   | 7.9   | - |
| Conductivity              | µS/cm        |        | 500  | 660   | 364   | 607   | 414   | - |
| Biochemical Oxygen Demand | mg/l O2      |        | 2.5  | 2.3   | 1.8   | 1.3   | 1.4   | - |
| Chemical Oxygen Demand    | mg/l O2      |        | 52   | 31    | 20    | 62    | 22    | - |
| Ammonia                   | mg/l N       |        | 0.11 | 0.051 | 0.027 | 0.046 | 0.039 | - |
| Chloride                  | mg/l Cl      |        | 23   | 27    | 20    | 24    | 22    | - |
| Suspended Solids          | mg/l         |        | <6   | 9     | 11    | <6    | 11    | - |

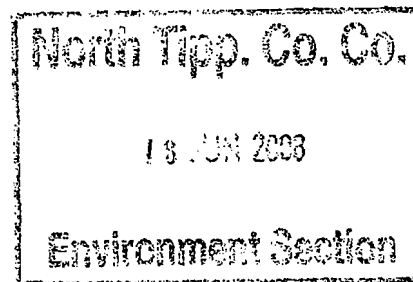
Comments:

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

Signed

Date:

Michael Neill, Regional Chemist



---

## **Appendix 5**

# **Surface water visual inspection**

|                      |                       |
|----------------------|-----------------------|
| Ballaghveny Landfill | Waste Licence 0078-02 |
|----------------------|-----------------------|

**Weekly Surfacewater Monitoring Results**

**January-08**

|                           |                                |   |                                  |
|---------------------------|--------------------------------|---|----------------------------------|
| <b>Site Name :</b>        | <b>Operator :</b>              | <b>Site Address :</b>                           | <b>National Grid Reference :</b> |
| Ballaghveny Landfill Site | North Tipperary County Council | Ballaghveny, Ballymackev, Nenagh, Co. Tipperary | 197040.85E, 182012.11N           |

**Monitoring Personnel:**

Michael Haverty

**RESULTS**

| Date      | Time  | Site Status | Weather      | Surfacewater Monitoring Stations          | Visual Inspection               | Odour Inspection | Suspended Solids(mg/L) |
|-----------|-------|-------------|--------------|---|---------------------------------|------------------|------------------------|
| 4-Jan-08  | 14:00 | Open        | Cold Showery | SW1 (Bridge above landfill entrance)      | Peaty Colour                    |                  |                        |
|           |       |             |              | SW2 (stream prior to Ollatrim River)      | Peaty                           |                  |                        |
|           |       |             |              | SW3 (Ollatrim River before stream enters) | Cloudy - Heavy flood            |                  |                        |
|           |       |             |              | SW4 (Bog above landfill)                  | Peaty / Plenty of Growth        |                  |                        |
|           |       |             |              | SW6(Ollatrim River after stream enters)   | Cloudy - Heavy flood            |                  |                        |
|           |       |             |              |   |                                 |                  |                        |
| 11-Jan-08 | 14:00 | Open        | Cool dry     | SW1 (Bridge above landfill entrance)      | peaty colour                    |                  |                        |
|           |       |             |              | SW2 (stream prior to Ollatrim River)      | clear                           |                  |                        |
|           |       |             |              | SW3 (Ollatrim River before stream enters) | Muddy - river high              |                  |                        |
|           |       |             |              | SW4 (Bog above landfill)                  | Peaty Colour - plenty of growth |                  |                        |
|           |       |             |              | SW6(Ollatrim River after stream enters)   | Muddy - river high              |                  |                        |
|           |       |             |              |   |                                 |                  |                        |
| 18-Jan-08 | 14:00 | Open        | mild - rainy | SW1 (Bridge above landfill entrance)      | Peaty Colour                    |                  |                        |
|           |       |             |              | SW2 (stream prior to Ollatrim River)      | peaty colour                    |                  |                        |
|           |       |             |              | SW3 (Ollatrim River before stream enters) | river high                      |                  |                        |
|           |       |             |              | SW4 (Bog above landfill)                  | Peaty Colour                    |                  |                        |
|           |       |             |              | SW6(Ollatrim River after stream enters)   | high due to heavy rain          |                  |                        |
|           |       |             |              |   |                                 |                  |                        |
| 25-Jan-08 | 14:00 | Open        | dry sunny    | SW1 (Bridge above landfill entrance)      | clear                           |                  |                        |
|           |       |             |              | SW2 (stream prior to Ollatrim River)      | clear                           |                  |                        |
|           |       |             |              | SW3 (Ollatrim River before stream enters) | clear                           |                  |                        |
|           |       |             |              | SW4 (Bog above landfill)                  | peaty                           |                  |                        |
|           |       |             |              | SW6(Ollatrim River after stream enters)   | clear                           |                  |                        |
|           |       |             |              |   |                                 |                  |                        |

**COMMENTS**



|                      |                       |
|----------------------|-----------------------|
| Ballaghveny Landfill | Waste Licence 0078-02 |
|----------------------|-----------------------|

**Weekly Surfacewater Monitoring Results**

**February-08**

|                           |                                |   |                                  |
|---------------------------|--------------------------------|---|----------------------------------|
| <b>Site Name :</b>        | <b>Operator :</b>              | <b>Site Address :</b>                           | <b>National Grid Reference :</b> |
| Ballaghveny Landfill Site | North Tipperary County Council | Ballaghveny, Ballymackev, Nenagh, Co. Tipperary | 197040.85E, 182012.11N           |

**Monitoring Personnel:**  
Michael Haverly

**RESULTS**

| Date | Time | Site Status | Weather | Surfacewater Monitoring Stations | Visual Inspection | Odour Inspection | Suspended Solids(mg/L) |
|------|------|-------------|---------|----------------------------------|-------------------|------------------|------------------------|
|------|------|-------------|---------|----------------------------------|-------------------|------------------|------------------------|

|          |       |      |     |   |                       |  |  |
|----------|-------|------|-----|---|-----------------------|--|--|
| 1-Feb-08 | 14:00 | Open | Dry | SW1 (Bridge above landfill entrance)      | Clear                 |  |  |
|          |       |      |     | SW2 (stream prior to Orlatrim River)      | Clear                 |  |  |
|          |       |      |     | SW3 (Orlatrim River before stream enters) | Clear                 |  |  |
|          |       |      |     | SW4 (Bog above landfill)                  | Peaty - bog in stream |  |  |
|          |       |      |     | SW6(Orlatrim River after stream enters)   | Clear                 |  |  |

|          |       |      |           |   |                                 |  |  |
|----------|-------|------|-----------|---|---------------------------------|--|--|
| 6-Feb-08 | 14:00 | Open | Dry sunny | SW1 (Bridge above landfill entrance)      | clear                           |  |  |
|          |       |      |           | SW2 (stream prior to Orlatrim River)      | clear                           |  |  |
|          |       |      |           | SW3 (Orlatrim River before stream enters) | Clear                           |  |  |
|          |       |      |           | SW4 (Bog above landfill)                  | Peaty Colour - plenty of growth |  |  |
|          |       |      |           | SW6(Orlatrim River after stream enters)   | Clear                           |  |  |

|           |       |      |              |   |                     |  |  |
|-----------|-------|------|--------------|---|---------------------|--|--|
| 15-Feb-08 | 14:00 | Open | dry overcast | SW1 (Bridge above landfill entrance)      | Clear               |  |  |
|           |       |      |              | SW2 (stream prior to Orlatrim River)      | Clear               |  |  |
|           |       |      |              | SW3 (Orlatrim River before stream enters) | Clear               |  |  |
|           |       |      |              | SW4 (Bog above landfill)                  | peaty colour        |  |  |
|           |       |      |              | SW6(Orlatrim River after stream enters)   | Muddy - heavy flood |  |  |

|           |       |      |            |   |              |  |  |
|-----------|-------|------|------------|---|--------------|--|--|
| 29-Feb-08 | 14:00 | Open | damp windy | SW1 (Bridge above landfill entrance)      | peaty colour |  |  |
|           |       |      |            | SW2 (stream prior to Orlatrim River)      | clear        |  |  |
|           |       |      |            | SW3 (Orlatrim River before stream enters) | clear        |  |  |
|           |       |      |            | SW4 (Bog above landfill)                  | peaty        |  |  |
|           |       |      |            | SW6(Orlatrim River after stream enters)   | clear        |  |  |

|                 |  |  |  |  |  |  |  |
|-----------------|--|--|--|--|--|--|--|
| <b>COMMENTS</b> |  |  |  |  |  |  |  |
|                 |  |  |  |  |  |  |  |

Ballaghveny Landfill Waste Licence 0078-02

**Weekly Surfacewater Monitoring Results**

**March-08**

|                           |                                |   |                                  |
|---------------------------|--------------------------------|---|----------------------------------|
| <b>Site Name :</b>        | <b>Operator :</b>              | <b>Site Address :</b>                           | <b>National Grid Reference :</b> |
| Ballaghveny Landfill Site | North Tipperary County Council | Ballaghveny, Ballymackev, Nenagh, Co. Tipperary | 197040.85E, 182012.11N           |

**Monitoring Personnel:**

Michael Haverly

**RESULTS**

| Date      | Time  | Site Status | Weather       | Surfacewater Monitoring Stations        | Visual Inspection                      | Odour Inspection | Suspended Solids(mg/L) |
|-----------|-------|-------------|---------------|---|--|------------------|------------------------|
| 8-Mar-08  | 14:00 | Open        | cold windy    | SW1 (Bridge above landfill entrance)    | Peaty Colour                           |                  |                        |
|           |       |             |               | SW2 (stream prior to Orlahm River)      | Clear                                  |                  |                        |
|           |       |             |               | SW3 (Orlahm River before stream enters) | Clear                                  |                  |                        |
|           |       |             |               | SW4 (Bog above landfill)                | Peaty - bog in stream                  |                  |                        |
|           |       |             |               | SW6(Orlahm River after stream enters)   | Clear                                  |                  |                        |
|           |       |             |               |   |  |                  |                        |
| 14-Mar-08 | 14:00 | Open        | cold overcast | SW1 (Bridge above landfill entrance)    | peaty colour                           |                  |                        |
|           |       |             |               | SW2 (stream prior to Orlahm River)      | peaty colour                           |                  |                        |
|           |       |             |               | SW3 (Orlahm River before stream enters) | Clear                                  |                  |                        |
|           |       |             |               | SW4 (Bog above landfill)                | Peaty - bog in stream                  |                  |                        |
|           |       |             |               | SW6(Orlahm River after stream enters)   | Clear                                  |                  |                        |
|           |       |             |               |   |  |                  |                        |
| 21-Mar-08 | 14:00 | Open        | cold showery  | SW1 (Bridge above landfill entrance)    | muddy slow flow                        |                  |                        |
|           |       |             |               | SW2 (stream prior to Orlahm River)      | clear normal flow                      |                  |                        |
|           |       |             |               | SW3 (Orlahm River before stream enters) | clear normal flow                      |                  |                        |
|           |       |             |               | SW4 (Bog above landfill)                | Peaty Colour - plenty of growth        |                  |                        |
|           |       |             |               | SW6(Orlahm River after stream enters)   | Clear                                  |                  |                        |
|           |       |             |               |   |  |                  |                        |
| 28-Mar-08 | 14:00 | Open        | showery cold  | SW1 (Bridge above landfill entrance)    | peaty colour                           |                  |                        |
|           |       |             |               | SW2 (stream prior to Orlahm River)      | clear                                  |                  |                        |
|           |       |             |               | SW3 (Orlahm River before stream enters) | clear                                  |                  |                        |
|           |       |             |               | SW4 (Bog above landfill)                | peaty - a lot of growth -bog in stream |                  |                        |
|           |       |             |               | SW6(Orlahm River after stream enters)   | clear                                  |                  |                        |
|           |       |             |               |   |  |                  |                        |

**COMMENTS**

## **Appendix 6**

# **Groundwater composition**

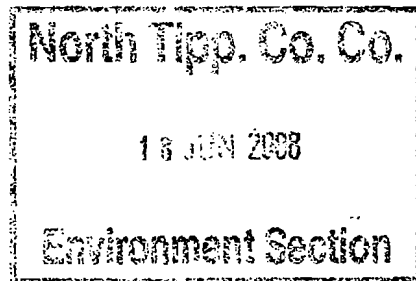
---

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

Report of: Analysis of landfill site sample(s)  
Report to: North Tipperary County Council  
Report date: 13/06/08

Facility: **Ballaghveny Landfill**  
Ballymackey, Co. Tipperary,  
Reference No: W0078-01

Date collected: 07/01/2008      Date received: 07/01/2008



|                                       |                         |                         |                         |                          |                       |                         |
|---------------------------------------|-------------------------|-------------------------|-------------------------|--------------------------|-----------------------|-------------------------|
| <b>Laboratory Ref:</b>                | 2800123                 | 2800124                 | 2800125                 | 2800126                  | 2800127               | 2800128                 |
| <b>Type of sample:</b>                | Groundwater             | Groundwater             | Groundwater             | Groundwater              | Groundwater           | Groundwater             |
| <b>Location code:</b>                 | WST-W0078-01-G<br>W5new | WST-W0078-01-G<br>W6new | WST-W0078-01-G<br>W9new | WST-W0078-01-G<br>W10new | WST-W0078-01-G<br>W12 | WST-W0078-01-BH<br>3new |
| <b>Sampling point:</b>                | no access-closed        | no access-closed        | clear                   | clear                    | clear                 | clear                   |
| <b>Sampled by:</b>                    | Jim McGarry             | Jim McGarry             | Jim McGarry             | Jim McGarry              | Jim McGarry           | Jim McGarry             |
| <b>Time Sampled:</b>                  | 12:00                   | 12:00                   | 14:33                   | 13:58                    | 13:25                 | 14:55                   |
| <b>Start/End - Dates of Analysis:</b> | /                       | /                       |                         |                          |                       |                         |
| <b>Status of results:</b>             | <b>Final Report</b>     | <b>Final Report</b>     | <b>Final Report</b>     | <b>Final Report</b>      | <b>Final Report</b>   | <b>Final Report</b>     |

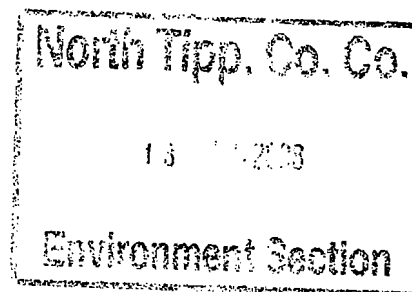
| Parameter           | Units        | Limits |   |   |      |       |       |       |
|---------------------|--------------|--------|---|---|------|-------|-------|-------|
| F Depth of Borehole | m            |        | - | - | 13   | 13.3  | -     | 12.2  |
| F Temperature       | °C           |        | - | - | 11.4 | 11.0  | 10.6  | 11.0  |
| F Water Level       | m            |        | - | - | 8.4  | 10.5  | -     | -     |
| F Dissolved Oxygen  | % Saturation |        | - | - | 21.0 | 65.5  | 91.4  | 24.6  |
| Conductivity        | µS/cm        |        | - | - | 1356 | 884   | 771   | 990   |
| pH                  | pH           |        | - | - | 7.1  | 7.1   | 7.3   | 7.0   |
| Ammonia             | mg/l N       |        | - | - | 9.5  | 0.023 | 0.019 | 0.097 |
| Chloride            | mg/l Cl      |        | - | - | 140  | 30    | 28    | 41    |

Comments: Sulphate analysis was not carried out due to instrumental problems in the laboratory.

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

Signed  
Michael Neill, Regional Chemist

Date:



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

Report of: 1988 Drinking Water Regulations Results of Analysis  
Report to: North Tipperary Co.Co.  
Report date: 13/06/08

Location sampled: Ballaghveny Landfill Site - W0078-01 --  
Date sampled: 07/01/2008 Date received: 07/01/2008  
Analysis group:

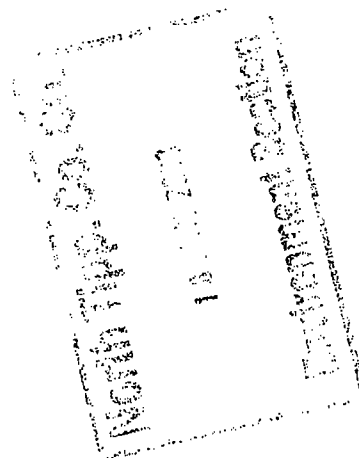
|                 |              |              |
|-----------------|--------------|--------------|
| Laboratory Ref: | 2800129      | 2800130      |
| Type of Sample: | Groundwater  | Groundwater  |
| Sampling Point: | Clear sample | Clear sample |

|               |           |            |
|---------------|-----------|------------|
| Water Supply: | Bresson's | Cullinan's |
|---------------|-----------|------------|

|                       |             |             |
|-----------------------|-------------|-------------|
| Public/Group/Private: |             |             |
| Sampled by:           | Jim McGarry | Jim McGarry |
| Time Sampled:         | 13:33       | 12:44       |

|                                |              |              |
|--------------------------------|--------------|--------------|
| Start/End - Dates of Analysis: |              |              |
| Status of Results:             | Final Report | Final Report |

| Parameter           | Units        | Limits |      |      |
|---------------------|--------------|--------|------|------|
| F Depth of Borehole | m            |        | -    | nm   |
| F Temperature       | °C           |        | 6.9  | -    |
| F Dissolved Oxygen  | % Saturation |        | 64.1 | 87.6 |
| pH                  | pH           |        | 7.2  | 7.4  |
| Conductivity        | µS/cm        |        | 785  | 800  |
| Ammonia             | mg/l NH4     | < 0.3  | 0.01 | 0    |
| Chloride            | mg/l Cl      |        | 20   | 46   |



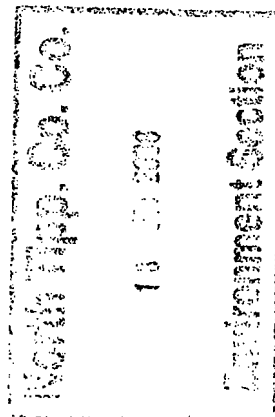
Comments: Sulphate analysis was not carried out due to instrumental problems in the laboratory.

- 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"
- 6) F "Field measured parameters"
- 7)

Signed

Date:

Michael Neill, Regional Chemist



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

Report of: Analysis of landfill site sample(s)  
Report to: North Tipperary County Council  
Report date: 13/06/08

Facility: **Ballaghveny Landfill**  
Ballymackey, Co. Tipperary,  
Reference No: W0078-01

Sampling location: **WST-W0078-01-GW, Ballaghveny Landfill Site - W0078-01 – GW 5 new-Groundwater**

Date collected: 11/03/2008      Date received: 11/03/2008  
Laboratory Ref: 2801399  
Type of sample: Groundwater  
Sampling point: Clear sample

Sampled by: Jim McGarry  
Time Sampled: 13:49  
Start/End - Dates of Analysis:

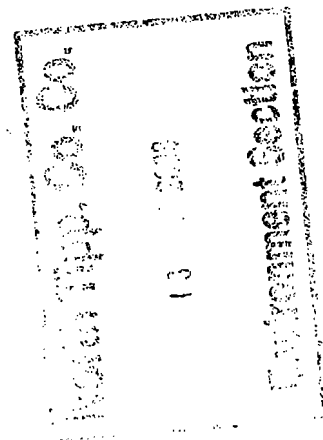
Status of results: **Final Report**

| Parameter           | Units        | Limits |
|---------------------|--------------|--------|
| F Depth of Borehole | m            | 14     |
| F Water Level       | m            | 12.5   |
| F Temperature       | °C           | 10.3   |
| F Dissolved Oxygen  | % Saturation | 14.1   |
| pH                  | pH           | 7.3    |
| Conductivity        | µS/cm        | 671    |
| Ammonia             | mg/l N       | 0.45   |
| Chloride            | mg/l Cl      | 9      |
| Sulphate            | mg/l SO4     | 26.6   |

**Comments:**

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

Signed:   
Date:   
Michael Neill, Regional Chemist





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

Report of: Analysis of landfill site sample(s)  
Report to: North Tipperary County Council  
Report date: 13/06/08

Facility: **Ballaghveny Landfill**  
Ballymackey, Co. Tipperary,  
Reference No: W0078-01

Sampling location: **WST-W0078-01-GW6new, Ballaghveny landfill site - W0078-01 – GW6 new - groundwater**

Date collected: 11/03/2008                      Date received: 11/03/2008  
Laboratory Ref: 2801400  
Type of sample: Groundwater  
Sampling point: Clear sample

Sampled by: Jim McGarry

Time Sampled: 13:30

Start/End - Dates of Analysis:

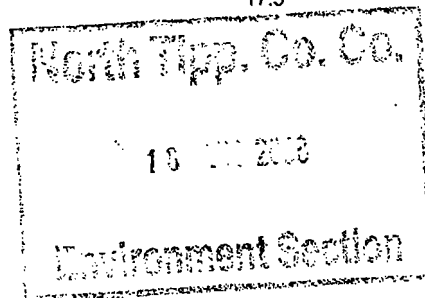
Status of results:

Final Report

| Parameter           | Units                | Limits |        |
|---------------------|----------------------|--------|--------|
| F Depth of Borehole | m                    |        | Tap    |
| F Water Level       | m                    |        | nm     |
| F Temperature       | °C                   |        | 7.5    |
| pH                  | pH                   |        | 7.4    |
| Conductivity        | µS/cm                |        | 775    |
| Odour               |                      |        | 1      |
| Ammonia             | mg/l N               |        | <0.003 |
| Chloride            | mg/l Cl              |        | 19     |
| Sulphate            | mg/l SO <sub>4</sub> |        | 17.5   |

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



Signed

Date:

Michael Neill, Regional Chemist

# **Appendix 7**

## **Groundwater levels**

---

## Quarterly Groundwater Monitoring Form

Ballaghveny Landfill

Waste Licence 0078-02

Quarter 1 2008

|                           |                                |   |                                  |
|---------------------------|--------------------------------|---|----------------------------------|
| <b>Site Name :</b>        | <b>Operator :</b>              | <b>Site Address :</b>                           | <b>National Grid Reference :</b> |
| Ballaghveny Landfill Site | North Tipperary County Council | Ballaghveny, Ballymackey, Nenagh, Co. Tipperary | 197040.85E, 182012.11N           |

**Instrument used :**

Geotechnical Instruments EA 450/010 Borehole Dipper

**Monitoring Personnel:**

Michael Haverly & Sean Madigan (Site Technician)

### RESULTS

| Date      | Time  | Site Status | Weather   | Groundwater Monitoring Stations | Groundwater Monitoring Total Borehole depth (in Meters) | Depth at which Groundwater reached (in meters) | Height of Groundwater (in Meters) |
|-----------|-------|-------------|-----------|---------------------------------|---|--|-----------------------------------|
| 31-Jan-08 | 14:00 | Open        | Dry windy |                                 |   |  |                                   |
|           |       |             |           | GW5                             | 13.80   | 1.24   | 12.56                             |
|           |       |             |           | GW10                            | 11.90   | 2.33   | 9.57                              |
|           |       |             |           | GW9                             | 12.30   | 3.88   | 8.42                              |
|           |       |             |           | BH3                             | 11.30   | 3.98   | 7.32                              |
|           |       |             |           | GW12                            | 11.20   | 2.28   | 8.92                              |
|           |       |             |           | GW6                             | 13.60   |  | 13.60                             |
|           |       |             |           | GW3                             | 14.50   | 2.31   | 12.19                             |
| 22-Feb-08 | 14:00 | Open        | Dry windy |                                 |   |  |                                   |
|           |       |             |           | GW5                             | 13.80   | 1.42   | 12.38                             |
|           |       |             |           | GW10                            | 11.90   | 3.11   | 8.79                              |
|           |       |             |           | GW9                             | 12.30   | 4.23   | 8.07                              |
|           |       |             |           | BH3                             | 11.30   | 4.25   | 7.05                              |
|           |       |             |           | GW12                            | 11.20   | 2.71   | 8.49                              |
|           |       |             |           | GW6                             | 13.60   |  | 13.60                             |
|           |       |             |           | GW3                             | 14.50   | 2.79   | 11.71                             |
| 27-Mar-08 | 14:00 | Open        | Dry windy |                                 |   |  |                                   |
|           |       |             |           | GW5                             | 13.80   | 1.50   | 12.30                             |
|           |       |             |           | GW10                            | 11.90   | 3.32   | 8.58                              |
|           |       |             |           | GW9                             | 12.30   | 4.59   | 7.71                              |
|           |       |             |           | BH3                             | 11.30   | 4.63   | 6.67                              |
|           |       |             |           | GW12                            | 11.20   | 3.32   | 7.88                              |
|           |       |             |           | GW6                             | 13.60   |  | 13.60                             |
|           |       |             |           | GW3                             | 14.50   | 3.02   | 11.48                             |

## **Appendix 8**

# **Quarterly groundwater visual inspection**

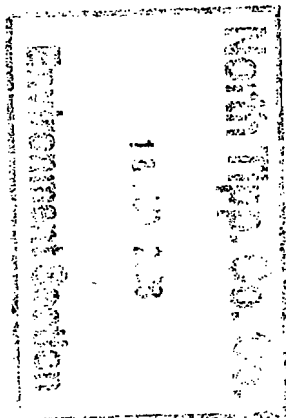
---

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

Report of: Analysis of landfill site sample(s)  
Report to: North Tipperary County Council  
Report date: 13/06/08

Facility: **Ballaghveny Landfill**  
Ballymackey, Co. Tipperary,  
Reference No: W0078-01

Date collected: 07/01/2008      Date received: 07/01/2008



|                                |                         |                         |                         |                          |                       |                         |
|--------------------------------|-------------------------|-------------------------|-------------------------|--------------------------|-----------------------|-------------------------|
| Laboratory Ref:                | 2800123                 | 2800124                 | 2800125                 | 2800126                  | 2800127               | 2800128                 |
| Type of sample:                | Groundwater             | Groundwater             | Groundwater             | Groundwater              | Groundwater           | Groundwater             |
| Location code:                 | WST-W0078-01-G<br>W5new | WST-W0078-01-G<br>W6new | WST-W0078-01-G<br>W9new | WST-W0078-01-G<br>W10new | WST-W0078-01-G<br>W12 | WST-W0078-01-BH<br>3new |
| Sampling point:                | no access-closed        | no access-closed        | clear                   | clear                    | clear                 | clear                   |
| Sampled by:                    | Jim McGarry             | Jim McGarry             | Jim McGarry             | Jim McGarry              | Jim McGarry           | Jim McGarry             |
| Time Sampled:                  | 12:00                   | 12:00                   | 14:33                   | 13:58                    | 13:25                 | 14:55                   |
| 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            | -      | - | 13   | 13.3  | 12.2  |
| F Temperature       | °C           | -      | - | 11.4 | 11.0  | 11.0  |
| F Water Level       | m            | -      | - | 8.4  | 10.5  | -     |
| F Dissolved Oxygen  | % Saturation | -      | - | 21.0 | 65.5  | 91.4  |
| Conductivity        | µS/cm        | -      | - | 1356 | 884   | 771   |
| pH                  | pH           | -      | - | 7.1  | 7.1   | 7.0   |
| Ammonia             | mg/l N       | -      | - | 9.5  | 0.023 | 0.019 |
| Chloride            | mg/l Cl      | -      | - | 140  | 30    | 41    |

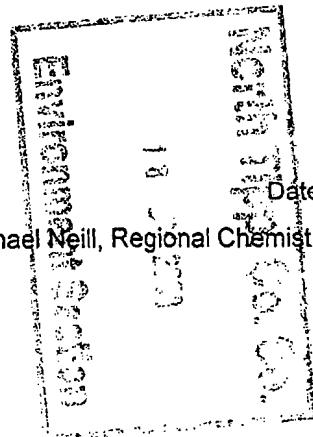
Comments: Sulphate analysis was not carried out due to instrumental problems in the laboratory.

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

Signed

Michael Neill, Regional Chemist

Date:



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

Report of: 1988 Drinking Water Regulations Results of Analysis  
Report to: North Tipperary Co.Co.  
Report date: 13/06/08

Location sampled: Ballaghveny Landfill Site - W0078-01 --  
Date sampled: 07/01/2008 Date received: 07/01/2008  
Analysis group:

|                 |              |              |
|-----------------|--------------|--------------|
| Laboratory Ref: | 2800129      | 2800130      |
| Type of Sample: | Groundwater  | Groundwater  |
| Sampling Point: | Clear sample | Clear sample |

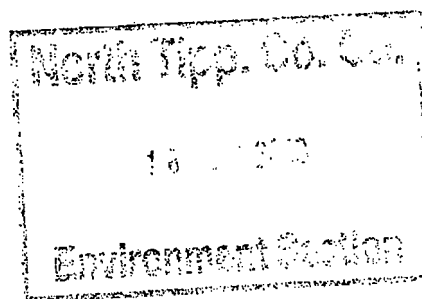
|               |           |            |
|---------------|-----------|------------|
| Water Supply: | Bresson's | Cullinan's |
|---------------|-----------|------------|

|                       |             |             |
|-----------------------|-------------|-------------|
| Public/Group/Private: |             |             |
| Sampled by:           | Jim McGarry | Jim McGarry |
| Time Sampled:         | 13:33       | 12:44       |

Start/End - Dates of Analysis:

|                    |              |              |
|--------------------|--------------|--------------|
| Status of Results: | Final Report | Final Report |
|--------------------|--------------|--------------|

| Parameter           | Units        | Limits |      |      |
|---------------------|--------------|--------|------|------|
| F Depth of Borehole | m            |        | -    | nm   |
| F Temperature       | °C           |        | 6.9  | -    |
| F Dissolved Oxygen  | % Saturation |        | 64.1 | 87.6 |
| pH                  | pH           |        | 7.2  | 7.4  |
| Conductivity        | µS/cm        |        | 785  | 800  |
| Ammonia             | mg/l NH4     | < 0.3  | 0.01 | 0    |
| Chloride            | mg/l Cl      |        | 20   | 46   |



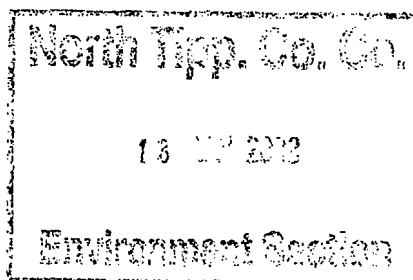
Comments: Sulphate analysis was not carried out due to instrumental problems in the laboratory.

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

Signed

Date:

Michael Neill, Regional Chemist





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

Report of: Analysis of landfill site sample(s)  
Report to: North Tipperary County Council  
Report date: 13/06/08

Facility: **Ballaghveny Landfill**  
Ballymackey, Co. Tipperary,  
Reference No: W0078-01

Sampling location: **WST-W0078-01-GW, Ballaghveny Landfill Site - W0078-01 -- GW 5 new-Groundwater**

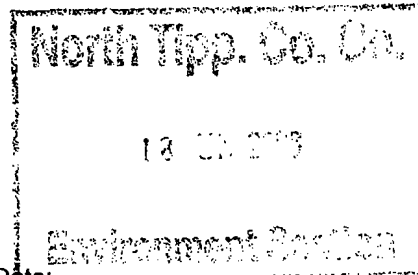
Date collected: 11/03/2008 Date received: 11/03/2008  
Laboratory Ref: 2801399  
Type of sample: Groundwater  
Sampling point: Clear sample

Sampled by: Jim McGarry  
Time Sampled: 13:49  
Start/End - Dates of Analysis:  
Status of results: **Final Report**

| Parameter           | Units        | Limits | Final Report |
|---------------------|--------------|--------|--------------|
| F Depth of Borehole | m            |        | 14           |
| F Water Level       | m            |        | 12.5         |
| F Temperature       | °C           |        | 10.3         |
| F Dissolved Oxygen  | % Saturation |        | 14.1         |
| pH                  | pH           |        | 7.3          |
| Conductivity        | µS/cm        |        | 671          |
| Ammonia             | mg/l N       |        | 0.45         |
| Chloride            | mg/l Cl      |        | 9            |
| Sulphate            | mg/l SO4     |        | 26.6         |

Comments:

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



Signed

Date

Michael Neill, Regional Chemist

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

Report of: Analysis of landfill site sample(s)  
Report to: North Tipperary County Council  
Report date: 13/06/08

Facility: **Ballaghveny Landfill**  
Ballymackey, Co. Tipperary,  
Reference No: W0078-01

Sampling location: **WST-W0078-01-GW6new, Ballaghveny landfill site - W0078-01 -- GW6 new - groundwater**

Date collected: 11/03/2008      Date received: 11/03/2008  
Laboratory Ref: 2801400  
Type of sample: Groundwater  
Sampling point: Clear sample

Sampled by: Jim McGarry  
Time Sampled: 13:30

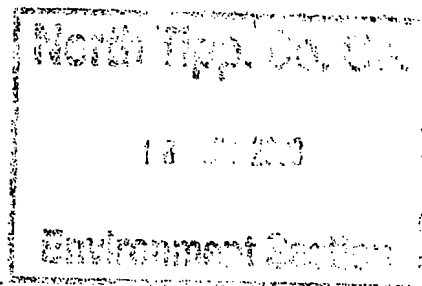
Start/End - Dates of Analysis:

Status of results: **Final Report**

| Parameter           | Units    | Limits |        |
|---------------------|----------|--------|--------|
| F Depth of Borehole | m        |        | Tap    |
| F Water Level       | m        |        | nm     |
| F Temperature       | °C       |        | 7.5    |
| pH                  | pH       |        | 7.4    |
| Conductivity        | µS/cm    |        | 775    |
| Odour               |          |        | 1      |
| Ammonia             | mg/l N   |        | <0.003 |
| Chloride            | mg/l Cl  |        | 19     |
| Sulphate            | mg/l SO4 |        | 17.5   |

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



Signed

Date:

Michael Neill, Regional Chemist

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## **Appendix 9**

# **Gas monitoring results**

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|                      |                       |
|----------------------|-----------------------|
| Ballaghveny Landfill | Waste Licence 0078-02 |
|----------------------|-----------------------|

**Gas Monitoring Locations as per DG152-02**

**January-08**

|                           |                                |                           |                                  |
|---------------------------|--------------------------------|---------------------------|----------------------------------|
| <b>Site Name :</b>        | <b>Operator :</b>              | <b>Site Address :</b>     | <b>National Grid Reference :</b> |
| Ballaghveny Landfill Site | North Tipperary County Council | Ballaghveny, Ballymackey, | 197040.85E, 182012.11N           |

**Instrument used :**  
Geotechnical Instruments GA94 Infra Red Gas Analyser

**Date Of Next Calibration**  
Apr-08

**Monitoring Personnel:**  
Rita McGrath

**Weather Conditions**  
overcast

**Barometric Pressure**  
1001

**RESULTS**

| Sample Station ID      | Borehole / Vent | Survey Depth | CH4% v/v | CO2% v/v | O2% v/v | Temp Celcius | Comments |
|------------------------|-----------------|--------------|----------|----------|---------|--------------|----------|
| <b>Cell Wells</b>      |                 |              |          |          |         |              |          |
| LFG1                   | Gas Vent        | n/a          | 0.00%    |          |         |              |          |
| LFG2                   | Gas Vent        | n/a          | 63.30%   |          |         |              |          |
| LFG3                   | Gas Vent        | n/a          | 64.10%   |          |         |              |          |
| LFG4                   | Gas Vent        | n/a          | 47.30%   |          |         |              |          |
| LFG5                   | Gas Vent        | n/a          | 26.20%   |          |         |              |          |
| LFG6                   | Gas Vent        | n/a          | 64.70%   |          |         |              |          |
| <b>Perimeter Wells</b> |                 |              |          |          |         |              |          |
| MP2                    | Gas Borehole    | 1m           | 0.00%    | 0.20%    | 20.50%  |              |          |
| MP3                    | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 20.20%  |              |          |
| MP4                    | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 17.60%  |              |          |
| MP6                    | Gas Borehole    | 1m           | 0.00%    | 0.01%    | 20.50%  |              |          |
| MP7                    | Gas Borehole    | 1m           | 0.00%    | 0.02%    | 19.60%  |              |          |
| MP8                    | Gas Borehole    | 1m           | 0.00%    | 0.03%    | 20.00%  |              |          |
| MP15                   | Gas Borehole    | 1m           | %        |          |         |              |          |
| MP16                   | Gas Borehole    | 1m           | 0.00%    | 0.02%    | 20.60%  |              |          |
| MP17                   | Gas Borehole    | 1m           | 0.00%    | 0.70%    | 20.60%  |              |          |
| MP18                   | Gas Borehole    | 1m           | 0.00%    | 0.05%    | 20.50%  |              |          |
| MP19                   | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 20.60%  |              |          |
| MP20                   | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 20.40%  |              |          |

|                      |                       |
|----------------------|-----------------------|
| Ballaghveny Landfill | Waste Licence 0078-02 |
|----------------------|-----------------------|

**Gas Monitoring Locations as per DG152-02**

**February-08**

|                           |                                |                           |                                  |
|---------------------------|--------------------------------|---------------------------|----------------------------------|
| <b>Site Name :</b>        | <b>Operator :</b>              | <b>Site Address :</b>     | <b>National Grid Reference :</b> |
| Ballaghveny Landfill Site | North Tipperary County Council | Ballaghveny, Ballymackey, | 197040.85E, 182012.11N           |

**Instrument used :**  
Geotechnical Instruments GA94 Infra Red Gas Analyser

**Date Of Next Calibration**  
Apr-08

**Monitoring Personnel:**  
Rita McGrath

**Weather Conditions**  
overcast

**Barometric Pressure**  
974

**RESULTS**

| Sample Station ID      | Borehole / Vent | Survey Depth | CH4% v/v | CO2% v/v | O2% v/v | Temp Celcius | Comments |
|------------------------|-----------------|--------------|----------|----------|---------|--------------|----------|
| <b>Cell Wells</b>      |                 |              |          |          |         |              |          |
| LFG1                   | Gas Vent        | n/a          | 44.50%   | 19.90%   | 3.70%   | 974          |          |
| LFG2                   | Gas Vent        | n/a          | 67.10%   | 27.00%   | 0.60%   | 974          |          |
| LFG3                   | Gas Vent        | n/a          | 70.20%   | 29.90%   | 0.30%   | 974          |          |
| LFG4                   | Gas Vent        | n/a          | 70.00%   |          |         |              |          |
| LFG5                   | Gas Vent        | n/a          | 65.70%   | 34.00%   | 0.70%   | 974          |          |
| LFG6                   | Gas Vent        | n/a          | 69.00%   | 33.30%   | 0.50%   | 974          |          |
| <b>Perimeter Wells</b> |                 |              |          |          |         |              |          |
| MP2                    | Gas Borehole    | 1m           |          |          |         |              |          |
| MP3                    | Gas Borehole    | 1m           | 0.00%    | 0.10%    | 19.40%  | 974          |          |
| MP4                    | Gas Borehole    | 1m           | 0.00%    | 1.30%    | 18.10%  | 974          |          |
| MP6                    | Gas Borehole    | 1m           | 0.00%    | 0.10%    | 19.50%  | 974          |          |
| MP7                    | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 19.50%  | 974          |          |
| MP8                    | Gas Borehole    | 1m           | 0.00%    | 0.10%    | 19.60%  | 974          |          |
| MP15                   | Gas Borehole    | 1m           | 0.00%    | 0.10%    | 19.80%  | 974          |          |
| MP16                   | Gas Borehole    | 1m           | 0.00%    | 0.10%    | 19.60%  | 974          |          |
| MP17                   | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 19.90%  | 974          |          |
| MP18                   | Gas Borehole    | 1m           | 0.00%    | 0.10%    | 19.70%  | 974          |          |
| MP19                   | Gas Borehole    | 1m           | 0.00%    | 0.10%    | 19.30%  | 974          |          |
| MP20                   | Gas Borehole    | 1m           |          |          |         |              |          |

|                      |                       |
|----------------------|-----------------------|
| Ballaghveny Landfill | Waste Licence 0078-02 |
|----------------------|-----------------------|

**Gas Monitoring Locations as per DG152-02**

**March-08**

|                           |                                |                           |                                  |
|---------------------------|--------------------------------|---------------------------|----------------------------------|
| <b>Site Name :</b>        | <b>Operator :</b>              | <b>Site Address :</b>     | <b>National Grid Reference :</b> |
| Ballaghveny Landfill Site | North Tipperary County Council | Ballaghveny, Ballymackey, | 197040.85E, 182012.11N           |

**Instrument used :**  
Geotechnical Instruments GA94 Infra Red Gas Analyser

**Date Of Next Calibration**  
Apr-08

**Monitoring Personnel:**  
Rita McGrath

**Weather Conditions**  
overcast

**Barometric Pressure**  
1015

**RESULTS**

| Sample Station ID      | Borehole / Vent | Survey Depth | CH4% v/v | CO2% v/v | O2% v/v | Temp Celcius | Comments |
|------------------------|-----------------|--------------|----------|----------|---------|--------------|----------|
| <b>Cell Wells</b>      |                 |              |          |          |         |              |          |
| LFG1                   | Gas Vent        | n/a          | 72.20%   | 24.20%   | 0.20%   | 1013         |          |
| LFG2                   | Gas Vent        | n/a          | 67.10%   | 23.40%   | 1.60%   | 1013         |          |
| LFG3                   | Gas Vent        | n/a          | 70.80%   | 28.90%   | 0.20%   | 1013         |          |
| LFG4                   | Gas Vent        | n/a          | 27.80%   | 20.80%   | 2.00%   | 1013         |          |
| LFG5                   | Gas Vent        | n/a          | 66.20%   | 33.90%   | 0.20%   | 1013         |          |
| LFG6                   | Gas Vent        | n/a          | 65.60%   | 33.60%   | 0.30%   | 1013         |          |
| <b>Perimeter Wells</b> |                 |              |          |          |         |              |          |
| MP2                    | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 19.10%  | 1015         |          |
| MP3                    | Gas Borehole    | 1m           | 0.00%    | 0.20%    | 18.70%  | 1015         |          |
| MP4                    | Gas Borehole    | 1m           | 0.00%    | 1.20%    | 17.80%  | 1015         |          |
| MP6                    | Gas Borehole    | 1m           | 0.00%    | 0.10%    | 18.90%  | 1015         |          |
| MP7                    | Gas Borehole    | 1m           | 0.00%    | 0.10%    | 18.90%  | 1015         |          |
| MP8                    | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 18.90%  | 1015         |          |
| MP15                   | Gas Borehole    | 1m           | 0.00%    | 0.10%    | 19.30%  | 1015         |          |
| MP16                   | Gas Borehole    | 1m           |          |          |         |              |          |
| MP17                   | Gas Borehole    | 1m           | 0.00%    | 0.20%    | 20.10%  | 1015         |          |
| MP18                   | Gas Borehole    | 1m           | 0.00%    | 0.10%    | 19.00%  | 1015         |          |
| MP19                   | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 19.20%  | 1015         |          |
| MP20                   | Gas Borehole    | 1m           |          |          |         |              |          |

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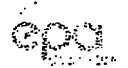
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**Appendix 10**

**Water standards**

WATER QUALITY STANDARDS - A SYNOPSIS

Environmental Protection Agency,  
Regional Water Laboratory, Kilkenny.



Synopsis only - for details refer to the EU Directives and Irish Statutory Instruments.

| PARAMETERS                          | UNITS                                | SURFACE ABSTRACTION               |         |                                  | DRINKING WATER        |                                  | FRESHWATER FISH         |          |          |          |  |
|-------------------------------------|--------------------------------------|-----------------------------------|---------|----------------------------------|-----------------------|----------------------------------|-------------------------|----------|----------|----------|--|
|                                     |                                      | Directive 75/440/EEC A1-Treatment |         | Irish Standard SI No.294 of 1989 | EC Directive 98/83/EC | Irish Standard SI No.439 of 2000 | EC Directive 78/659/EEC |          |          |          |  |
|                                     |                                      | Guide                             | M.A.C.* |                                  |                       |                                  | SALMONID                |          | CYPRINID |          | Irish Salmonid Stds. SI No 293 of 1988 |
|                                     |                                      |                                   |         | Guide                            | M.A.C.*               | Guide                            | M.A.C.*                 | Guide    | M.A.C.*  |          |  |
| Temperature                         | °C                                   | 22                                | 25      | 25                               | —                     | —                                | —                       | 21.5(a)  | —        | 28(b)    | 21.5(c)                                |
| Dissolved Oxygen                    | mg/l O <sub>2</sub>                  | —                                 | —       | —                                | —                     | —                                | 50%>9                   | 50%>9    | 50%>8    | 50%>7    | 50%>9                                  |
| Dissolved Oxygen % Sat              | % Sat                                | —                                 | —       | —                                | —                     | —                                | 100%>7                  | —        | 100%>5   | —        | —                                      |
| BOD                                 | mg/l O <sub>2</sub>                  | >70%                              | —       | >60%                             | —                     | —                                | —                       | —        | —        | —        | —                                      |
| BOD                                 | mg/l O <sub>2</sub>                  | 3                                 | —       | 5                                | —                     | —                                | 3                       | —        | 6        | —        | 85%<5                                  |
| Conductivity                        | uS/cm                                | 1000                              | —       | 1000                             | 2500                  | 2500                             | —                       | —        | —        | —        | —                                      |
| pH                                  |                                      | 6.5 - 8.5                         | —       | 5.5 - 8.5                        | 6.5 - 9.5             | 6.5 - 9.5                        | —                       | 6 - 9    | —        | 6 - 9    | 6 - 9                                  |
| Colour                              | Hazen                                | 10                                | 20      | 20                               | Acceptable            | Acceptable                       | —                       | —        | —        | —        | —                                      |
| Turbidity                           | NTU                                  | —                                 | —       | —                                | Acceptable            | Acceptable                       | —                       | —        | —        | —        | —                                      |
| Phosphorous                         | mg/l P                               | 0.17                              | —       | 0.22                             | —                     | —                                | —                       | 0.65     | —        | 0.13     | —                                      |
| Nitrate                             | mg/l N                               | 5.85                              | 11.3    | 11.3                             | 11.3                  | 11.3                             | —                       | —        | —        | —        | —                                      |
| Nitrite                             | mg/l NO <sub>2</sub>                 | —                                 | —       | —                                | 0.5                   | 0.5                              | 0.01                    | —        | 0.03     | —        | 95%<0.05                               |
| Sulphate                            | mg/l SO <sub>4</sub>                 | 150                               | 250     | 200                              | 250                   | 250                              | —                       | —        | —        | —        | —                                      |
| Suspended Solids                    | mg/l                                 | 25                                | —       | 50                               | —                     | —                                | 25                      | —        | 25       | —        | 25                                     |
| Odour                               | Dilution                             | 3@25°C                            | —       | 5@25°C                           | Acceptable            | Acceptable                       | —                       | —        | —        | —        | —                                      |
| Taste                               | Dilution                             | —                                 | —       | —                                | Acceptable            | Acceptable                       | —                       | —        | —        | —        | —                                      |
| Fluoride                            | mg/l F                               | 0.7-1.0                           | 1.5     | 1                                | 1.5                   | 1.0 (d)                          | —                       | —        | —        | —        | —                                      |
| Chloride                            | mg/l Cl                              | 200                               | —       | 250                              | 250                   | 250                              | —                       | —        | —        | —        | —                                      |
| Cyanide                             | mg/l CN                              | —                                 | 0.05    | 0.05                             | 0.05                  | 0.05                             | —                       | —        | —        | —        | —                                      |
| Sulphide                            | mg/l S                               | —                                 | —       | —                                | —                     | —                                | —                       | —        | —        | —        | —                                      |
| Ammonia (Total)                     | mg/l NH <sub>3</sub>                 | 0.05                              | —       | 0.2                              | 0.5                   | 0.3                              | 0.04                    | 1        | 0.2      | 1        | 1                                      |
| Non-ionised                         | mg/l NH <sub>3</sub>                 | —                                 | —       | —                                | —                     | —                                | 0.005                   | 0.025    | 0.005    | 0.03     | 0.02                                   |
| Nitrogen (Kjeldahl)                 | mg/l N                               | 1                                 | —       | 1                                | —                     | —                                | —                       | —        | —        | —        | —                                      |
| Residual Chlorine                   | mg/l Cl <sub>2</sub>                 | —                                 | —       | —                                | —                     | —                                | —                       | 0.005    | —        | 0.01     | 0.005                                  |
| Oxidisability (KMnO <sub>4</sub> )  | mg/l O <sub>2</sub>                  | —                                 | —       | —                                | 5.0                   | 5.0                              | —                       | —        | —        | —        | —                                      |
| TOC                                 | mg/l C                               | —                                 | —       | —                                | No change             | No change                        | —                       | —        | —        | —        | —                                      |
| Bromate                             | µg/l                                 | —                                 | —       | —                                | 10                    | 10                               | —                       | —        | —        | —        | —                                      |
| Acrylamide                          | µg/l                                 | —                                 | —       | —                                | 0.10                  | 0.10                             | —                       | —        | —        | —        | —                                      |
| Benzene                             | µg/l                                 | —                                 | —       | —                                | 1.0                   | 1.0                              | —                       | —        | —        | —        | —                                      |
| Benzo(a)pyrene                      | µg/l                                 | —                                 | —       | —                                | 0.01                  | 0.01                             | —                       | —        | —        | —        | —                                      |
| 1,2-dichloroethane                  | µg/l                                 | —                                 | —       | —                                | 3.0                   | 3.0                              | —                       | —        | —        | —        | —                                      |
| Epichlorohydrin                     | µg/l                                 | —                                 | —       | —                                | 0.1                   | 0.1                              | —                       | —        | —        | —        | —                                      |
| THMs total                          | µg/l                                 | —                                 | —       | —                                | 100                   | 100                              | —                       | —        | —        | —        | —                                      |
| Vinyl chloride                      | µg/l                                 | —                                 | —       | —                                | 0.5                   | 0.5                              | —                       | —        | —        | —        | —                                      |
| Tetrachloroethene & Trichloroethene | µg/l                                 | —                                 | —       | —                                | 10                    | —                                | —                       | —        | —        | —        | —                                      |
| Detergents (MBAS)                   | mg/l                                 | 0.2                               | —       | 0.2                              | —                     | —                                | —                       | —        | —        | —        | —                                      |
| Phenol                              | mg/l C <sub>6</sub> H <sub>5</sub> O | —                                 | 0.001   | 0.0005                           | —                     | —                                | —                       | No taste | —        | No taste | No taste                               |
| Hydrocarbons                        | mg/l                                 | —                                 | 0.05    | 0.01                             | —                     | —                                | —                       | (e)      | —        | (e)      | (e)                                    |
| Aromatics (PAH)                     | mg/l                                 | —                                 | 0.0002  | 0.0002                           | 0.0001                | 0.0001                           | —                       | —        | —        | —        | —                                      |
| Pesticides (total)                  | mg/l                                 | —                                 | 0.001   | 0.0005                           | 0.0005                | 0.0005                           | —                       | —        | —        | —        | —                                      |
| Pesticides (single)                 | mg/l                                 | —                                 | —       | —                                | 0.0001                | 0.0001                           | —                       | —        | —        | —        | —                                      |
| CHCl <sub>3</sub> Extract           | mg/l                                 | 0.1                               | —       | 0.2                              | —                     | —                                | —                       | —        | —        | —        | —                                      |
| Total Coliforms                     | /100ml                               | 50                                | —       | 5000                             | 0                     | 0                                | —                       | —        | —        | —        | —                                      |
| Fecal Coliforms                     | /100ml                               | 20                                | —       | 1000                             | 0                     | 0                                | —                       | —        | —        | —        | —                                      |
| Fecal Streptococci                  | /100ml                               | 20                                | —       | 200                              | —                     | —                                | —                       | —        | —        | —        | —                                      |
| Salmonella                          | /5000ml                              | NI                                | —       | NI/500ml                         | —                     | —                                | —                       | —        | —        | —        | —                                      |
| Enterococci                         | /100ml                               | —                                 | —       | —                                | 0                     | 0                                | —                       | —        | —        | —        | —                                      |
| Clostridia                          | /100ml                               | —                                 | —       | —                                | 0                     | 0                                | —                       | —        | —        | —        | —                                      |
| Total Bacteria                      | /ml @ 22°C                           | —                                 | —       | —                                | No change             | No change                        | —                       | —        | —        | —        | —                                      |
| Calcium                             | mg/l Ca                              | —                                 | —       | —                                | —                     | —                                | —                       | —        | —        | —        | —                                      |
| Magnesium                           | mg/l Mg                              | —                                 | —       | —                                | —                     | —                                | —                       | —        | —        | —        | —                                      |
| Sodium                              | mg/l Na                              | —                                 | —       | —                                | 200                   | 200                              | —                       | —        | —        | —        | —                                      |
| Potassium                           | mg/l K                               | —                                 | —       | —                                | —                     | —                                | —                       | —        | —        | —        | —                                      |
| Iron                                | mg/l Fe                              | 0.1                               | 0.3     | 0.2                              | 0.2                   | 0.2                              | —                       | —        | —        | —        | —                                      |
| Copper                              | mg/l Cu                              | 0.02                              | 0.05    | 0.05                             | 0.002                 | 0.002                            | 0.04 (f)                | —        | 0.04 (f) | —        | 0.04 (f)                               |
| Manganese                           | mg/l Mn                              | 0.05                              | —       | 0.05                             | 0.05                  | 0.05                             | —                       | —        | —        | —        | —                                      |
| Zinc                                | mg/l Zn                              | 0.5                               | 3       | 3                                | —                     | —                                | —                       | 0.3 (f)  | —        | 1.0 (f)  | 0.3 (f)                                |
| Chromium                            | mg/l Cr                              | —                                 | 0.05    | 0.05                             | 0.05                  | 0.05                             | —                       | —        | —        | —        | —                                      |
| Lead                                | mg/l Pb                              | —                                 | 0.05    | 0.05                             | 0.01                  | 0.01                             | —                       | —        | —        | —        | —                                      |
| Nickel                              | mg/l Ni                              | —                                 | —       | —                                | 0.02                  | 0.02                             | —                       | —        | —        | —        | —                                      |
| Aluminium                           | mg/l Al                              | —                                 | —       | —                                | 0.2                   | 0.2                              | —                       | —        | —        | —        | —                                      |
| Cadmium                             | mg/l Cd                              | 0.001                             | 0.005   | 0.005                            | 0.005                 | 0.005                            | —                       | —        | —        | —        | —                                      |
| Arsenic                             | mg/l As                              | 0.01                              | 0.05    | 0.05                             | 0.01                  | 0.01                             | —                       | —        | —        | —        | —                                      |
| Mercury                             | mg/l Hg                              | 0.0005                            | 0.001   | 0.001                            | 0.001                 | 0.001                            | —                       | —        | —        | —        | —                                      |
| Boron                               | mg/l B                               | 1                                 | —       | 2                                | 1.0                   | 1.0                              | —                       | —        | —        | —        | —                                      |
| Silver                              | mg/l Ag                              | —                                 | —       | —                                | —                     | —                                | —                       | —        | —        | —        | —                                      |
| Antimony                            | mg/l Sb                              | —                                 | —       | —                                | 0.005                 | 0.005                            | —                       | —        | —        | —        | —                                      |
| Selenium                            | mg/l Se                              | —                                 | 0.01    | 0.01                             | 0.01                  | 0.01                             | —                       | —        | —        | —        | —                                      |
| Barium                              | mg/l Ba                              | —                                 | 0.1     | 0.1                              | —                     | —                                | —                       | —        | —        | —        | —                                      |

NOTES: (a) 10° Limit for certain periods - See Directive.

(b) 10°C Limit - November to April inclusive.

(c) Indicative level - In order to reduce eutrophication - for lake water see formula in the Directive.

(d) Max level of 1.5 mg/l F allowed where fluoride is naturally

(e) None Visible.

(f) Standards for Copper and Zinc vary with Hardness.

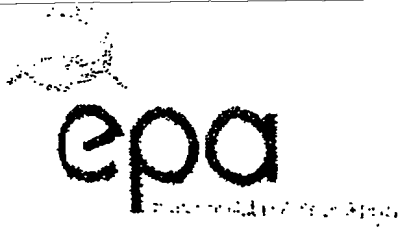
\* M.A.C. = Maximum Admissible Concentration.





# **Appendix 1**

## **Leachate Composition**



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

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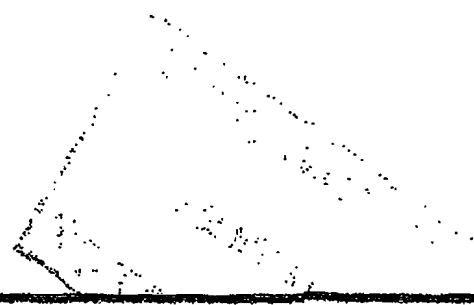
Report of: Analysis of landfill site sample(s)  
Report to: North Tipperary County Council  
Report date: 17/06/08

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Facility: **Ballaghveny Landfill**  
Ballymackey, Co. Tipperary,  
Reference No: W0078-01

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Date collected: 16/04/2008      Date received: 16/04/2008



|                 |                  |                     |                  |                  |                  |                  |  |
|-----------------|------------------|---------------------|------------------|------------------|------------------|------------------|--|
| Laboratory Ref: | 2802016          | 2802017             | 2802018          | 2802019          | 2802020          | 2802021          |  |
| Type of sample: | Leachate         | Leachate            | Leachate         | Leachate         | Leachate         | Leachate         |  |
| Location code:  | WST-W0078-01-LM1 | WST-W0078-01-LM3    | WST-W0078-01-LM5 | WST-W0078-01-LM7 | WST-W0078-01-LM8 | WST-W0078-01-L12 |  |
| Sampling point  | Brown colour     | Green/yellow colour | Black colour     | no sample-dry    | Amber colour     | Black colour     |  |
| Sampled by:     | Jim McGarry      | Jim McGarry         | Jim McGarry      | Jim McGarry      | Jim McGarry      | Jim McGarry      |  |

| Start/End - Dates of Analysis: |         |        |              |              |              |              |              |              |
|--------------------------------|---------|--------|--------------|--------------|--------------|--------------|--------------|--------------|
| Status of results:             |         |        | Final Report | Final Report | Final Report | Final Report | Final Report | Final Report |
| Parameter                      | Units   | Limits |              |              |              |              |              |              |
| Biochemical Oxygen Demand      | mg/l O2 |        | 25.0         | 45.0         | 64.0         | -            | 300.0        | 84.0         |
| Chemical Oxygen Demand         | mg/l O2 |        | 261          | 1045         | 1395         | -            | 6000         | 531          |
|                                |         |        |              |              |              |              |              |              |

Comments: Field measurements (temperature) was not recorded due to a fault with the equipment on the day.

- 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.  
Pb and Cd 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:   
Michael Neill, Regional Chemist

Date: 17/6/08

## **Appendix 2**

### **Leachate Levels**

## Leachate Extraction & Monitoring Points as per DG0152-02

|                      |                       |
|----------------------|-----------------------|
| Ballaghveny Landfill | Waste Licence 0078-02 |
|----------------------|-----------------------|

April-08

| Site Name :               | Operator :                     | Site Address :                                  | National Grid Reference : |
|---------------------------|--------------------------------|---|---------------------------|
| Ballaghveny Landfill Site | North Tipperary County Council | Ballaghveny, Ballymackey, Nenagh, Co. Tipperary | 197040.85E, 182012.11N    |

**Instrument used :**

Geotechnical Instruments EA 450/010 Borehole Dipper

**Sampling Points: Leachate Lagoon**

LM01, LM02, LM03, LM04, LM05, LM06, LM07, LM08, LM09.

**Monitoring Personnel:**

Sean Madigan (Site Technician)

### RESULTS

| Date      | Time  | Site Status | Weather   | Leachate Levels Monitoring Point | Leachate Monitoring Total Borehole depth (in Meters) | Depth at which Leachate reached (in meters) | Height of Leachate (in Meters) |
|-----------|-------|-------------|-----------|----------------------------------|--|---|--------------------------------|
| 9-Apr-08  | 14:00 | Open        | dry sunny | Leachate Lagoon                  |  |   |                                |
|           |       |             |           | LM1                              | 10.00  | 6.90  | 3.10                           |
|           |       |             |           | LM2                              | 11.90  | 9.10  | 2.80                           |
|           |       |             |           | LM3                              | 12.30  | 9.25  | 3.05                           |
|           |       |             |           | LM4                              | 11.30  | 8.90  | 2.40                           |
|           |       |             |           | LM5                              | 11.20  | 9.60  | 1.40                           |
|           |       |             |           | LM6                              | 13.60  | 10.70                                       | 2.90                           |
|           |       |             |           | LM7                              | 14.50  | 10.40                                       | 4.10                           |
|           |       |             |           | LM8                              | 13.30  | 10.10                                       | 3.20                           |
|           |       |             |           | LM9                              | 13.00  | 11.20                                       | 1.80                           |
| 17-Apr-08 | 14:00 | Open        | overcast  | Leachate Lagoon                  | Empty  |   |                                |
|           |       |             |           | LM1                              | 10.00  | 7.10  | 2.90                           |
|           |       |             |           | LM2                              | 11.90  | 9.32  | 2.58                           |
|           |       |             |           | LM3                              | 12.30  | 9.37  | 2.93                           |
|           |       |             |           | LM4                              | 11.30  | 8.90  | 2.40                           |
|           |       |             |           | LM5                              | 11.20  | 10.10                                       | 1.10                           |
|           |       |             |           | LM6                              | 13.60  | 10.87                                       | 2.73                           |
|           |       |             |           | LM7                              | 14.50  | 10.63                                       | 3.87                           |
|           |       |             |           | LM8                              | 13.30  | 10.41                                       | 2.89                           |
|           |       |             |           | LM9                              | 13.00  | 11.22                                       | 1.78                           |
| 24-Apr-08 | 14:00 | Open        | showery   | Leachate Lagoon                  |  |   |                                |
|           |       |             |           | LM1                              | 10.00  | 7.30  | 2.70                           |
|           |       |             |           | LM2                              | 11.90  | 9.30  | 2.60                           |
|           |       |             |           | LM3                              | 12.30  | 9.50  | 2.80                           |
|           |       |             |           | LM4                              | 11.30  | 8.90  | 2.40                           |
|           |       |             |           | LM5                              | 11.20  | 10.30                                       | 0.90                           |
|           |       |             |           | LM6                              | 13.60  | 10.55                                       | 3.05                           |
|           |       |             |           | LM7                              | 14.50  | 10.78                                       | 3.72                           |
|           |       |             |           | LM8                              | 13.30  | 10.50                                       | 2.80                           |
|           |       |             |           | LM9                              | 13.00  | 11.20                                       | 1.80                           |

## Leachate Extraction & Monitoring Points as per DG0152-02

Ballaghveny Landfill

Waste Licence 0078-02

May-08

|                           |                                |   |                                  |
|---------------------------|--------------------------------|---|----------------------------------|
| <b>Site Name :</b>        | <b>Operator :</b>              | <b>Site Address :</b>                           | <b>National Grid Reference :</b> |
| Ballaghveny Landfill Site | North Tipperary County Council | Ballaghveny, Ballymackey, Nenagh, Co. Tipperary | 197040.85E, 182012.11N           |

**Instrument used :**

Geotechnical Instruments EA 450/010 Borehole Dipper

**Sampling Points: Leachate Lagoon**

LM01, LM02, LM03, LM04, LM05, LM06, LM07, LM08, LM09,

**Monitoring Personnel:**

Sean Madigan (Site Technician)

### RESULTS

| Date      | Time  | Site Status | Weather       | Leachate Levels Monitoring Point | Leachate Monitoring Total Borehole depth (in Meters) | Depth at which Leachate reached (in meters) | Height of Leachate (in Meters) |
|-----------|-------|-------------|---------------|----------------------------------|--|---|--------------------------------|
| 7-May-08  | 14:00 | Open        | dry sunny     | Leachate Lagoon                  |  |   |                                |
|           |       |             |               | LM1                              | 10.00  | 7.75  | 2.25                           |
|           |       |             |               | LM2                              | 11.90  | 9.00  | 2.90                           |
|           |       |             |               | LM3                              | 12.30  | 9.35  | 2.95                           |
|           |       |             |               | LM4                              | 11.30  | 8.90  | 2.40                           |
|           |       |             |               | LM5                              | 11.20  | 9.60  | 1.60                           |
|           |       |             |               | LM6                              | 13.60  | 13.60                                       | 0.00                           |
|           |       |             |               | LM7                              | 14.50  | 10.45                                       | 4.05                           |
|           |       |             |               | LM8                              | 13.30  | 10.20                                       | 3.10                           |
|           |       |             |               | LM9                              | 13.00  | 11.10                                       | 1.90                           |
| 20-May-08 | 10:30 | Open        | overcast      | Leachate Lagoon                  |  |   |                                |
|           |       |             |               | LM1                              | 10.00  | 6.90  | 3.10                           |
|           |       |             |               | LM2                              | 11.90  | 9.00  | 2.90                           |
|           |       |             |               | LM3                              | 12.30  | 9.45  | 2.85                           |
|           |       |             |               | LM4                              | 11.30  | 8.90  | 2.40                           |
|           |       |             |               | LM5                              | 11.20  | 9.60  | 1.60                           |
|           |       |             |               | LM6                              | 13.60  | 10.70                                       | 2.90                           |
|           |       |             |               | LM7                              | 14.50  | 11.40                                       | 3.10                           |
|           |       |             |               | LM8                              | 13.30  | 10.15                                       | 3.15                           |
|           |       |             |               | LM9                              | 13.00  | 11.12                                       | 1.88                           |
| 27-May-08 | 11:00 | Open        | showery/windy | Leachate Lagoon                  |  |   |                                |
|           |       |             |               | LM1                              | 10.00  | 6.90  | 3.10                           |
|           |       |             |               | LM2                              | 11.90  | 9.10  | 2.80                           |
|           |       |             |               | LM3                              | 12.30  | 9.50  | 2.80                           |
|           |       |             |               | LM4                              | 11.30  | 8.90  | 2.40                           |
|           |       |             |               | LM5                              | 10.32  | 9.60  | 0.72                           |
|           |       |             |               | LM6                              | 13.60  | 10.80                                       | 2.80                           |
|           |       |             |               | LM7                              | 14.50  | 10.40                                       | 4.10                           |
|           |       |             |               | LM8                              | 13.30  | 10.20                                       | 3.10                           |
|           |       |             |               | LM9                              | 13.00  | 11.20                                       | 1.80                           |
|           |       |             |               | LM10                             | 7.5  | 7.46  | 0.04                           |
|           |       |             |               | LM11                             | 11.1   | 7.4   | 3.70                           |
|           |       |             |               | LM12                             |  |   | 0.00                           |
|           |       |             |               | LM13                             | 6.4  | 2.9   | 3.50                           |
|           |       |             |               | LM14                             | 9.6  | 2.6   | 7.00                           |
|           |       |             |               | LM15                             | 7.3  | 3.5   | 3.80                           |
|           |       |             |               | LM16                             | 10   | 4   | 6.00                           |
|           |       |             |               | LM17                             | 7.8  | 2.6   | 5.20                           |
|           |       |             |               | LM18                             | 8  | 3   | 5.00                           |
| LM19      | 12    | 6.8         | 5.20          |                                  |  |   |                                |

**Leachate Extraction & Monitoring Points as per DG0152-02**

Ballaghveny Landfill Waste Licence 0078-02

**June-08**

|                           |                                |   |                                  |
|---------------------------|--------------------------------|---|----------------------------------|
| <b>Site Name :</b>        | <b>Operator :</b>              | <b>Site Address :</b>                           | <b>National Grid Reference :</b> |
| Ballaghveny Landfill Site | North Tipperary County Council | Ballaghveny, Ballymackey, Nenagh, Co. Tipperary | 197040.85E, 182012.11N           |

**Instrument used :**  
Geotechnical Instruments EA 450/010 Borehole Dipper

**Sampling Points: Leachate Lagoon**  
LM01, LM02, LM03, LM04, LM05, LM06, LM07, LM08, LM09

**Monitoring Personnel:**  
Sean Madigan (Site Technician)

**RESULTS**

| Date | Time | Site Status | Weather | Leachate Levels Monitoring Point | Leachate Monitoring Total Borehole depth (in Meters) | Depth at which Leachate reached (in meters) | Height of Leachate (in Meters) |
|------|------|-------------|---------|----------------------------------|--|---|--------------------------------|
|------|------|-------------|---------|----------------------------------|--|---|--------------------------------|

|          |       |      |          |                 |       |       |       |
|----------|-------|------|----------|-----------------|-------|-------|-------|
| 0-Jun-08 | 11:00 | Open | sun/mild | Leachate Lagoon |       |       |       |
|          |       |      |          | LM1             | 10.00 | 6.90  | 3.10  |
|          |       |      |          | LM2             | 11.80 | 9.10  | 2.70  |
|          |       |      |          | LM3             | 12.30 | 9.60  | 2.70  |
|          |       |      |          | LM4             | 11.30 | 8.90  | 2.40  |
|          |       |      |          | LM5             | 10.32 | 8.70  | 1.62  |
|          |       |      |          | LM6             | 13.60 | 10.70 | 2.90  |
|          |       |      |          | LM7             | 14.50 | 10.50 | 4.00  |
|          |       |      |          | LM8             | 13.30 | 10.20 | 3.10  |
|          |       |      |          | LM9             | 13.00 | 11.10 | 1.90  |
|          |       |      |          | LM10            | 7.5   | 6.1   | 1.40  |
|          |       |      |          | LM11            | 11.1  | 7.45  | 3.65  |
|          |       |      |          | LM12            |       |       | 0.00  |
|          |       |      |          | LM13            | 6.4   | 3     | 3.40  |
|          |       |      |          | LM14            | 9.8   | 2.5   | 7.30  |
|          |       |      |          | LM15            | 7.3   |       | 7.80  |
|          |       |      |          | LM16            | 10    | 4     | 6.00  |
|          |       |      |          | LM17            | 7.8   | 4     | 3.80  |
|          |       |      |          | LM18            | 8     | 3     | 5.00  |
|          |       |      |          | LM19            | 12    |       | 12.00 |

|           |       |      |              |                 |       |       |       |
|-----------|-------|------|--------------|-----------------|-------|-------|-------|
| 17-Jun-08 | 11:00 | Open | dry overcast | Leachate Lagoon |       |       |       |
|           |       |      |              | LM1             | 10.00 | 9.20  | 0.80  |
|           |       |      |              | LM2             | 11.80 | 9.95  | 1.85  |
|           |       |      |              | LM3             | 12.30 | 9.60  | 2.70  |
|           |       |      |              | LM4             | 11.30 | 8.90  | 2.40  |
|           |       |      |              | LM5             | 10.32 | 8.70  | 1.62  |
|           |       |      |              | LM6             | 13.60 | 10.83 | 2.77  |
|           |       |      |              | LM7             | 14.50 | 10.35 | 4.15  |
|           |       |      |              | LM8             | 13.30 | 10.10 | 3.20  |
|           |       |      |              | LM9             | 13.00 | 11.15 | 1.85  |
|           |       |      |              | LM10            | 7.5   |       | 7.80  |
|           |       |      |              | LM11            | 11.1  |       | 11.10 |
|           |       |      |              | LM12            |       |       | 0.00  |
|           |       |      |              | LM13            | 6.4   |       | 6.40  |
|           |       |      |              | LM14            | 9.8   |       | 9.80  |
|           |       |      |              | LM15            | 7.3   |       | 7.30  |
|           |       |      |              | LM16            | 10    |       | 10.00 |
|           |       |      |              | LM17            | 7.8   |       | 7.80  |
|           |       |      |              | LM18            | 8     |       | 8.00  |
|           |       |      |              | LM19            | 12    |       | 12.00 |

|           |       |      |     |                 |       |       |       |
|-----------|-------|------|-----|-----------------|-------|-------|-------|
| 21-Jun-08 | 11:00 | Open | wet | Leachate Lagoon |       |       |       |
|           |       |      |     | LM1             | 10.00 | 9.15  | 0.85  |
|           |       |      |     | LM2             | 11.80 | 8.80  | 3.00  |
|           |       |      |     | LM3             | 12.30 | 9.50  | 2.80  |
|           |       |      |     | LM4             | 11.30 | 8.90  | 2.40  |
|           |       |      |     | LM5             | 10.32 | 8.55  | 1.77  |
|           |       |      |     | LM6             | 13.60 | 10.60 | 3.00  |
|           |       |      |     | LM7             | 14.50 | 10.28 | 4.22  |
|           |       |      |     | LM8             | 13.30 | 10.00 | 3.30  |
|           |       |      |     | LM9             | 13.00 | 11.05 | 1.95  |
|           |       |      |     | LM10            | 7.6   |       | 7.60  |
|           |       |      |     | LM11            | 11.1  |       | 11.10 |
|           |       |      |     | LM12            |       |       | 0.00  |
|           |       |      |     | LM13            | 6.4   |       | 6.40  |
|           |       |      |     | LM14            | 9.8   |       | 9.80  |
|           |       |      |     | LM15            | 7.3   |       | 7.30  |
|           |       |      |     | LM16            | 10    |       | 10.00 |
|           |       |      |     | LM17            | 7.8   |       | 7.80  |
|           |       |      |     | LM18            | 8     |       | 8.00  |
|           |       |      |     | LM19            | 12    |       | 12.00 |

|           |       |      |             |                 |       |       |       |
|-----------|-------|------|-------------|-----------------|-------|-------|-------|
| 27-Jun-08 | 11:00 | Open | humid windy | Leachate Lagoon |       | 3.00  |       |
|           |       |      |             | LM1             | 10.00 | 9.30  | 0.70  |
|           |       |      |             | LM2             | 11.80 | 9.85  | 1.95  |
|           |       |      |             | LM3             | 12.30 | 9.75  | 2.55  |
|           |       |      |             | LM4             | 11.30 | 8.80  | 2.50  |
|           |       |      |             | LM5             | 11.20 | 8.75  | 2.45  |
|           |       |      |             | LM6             | 13.60 | 10.60 | 3.00  |
|           |       |      |             | LM7             | 14.50 | 10.40 | 4.10  |
|           |       |      |             | LM8             | 13.30 | 10.20 | 3.10  |
|           |       |      |             | LM9             | 13.00 | 11.10 | 1.90  |
|           |       |      |             | LM10            | 7.5   |       | 7.60  |
|           |       |      |             | LM11            | 11.1  |       | 11.10 |
|           |       |      |             | LM12            |       |       | 0.00  |
|           |       |      |             | LM13            | 6.4   |       | 6.40  |
|           |       |      |             | LM14            | 9.8   |       | 9.80  |
|           |       |      |             | LM15            | 7.3   |       | 7.30  |
|           |       |      |             | LM16            | 10    |       | 10.00 |
|           |       |      |             | LM17            | 7.8   |       | 7.80  |
|           |       |      |             | LM18            | 8     |       | 8.00  |
|           |       |      |             | LM19            | 12    |       | 12.00 |



## **Appendix 3**

# **Leachate Visual Inspection**



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

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Report of: Analysis of landfill site sample(s)  
Report to: North Tipperary County Council  
Report date: 17/06/08

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Facility: **Ballaghveny Landfill**  
Ballymackey, Co. Tipperary,  
Reference No: W0078-01

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Date collected: 16/04/2008      Date received: 16/04/2008



|                                |         |        |                  |                     |                  |                  |                  |                  |  |
|--------------------------------|---------|--------|------------------|---------------------|------------------|------------------|------------------|------------------|--|
| Laboratory Ref:                |         |        | 2802016          | 2802017             | 2802018          | 2802019          | 2802020          | 2802021          |  |
| Type of sample:                |         |        | Leachate         | Leachate            | Leachate         | Leachate         | Leachate         | Leachate         |  |
| Location code:                 |         |        | WST-W0078-01-LM1 | WST-W0078-01-LM3    | WST-W0078-01-LM5 | WST-W0078-01-LM7 | WST-W0078-01-LM8 | WST-W0078-01-L12 |  |
| Sampling point:                |         |        | Brown colour     | Green/yellow colour | Black colour     | no sample-dry    | Amber colour     | Black colour     |  |
| Sampled by:                    |         |        | Jim McGarry      | Jim McGarry         | Jim McGarry      | Jim McGarry      | Jim McGarry      | Jim McGarry      |  |
| Start/End - Dates of Analysis: |         |        |                  |                     |                  |                  |                  |                  |  |
| Status of results:             |         |        | Final Report     | Final Report        | Final Report     | Final Report     | Final Report     | Final Report     |  |
| Parameter                      | Units   | Limits |                  |                     |                  |                  |                  |                  |  |
| Biochemical Oxygen Demand      | mg/l O2 |        | 25.0             | 45.0                | 64.0             | -                | 300.0            | 84.0             |  |
| Chemical Oxygen Demand         | mg/l O2 |        | 261              | 1045                | 1395             | -                | 6000             | 531              |  |
|                                |         |        |                  |                     |                  |                  |                  |                  |  |

Comments: Field measurements (temperature) was not recorded due to a fault with the equipment on the day.

- 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.  
Pesticides 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:

*Michael Neill*

Date:

17/1/08

Michael Neill, Regional  
Chemist

## **Appendix 4**

# **Surface water composition**



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

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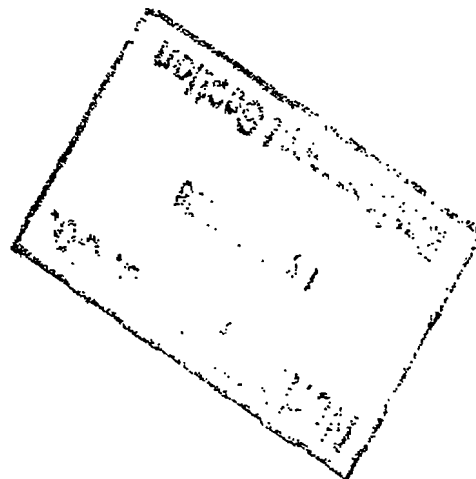
Report of: Analysis of landfill site sample(s)  
Report to: North Tipperary County Council  
Report date: 17/06/08

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Facility: **Ballaghveny Landfill**  
Ballymackey, Co. Tipperary,  
Reference No: W0078-01

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Date collected: 15/04/2008      Date received: 15/04/2008



|                                       |                     |                     |                     |                     |
|---------------------------------------|---------------------|---------------------|---------------------|---------------------|
| <b>Laboratory Ref:</b>                | 2802054             | 2802055             | 2802056             | 2802057             |
| <b>Type of sample:</b>                | Surface Water       | Surface Water       | Surface Water       | Surface Water       |
| <b>Location code:</b>                 | WST-W0078-01-SW1    | WST-W0078-01-SW2    | WST-W0078-01-SW3    | WST-W0078-01-SW6    |
| <b>Sampling point:</b>                | Light brown colour  | Clear sample        | Clear sample        | Clear sample        |
| <b>Sampled by:</b>                    | Jim McGarry         | Jim McGarry         | Jim McGarry         | Jim McGarry         |
| <b>Time Sampled:</b>                  | 14:15               | 15:25               | 15:35               | 15:12               |
| <b>Start/End - Dates of Analysis:</b> |                     |                     |                     |                     |
| <b>Status of results:</b>             | <b>Final Report</b> | <b>Final Report</b> | <b>Final Report</b> | <b>Final Report</b> |

| <b>Parameter</b>          | <b>Units</b> | <b>Limits</b> |       |       |        |       |
|---------------------------|--------------|---------------|-------|-------|--------|-------|
| F Temperature             | °C           |               | 11.4  | 12.8  | 12.9   | 11.7  |
| F Dissolved Oxygen        | % Saturation |               | 83.9  | 98.0  | 106.9  | 107.0 |
| pH                        | pH           |               | 7.7   | 7.9   | 8.3    | 8.2   |
| Conductivity              | µS/cm        |               | 769   | 820   | 490    | 537   |
| Biochemical Oxygen Demand | mg/l O2      |               | 0.7   | 0.5   | 0.5    | 0.6   |
| Chemical Oxygen Demand    | mg/l O2      |               | 21    | <8    | <8     | <8    |
| Ammonia                   | mg/l N       |               | 0.066 | 0.016 | <0.003 | 0.011 |
| Chloride                  | mg/l Cl      |               | 24    | 27    | 19     | 20    |
| Suspended Solids          | mg/l         |               | <6    | <6    | <6     | 7     |

**Comments:**

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

Signed

Date:

Michael Neill, Regional Chemist

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

Report of: Analysis of landfill site sample(s)  
Report to: North Tipperary County Council  
Report date: 17/06/08

Facility: **Ballaghveny Landfill**  
Ballymackey, Co. Tipperary,  
Reference No: W0078-01

Date collected: 15/04/2008

Date received: 15/04/2008

|                 |                    |   |
|-----------------|--------------------|---|
| Laboratory Ref: | 2802008            | 2802009   |
| Type of sample: | Surface Water      | Surface Water                                   |
| Location code:  | WST-W0078-01-SW4   | WST-W0078-01                                    |
| Sampling point: | Light brown colour | Discharge to surface water - light brown colour |

|               |             |             |
|---------------|-------------|-------------|
| Sampled by:   | Jim McGarry | Jim McGarry |
| Time Sampled: | 13:00       | 14:19       |

**Start/End - Dates of Analysis:**

|                           | Status of results:  | Final Report | Final Report |
|---------------------------|---------------------|--------------|--------------|
| pH                        | pH                  | 7.5          | 7.5          |
| Conductivity              | µS/cm               | 738          | 466          |
| Biochemical Oxygen Demand | mg/l O <sub>2</sub> | 1.6          | 1.1          |
| Chemical Oxygen Demand    | mg/l O <sub>2</sub> | 43           | 70           |
| Ammonia                   | mg/l N              | 0.1          | 0.024        |
| Chloride                  | mg/l Cl             | 20           | 46           |
| Suspended Solids          | mg/l                | 23           | <15          |

Comments: Location SW4 was heavily overgrown with grass and aquatic weeds. There were a lot of fertiliser bags along the watercourse.

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

Signed

Date:

Michael Neill, Regional Chemist

# **Appendix 5**

## **Surface water visual inspection**



|                      |                       |
|----------------------|-----------------------|
| Ballaghveny Landfill | Waste Licence 0078-02 |
|----------------------|-----------------------|

**Weekly Surfacewater Monitoring Results**

**April-08**

|                           |                                |   |                                  |
|---------------------------|--------------------------------|---|----------------------------------|
| <b>Site Name :</b>        | <b>Operator :</b>              | <b>Site Address :</b>                           | <b>National Grid Reference :</b> |
| Ballaghveny Landfill Site | North Tipperary County Council | Ballaghveny, Ballymackey, Nenagh, Co. Tipperary | 197040.85E, 182012.11N           |

**Monitoring Personnel:**

Michael Haverly

**RESULTS**

| Date | Time | Site Status | Weather | Surfacewater Monitoring Stations | Visual Inspection | Odour Inspection | Suspended Solids(mg/L) |
|------|------|-------------|---------|----------------------------------|-------------------|------------------|------------------------|
|------|------|-------------|---------|----------------------------------|-------------------|------------------|------------------------|

|          |       |      |     |   |                          |  |  |
|----------|-------|------|-----|---|--------------------------|--|--|
| 4-Apr-08 | 14:00 | Open | Dry | SW1 (Bridge above landfill entrance)      | Peaty Colour             |  |  |
|          |       |      |     | SW2 (stream prior to Ollatrim River)      | Clear                    |  |  |
|          |       |      |     | SW3 (Ollatrim River before stream enters) | Clear                    |  |  |
|          |       |      |     | SW4 (Bog above landfill)                  | Peaty / Plenty of Growth |  |  |
|          |       |      |     | SW6(Ollatrim River after stream enters)   | Clear                    |  |  |

|           |       |      |           |   |                                 |  |  |
|-----------|-------|------|-----------|---|---------------------------------|--|--|
| 11-Apr-08 | 14:00 | Open | dry sunny | SW1 (Bridge above landfill entrance)      | cloudy                          |  |  |
|           |       |      |           | SW2 (stream prior to Ollatrim River)      | clear                           |  |  |
|           |       |      |           | SW3 (Ollatrim River before stream enters) | Clear                           |  |  |
|           |       |      |           | SW4 (Bog above landfill)                  | Peaty Colour - plenty of growth |  |  |
|           |       |      |           | SW6(Ollatrim River after stream enters)   | Clear                           |  |  |

|           |       |      |          |   |                                 |  |  |
|-----------|-------|------|----------|---|---------------------------------|--|--|
| 18-Apr-08 | 14:00 | Open | Dry cold | SW1 (Bridge above landfill entrance)      | Peaty Colour                    |  |  |
|           |       |      |          | SW2 (stream prior to Ollatrim River)      | Clear                           |  |  |
|           |       |      |          | SW3 (Ollatrim River before stream enters) | Clear                           |  |  |
|           |       |      |          | SW4 (Bog above landfill)                  | Peaty Colour - plenty of growth |  |  |
|           |       |      |          | SW6(Ollatrim River after stream enters)   | Clear                           |  |  |

|           |       |      |          |   |                         |  |  |
|-----------|-------|------|----------|---|-------------------------|--|--|
| 25-Apr-08 | 14:00 | Open | overcast | SW1 (Bridge above landfill entrance)      | peaty colour            |  |  |
|           |       |      |          | SW2 (stream prior to Ollatrim River)      | clear                   |  |  |
|           |       |      |          | SW3 (Ollatrim River before stream enters) | clear                   |  |  |
|           |       |      |          | SW4 (Bog above landfill)                  | peaty - a lot of growth |  |  |
|           |       |      |          | SW6(Ollatrim River after stream enters)   | clear                   |  |  |

**COMMENTS**

|                      |                       |
|----------------------|-----------------------|
| Ballaghveny Landfill | Waste Licence 0078-02 |
|----------------------|-----------------------|

**Weekly Surfacewater Monitoring Results**

**May-08**

|                           |                                |   |                                  |
|---------------------------|--------------------------------|---|----------------------------------|
| <b>Site Name :</b>        | <b>Operator :</b>              | <b>Site Address :</b>                           | <b>National Grid Reference :</b> |
| Ballaghveny Landfill Site | North Tipperary County Council | Ballaghveny, Ballymackev, Nenagh, Co. Tipperary | 197040.85E, 182012.11N           |

**Monitoring Personnel:**

Michael Haverly

**RESULTS**

| Date      | Time  | Site Status | Weather     | Surfacewater Monitoring Stations         | Visual Inspection               | Odour Inspection | Suspended Solids(mg/L) |
|-----------|-------|-------------|-------------|--|---------------------------------|------------------|------------------------|
| 2-May-08  | 14:00 | Open        | dry / sunny | SW1 (Bridge above landfill entrance)     | Peaty Colour                    |                  |                        |
|           |       |             |             | SW2 (stream prior to Olatrim River)      | Clear                           |                  |                        |
|           |       |             |             | SW3 (Olatrim River before stream enters) | Clear                           |                  |                        |
|           |       |             |             | SW4 (Bog above landfill)                 | Peaty / Plenty of Growth        |                  |                        |
|           |       |             |             | SW6(Olatrim River after stream enters)   | Clear                           |                  |                        |
| 9-May-08  | 14:00 | Open        | Dry         | SW1 (Bridge above landfill entrance)     | clear                           |                  |                        |
|           |       |             |             | SW2 (stream prior to Olatrim River)      | clear                           |                  |                        |
|           |       |             |             | SW3 (Olatrim River before stream enters) | Clear                           |                  |                        |
|           |       |             |             | SW4 (Bog above landfill)                 | Peaty Colour - plenty of growth |                  |                        |
|           |       |             |             | SW6(Olatrim River after stream enters)   | Clear                           |                  |                        |
| 17-May-08 | 14:00 | Open        | cloudy cool | SW1 (Bridge above landfill entrance)     | Clear                           |                  |                        |
|           |       |             |             | SW2 (stream prior to Olatrim River)      | Clear                           |                  |                        |
|           |       |             |             | SW3 (Olatrim River before stream enters) | Clear                           |                  |                        |
|           |       |             |             | SW4 (Bog above landfill)                 | Peaty Colour - plenty of growth |                  |                        |
|           |       |             |             | SW6(Olatrim River after stream enters)   | Clear                           |                  |                        |
| 23-May-08 | 14:00 | Open        | overcast    | SW1 (Bridge above landfill entrance)     | clear                           |                  |                        |
|           |       |             |             | SW2 (stream prior to Olatrim River)      | clear                           |                  |                        |
|           |       |             |             | SW3 (Olatrim River before stream enters) | clear                           |                  |                        |
|           |       |             |             | SW4 (Bog above landfill)                 | peaty - plastic bag in stream   |                  |                        |
|           |       |             |             | SW6(Olatrim River after stream enters)   | clear                           |                  |                        |
| 30-May-08 | 14:00 | Open        | overcast    | SW1 (Bridge above landfill entrance)     | clear                           |                  |                        |
|           |       |             |             | SW2 (stream prior to Olatrim River)      | clear                           |                  |                        |
|           |       |             |             | SW3 (Olatrim River before stream enters) | clear                           |                  |                        |
|           |       |             |             | SW4 (Bog above landfill)                 | Peaty Colour - plenty of growth |                  |                        |
|           |       |             |             | SW6(Olatrim River after stream enters)   | clear                           |                  |                        |

**COMMENTS**

|                      |                       |
|----------------------|-----------------------|
| Ballaghveny Landfill | Waste Licence 0078-02 |
|----------------------|-----------------------|

**Weekly Surfacewater Monitoring Results**

**June-08**

|                           |                                |   |                                  |
|---------------------------|--------------------------------|---|----------------------------------|
| <b>Site Name :</b>        | <b>Operator :</b>              | <b>Site Address :</b>                           | <b>National Grid Reference :</b> |
| Ballaghveny Landfill Site | North Tipperary County Council | Ballaghveny, Ballvmackev, Nenagh, Co. Tipperary | 197040.85E, 182012.11N           |

**Monitoring Personnel:**  
Michael Haverly

**RESULTS**

| Date      | Time  | Site Status | Weather      | Surfacewater Monitoring Stations          | Visual Inspection                       | Odour Inspection | Suspended Solids(mg/L) |
|-----------|-------|-------------|--------------|---|---|------------------|------------------------|
| 6-Jun-08  | 14:00 | Open        | overcast     | SW1 (Bridge above landfill entrance)      | Clear                                   |                  |                        |
|           |       |             |              | SW2 (stream prior to Ollatrim River)      | Clear                                   |                  |                        |
|           |       |             |              | SW3 (Ollatrim River before stream enters) | Clear                                   |                  |                        |
|           |       |             |              | SW4 (Bog above landfill)                  | Peaty - lots of growth - bags in stream |                  |                        |
|           |       |             |              | SW6(Ollatrim River after stream enters)   | Clear                                   |                  |                        |
| 13-Jun-08 | 14:00 | Open        | Overcast dry | SW1 (Bridge above landfill entrance)      | clear                                   |                  |                        |
|           |       |             |              | SW2 (stream prior to Ollatrim River)      | clear                                   |                  |                        |
|           |       |             |              | SW3 (Ollatrim River before stream enters) | Clear                                   |                  |                        |
|           |       |             |              | SW4 (Bog above landfill)                  | Peaty - lots of growth - bags in stream |                  |                        |
|           |       |             |              | SW6(Ollatrim River after stream enters)   | Clear                                   |                  |                        |
| 20-Jun-08 | 14:00 | Open        | sunny warm   | SW1 (Bridge above landfill entrance)      | Clear                                   |                  |                        |
|           |       |             |              | SW2 (stream prior to Ollatrim River)      | Clear                                   |                  |                        |
|           |       |             |              | SW3 (Ollatrim River before stream enters) | Clear                                   |                  |                        |
|           |       |             |              | SW4 (Bog above landfill)                  | Peaty - lots of growth - bags in stream |                  |                        |
|           |       |             |              | SW6(Ollatrim River after stream enters)   | Clear                                   |                  |                        |
| 27-Jun-08 | 14:00 | Open        | overcast     | SW1 (Bridge above landfill entrance)      | Peaty                                   |                  |                        |
|           |       |             |              | SW2 (stream prior to Ollatrim River)      | Peaty                                   |                  |                        |
|           |       |             |              | SW3 (Ollatrim River before stream enters) | clear                                   |                  |                        |
|           |       |             |              | SW4 (Bog above landfill)                  | Peaty - covered in growth               |                  |                        |
|           |       |             |              | SW6(Ollatrim River after stream enters)   | clear                                   |                  |                        |

**COMMENTS**

## **Appendix 6**

# **Groundwater composition**

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

Report of: Analysis of landfill site sample(s)  
Report to: North Tipperary County Council  
Report date: 17/06/08

Facility: **Ballaghveny Landfill**  
Ballymackey, Co. Tipperary,  
Reference No: W0078-01

Date collected: 16/04/2008                      Date received: 16/04/2008

Comments:

Field measurements (temperature and dissolved oxygen) were not recorded due to a fault with the equipment on the day. Sulphate was not measured due to instrumental problems in the lab.

- 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:

12/6/88



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

Report of: Analysis of landfill site sample(s)  
 Report to: North Tipperary County Council  
 Report date: 17/06/08

Facility: **Ballaghveny Landfill**  
 Ballymackey, Co. Tipperary,  
 Reference No: W0078-01

Date collected: 16/04/2008 Date received: 16/04/2008

| Parameter           | Units        | Limits | 2802058 | 2802059 | 2802060 |
|---------------------|--------------|--------|---------|---------|---------|
| F Depth of Borehole | m            |        | 33      | 13.1    | 11.8    |
| F Water Level       | m            |        | 8.3     | 8.6     | 8       |
| F Temperature       | °C           |        | 11.4    | 11.1    | 10.6    |
| F Dissolved Oxygen  | % Saturation |        | 20.2    | 81.9    | 26.3    |
| pH                  | pH           |        | 7.3     | 7.2     | 7.1     |
| Conductivity        | µS/cm        |        | 1188    | 948     | 943     |
| Ammonia             | mg/l N       |        | 5.9     | 0.027   | 0.03    |
| Chloride            | mg/l Cl      |        | 86      | 36      | 36      |
| Sulphate            | mg/l SO4     |        | nm      | nm      | nm      |

Comments: Sulphate was not measured due to instrumental problems in the laboratory.

- 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 Castebar 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: 17/6/08  
 Michael Neill, Regional Chemist



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

Report of: Analysis of landfill site sample(s)  
Report to: North Tipperary County Council  
Report date: 17/06/08

Facility: Ballaghveny Landfill  
Ballymackey, Co. Tipperary,  
Reference No: W0078-01

Date collected: 15/04/2008 Date received: 15/04/2008

|   | Laboratory Ref:                | 2802013             | 2802014               | 2802015                  |
|---|--------------------------------|---------------------|-----------------------|--------------------------|
|   | Type of sample:                | Groundwater         | Groundwater           | Groundwater              |
|   | Location code:                 | WST-W0078-01-GW5new | WST-W0078-01-GW6new   | WST-W0078-01-GW12        |
|   | Sampling point:                | Slight brown colour | Clear sample from tap | Clear sample - Open well |
|   | Sampled by:                    | Jim McGarry         | Jim McGarry           | Jim McGarry              |
|   | Time Sampled:                  | 14:46               | 14:31                 | 15:00                    |
|   | Start/End - Dates of Analysis: |                     |                       |                          |
|   | Status of results:             | Final Report        | Final Report          | Final Report             |
| F | Depth of Borehole              | m                   | 13.8                  | -                        |
| F | Water Level                    | m                   | 12.3                  | -                        |
|   | pH                             | pH                  | 7.2                   | 7.3                      |
|   | Conductivity                   | $\mu\text{S/cm}$    | 681                   | 768                      |
|   | Ammonia                        | mg/l N              | 0.44                  | <0.003                   |
|   | Chloride                       | mg/l Cl             | 11                    | 19                       |
|   | Sulphate                       | mg/l SO4            | nm                    | nm                       |

RECEIVED  
 17/06/08  
 12:00 PM  
 61

Comments:

Field measurements (temperature and dissolved oxygen) were not recorded due to a fault with the equipment on the day. Sulphate was not measured due to instrumental problems in the lab.

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

Signed: *Michael Neill*  
Michael Neill, Regional  
Chemist

Date: 12/6/08





Environmental Protection Agency  
 Environmental Protection Agency  
 Environmental Protection Agency

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

Report of: 1988 Drinking Water Regulations Results of Analysis  
 Report to: North Tipperary Co.Co.  
 Report date: 17/06/08

Location sampled: Ballaghveny Landfill Site - W0078-01 --  
 Date sampled: 15/04/2008 Date received: 15/04/2008  
 Analysis group: Drinking Water

|                         |           |                 |  | Laboratory Ref:                | 2802010        | 2802011        | 2802012                     |
|-------------------------|-----------|-----------------|--|--------------------------------|----------------|----------------|-----------------------------|
|                         |           |                 |  | Type of Sample:                | Drinking Water | Drinking Water | Drinking Water              |
|                         |           |                 |  | Sampling Point:                | clear sample   | clear sample   | no sample - well not in use |
|                         |           |                 |  | Water Supply:                  | Bressons       | Cullinches     | Hogans                      |
|                         |           |                 |  | Public/Group/Private:          |                |                |                             |
|                         |           |                 |  | Sampled by:                    | Jim McGarry    | Jim McGarry    | Jim McGarry                 |
|                         |           |                 |  | Time Sampled:                  | 15:40          | 15:14          | 12:00                       |
|                         |           |                 |  | Start/End - Dates of Analysis: |                |                | /                           |
|                         |           |                 |  | Status of Results:             | Final Report   | Final Report   | Final Report                |
| Parameter               | Units     | Limits          |  |                                |                |                |                             |
| Temperature             | °C        |                 |  | nm                             | nm             |                | -                           |
| pH                      | pH        | > 6.5 And < 9.5 |  | 7.3                            | 7.4            |                | -                           |
| Conductivity            | µS/cm     | < 2764          |  | 787                            | 797            |                | -                           |
| Odour                   |           |                 |  | 1                              | 1              |                | -                           |
| Ammonia                 | mg/l NH4  | < 0.3           |  | <0.004                         | <0.004         |                | -                           |
| Chloride                | mg/l Cl   |                 |  | 19                             | 45             |                | -                           |
| Nitrite                 | mg/l NO2  | < 0.1           |  | <0.003                         | 0.003          |                | -                           |
| Ortho-Phosphate         | µg/l P2O5 | < 5000          |  | <27.48                         | <27.48         |                | -                           |
| Total Oxidised Nitrogen | mg/l NO3  | < 50            |  | 24.88                          | 11.88          |                | -                           |

# **Appendix 7**

## **Groundwater levels**

## Quarterly Groundwater Monitoring Form

|                      |                       |
|----------------------|-----------------------|
| Ballaghveny Landfill | Waste Licence 0078-02 |
|----------------------|-----------------------|

Quarter 2 2008

| Site Name :               | Operator :                     | Site Address :                                  | National Grid Reference : |
|---------------------------|--------------------------------|---|---------------------------|
| Ballaghveny Landfill Site | North Tipperary County Council | Ballaghveny, Ballymackey, Nenagh, Co. Tipperary | 197040.8SE, 182012.11N    |

**Instrument used :**

Geotechnical Instruments EA 450/010 Borehole Dipper

**Monitoring Personnel:**

Sean Madigan (Site Technician)

### RESULTS

| Date      | Time  | Site Status | Weather        | Groundwater Monitoring Stations | Groundwater Monitoring Total Borehole depth (in Meters) | Depth at which Groundwater reached (in meters) | Height of Groundwater (in Meters) |
|-----------|-------|-------------|----------------|---------------------------------|---|--|-----------------------------------|
| 22-Apr-08 | 14:00 | Open        | Windy overcast |                                 |   |  |                                   |
|           |       |             |                | GW5                             | 13.80   | 1.45   | 12.35                             |
|           |       |             |                | GW10                            | 11.90   | 3.48   | 8.42                              |
|           |       |             |                | GW9                             | 12.30   | 4.71   | 7.59                              |
|           |       |             |                | BH3                             | 11.30   | 4.69   | 6.61                              |
|           |       |             |                | GW12                            | 11.20   | 3.40   | 7.80                              |
|           |       |             |                | GW6                             | 13.60   | Tap  |                                   |
|           |       |             |                | GW3                             | 14.50   | 3.20   | 11.30                             |
| 7-May-08  | 14:00 | Open        | sunny hot      |                                 |   |  |                                   |
|           |       |             |                | GW5                             | 13.80   | 1.50   | 12.30                             |
|           |       |             |                | GW10                            | 11.90   | 3.65   | 8.25                              |
|           |       |             |                | GW9                             | 12.30   | 4.95   | 7.35                              |
|           |       |             |                | BH3                             | 11.30   | 4.75   | 6.55                              |
|           |       |             |                | GW12                            | 11.20   | 3.80   | 7.40                              |
|           |       |             |                | GW6                             | 13.60   |  | 13.60                             |
|           |       |             |                | GW3                             | 14.50   |  | 14.50                             |
|           |       |             |                | WGBH / GW13                     | 17.50   | 8.05   | 9.45                              |
|           |       |             |                | BRBH / GW14                     |   |  |                                   |
| 19-Jun-08 | 14:00 | Open        | sunny hot      |                                 |   |  |                                   |
|           |       |             |                | GW5                             | 13.80   | 1.65   | 12.15                             |
|           |       |             |                | GW10                            | 11.90   | 3.70   | 8.20                              |
|           |       |             |                | GW9                             | 12.30   | 4.80   | 7.50                              |
|           |       |             |                | BH3                             | 11.30   | 4.80   | 6.50                              |
|           |       |             |                | GW12                            | 11.20   | 3.90   | 7.30                              |
|           |       |             |                | GW6                             | 13.60   |  | 13.60                             |
|           |       |             |                | GW3                             | 14.50   |  | 14.50                             |
|           |       |             |                | WGBH / GW13                     | 17.50   | 8.00   | 9.50                              |
|           |       |             |                | BRBH / GW14                     |   |  |                                   |

## **Appendix 8**

# **Quarterly groundwater visual inspection**

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

Report of: Analysis of landfill site sample(s)  
Report to: North Tipperary County Council  
Report date: 17/06/08

Facility: **Ballaghveny Landfill**  
Ballymackey, Co. Tipperary,  
Reference No: W0078-01

Date collected: 16/04/2008                      Date received: 16/04/2008

Comments:

Field measurements (temperature and dissolved oxygen) were not recorded due to a fault with the equipment on the day. Sulphate was not measured due to instrumental problems in the lab.

- 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) ? "Field measured parameters"

Signed:

*Michael Neill*  
Michael Neill, Regional  
Chemist

Date:

12/6/88



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

Report of: Analysis of landfill site sample(s)  
 Report to: North Tipperary County Council  
 Report date: 17/06/08

Facility: **Ballaghveny Landfill**  
 Ballymackey, Co. Tipperary,  
 Reference No: W0078-01

Date collected: 16/04/2008 Date received: 16/04/2008

RECEIVED  
 2008 JUN 15 11:51  
 NORTH TIPPERARY COUNTY COUNCIL

| Parameter           | Units        | Limits | 2802058 | 2802059 | 2802060 |
|---------------------|--------------|--------|---------|---------|---------|
| F Depth of Borehole | m            |        | 13      | 13.1    | 11.8    |
| F Water Level       | m            |        | 8.3     | 8.6     | 8       |
| F Temperature       | °C           |        | 11.4    | 11.1    | 10.6    |
| F Dissolved Oxygen  | % Saturation |        | 20.2    | 61.9    | 26.3    |
| pH                  | pH           |        | 7.3     | 7.2     | 7.1     |
| Conductivity        | µS/cm        |        | 1188    | 948     | 943     |
| Ammonia             | mg/l N       |        | 5.9     | 0.027   | 0.03    |
| Chloride            | mg/l Cl      |        | 96      | 36      | 36      |
| Sulphate            | mg/l SO4     |        | nm      | nm      | nm      |

Comments: Sulphate was not measured due to instrumental problems in the laboratory.

- 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* Date: 17/6/08  
 Michael Neill, Regional Chemist

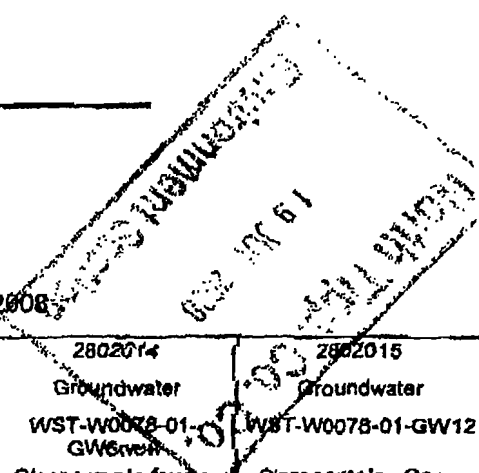


Environmental Protection Agency  
 Regional Inspectorate  
 Seville Lodge, Callan Road,  
 Kilkenny

Report of: Analysis of landfill site sample(s)  
 Report to: North Tipperary County Council  
 Report date: 17/06/08

Facility: Ballaghveny Landfill  
 Ballymackey, Co. Tipperary,  
 Reference No: W0078-01

Date collected: 15/04/2008 Date received: 15/04/2008



|   | Laboratory Ref:                | 2802013             | 2802014               | 2802015                  |
|---|--------------------------------|---------------------|-----------------------|--------------------------|
|   | Type of sample:                | Groundwater         | Groundwater           | Groundwater              |
|   | Location code:                 | WST-W0078-01-GW5new | WST-W0078-01-GW6new   | WST-W0078-01-GW12        |
|   | Sampling point:                | Slight brown colour | Clear sample from tap | Clear sample - Open well |
|   | Sampled by:                    | Jim McGarry         | Jim McGarry           | Jim McGarry              |
|   | Time Sampled:                  | 14:45               | 14:31                 | 15:00                    |
|   | Start/End - Dates of Analysis: |                     |                       |                          |
|   | Status of results:             | Final Report        | Final Report          | Final Report             |
| F | Depth of Borehole              | m                   | 13.8                  | -                        |
| F | Water Level                    | m                   | 12.3                  | -                        |
|   | pH                             | pH                  | 7.2                   | 7.4                      |
|   | Conductivity                   | µS/cm               | 681                   | 651                      |
|   | Ammonia                        | mg/l N              | 0.44                  | <0.003                   |
|   | Chloride                       | mg/l Cl             | 11                    | 19                       |
|   | Sulphate                       | mg/l SO4            | nm                    | nm                       |

Comments:

Field measurements (temperature and dissolved oxygen) were not recorded due to a fault with the equipment on the day. Sulphate was not measured due to instrumental problems in the lab.

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

Signed: *Michael Neill*  
 Michael Neill, Regional Chemist

Date: 17/6/08





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

Report of: 1988 Drinking Water Regulations Results of Analysis  
 Report to: North Tipperary Co.Co.  
 Report date: 17/06/08

Location sampled: Ballaghveny Landfill Site - W0078-01 -  
 Date sampled: 15/04/2008 Date received: 15/04/2008  
 Analysis group: Drinking Water

|                         |           |                 | Laboratory Ref:                | 2802010        | 2802011        | 2802012                     |
|-------------------------|-----------|-----------------|--------------------------------|----------------|----------------|-----------------------------|
|                         |           |                 | Type of Sample:                | Drinking Water | Drinking Water | Drinking Water              |
|                         |           |                 | Sampling Point:                | clear sample   | clear sample   | no sample - well not in use |
|                         |           |                 | Water Supply:                  | Bressans       | Callan         | Hogans                      |
|                         |           |                 | Public/Group/Private:          |                |                |                             |
|                         |           |                 | Sampled by:                    | Jim McGarry    | Jim McGarry    | Jim McGarry                 |
|                         |           |                 | Time Sampled:                  | 15:40          | 16:14          | 12:00                       |
|                         |           |                 | Start/End - Dates of Analysis: |                |                | /                           |
|                         |           |                 | Status of Results:             | Final Report   | Final Report   | Final Report                |
| Parameter               | Units     | Limite          |                                |                |                |                             |
| Temperature             | °C        |                 | nm                             | nm             |                | -                           |
| pH                      | pH        | > 6.5 And < 9.5 | 7.3                            | 7.4            |                | -                           |
| Conductivity            | µS/cm     | < 2764          | 767                            | 797            |                | -                           |
| Odour                   |           |                 | 1                              | 1              |                | -                           |
| Ammonia                 | mg/l NH4  | < 0.3           | <0.004                         | <0.004         |                | -                           |
| Chloride                | mg/l Cl   |                 | 19                             | 45             |                | -                           |
| Nitrite                 | mg/l NO2  | < 0.1           | <0.003                         | 0.05           |                | -                           |
| Ortho-Phosphate         | µg/l P2O5 | < 5000          | <27.48                         | <27.48         |                | -                           |
| Total Oxidised Nitrogen | mg/l NO3  | < 50            | 24.88                          | 11.88          |                | -                           |

## **Appendix 9**

# **Gas monitoring results**

|                      |                       |
|----------------------|-----------------------|
| Ballaghveny Landfill | Waste Licence 0078-02 |
|----------------------|-----------------------|

**Gas Monitoring Locations as per DG152-02**

**April-08**

|                           |                                |                           |                                  |
|---------------------------|--------------------------------|---------------------------|----------------------------------|
| <b>Site Name :</b>        | <b>Operator :</b>              | <b>Site Address :</b>     | <b>National Grid Reference :</b> |
| Ballaghveny Landfill Site | North Tipperary County Council | Ballaghveny, Ballymackey, | 197040.85E, 182012.11N           |

**Instrument used :**  
Geotechnical Instruments GA94 Infra Red Gas Analyser

**Date Of Next Calibration**  
Apr-08

**Monitoring Personnel:**  
Sean Madigan

**Weather Conditions**  
overcast

**Barometric Pressure**  
975

**RESULTS**

| Sample Station ID      | Borehole / Vent | Survey Depth | CH4% v/v | CO2% v/v | O2% v/v | Temp Celcius | Comments |
|------------------------|-----------------|--------------|----------|----------|---------|--------------|----------|
| <b>Cell Wells</b>      |                 |              |          |          |         |              |          |
| LFG1                   | Gas Vent        | n/a          | 71.20%   | 24.30%   | 0.10%   | 975          |          |
| LFG2                   | Gas Vent        | n/a          | 68.30%   | 23.70%   | 1.20%   | 974          |          |
| LFG3                   | Gas Vent        | n/a          | 70.10%   | 29.10%   | 0.20%   | 974          |          |
| LFG4                   | Gas Vent        | n/a          | 30.50%   | 20.40%   | 1.80%   | 974          |          |
| LFG5                   | Gas Vent        | n/a          | 65.10%   | 34.20%   | 0.20%   | 974          |          |
| LFG6                   | Gas Vent        | n/a          | 64.20%   | 32.10%   | 0.20%   | 974          |          |
| <b>Perimeter Wells</b> |                 |              |          |          |         |              |          |
| MP2                    | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 18.90%  | 994          |          |
| MP3                    | Gas Borehole    | 1m           | 0.00%    | 0.10%    | 19.20%  | 994          |          |
| MP4                    | Gas Borehole    | 1m           | 0.00%    | 1.00%    | 18.30%  | 995          |          |
| MP6                    | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 18.70%  | 995          |          |
| MP7                    | Gas Borehole    | 1m           | 0.00%    | 0.10%    | 18.60%  | 995          |          |
| MP8                    | Gas Borehole    | 1m           | 0.00%    | 0.10%    | 19.10%  | 994          |          |
| MP15                   | Gas Borehole    | 1m           | 0.00%    | 0.10%    | 19.50%  | 995          |          |
| MP16                   | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 18.60%  | 995          |          |
| MP17                   | Gas Borehole    | 1m           | 0.00%    | 0.10%    | 19.80%  | 995          |          |
| MP18                   | Gas Borehole    | 1m           | 0.00%    | 0.10%    | 20.00%  | 995          |          |
| MP19                   | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 19.80%  | 995          |          |
| MP20                   | Gas Borehole    | 1m           |          |          |         |              |          |

|                      |                       |
|----------------------|-----------------------|
| Ballaghveny Landfill | Waste Licence 0078-02 |
|----------------------|-----------------------|

**Gas Monitoring Locations as per DG152-02**

**May-08**

|                           |                                |                           |                                  |
|---------------------------|--------------------------------|---------------------------|----------------------------------|
| <b>Site Name :</b>        | <b>Operator :</b>              | <b>Site Address :</b>     | <b>National Grid Reference :</b> |
| Ballaghveny Landfill Site | North Tipperary County Council | Ballaghveny, Ballymackey, | 197040.85E, 182012.11N           |

**Instrument used :**  
Geotechnical Instruments GA94 Infra Red Gas Analyser

**Date Of Next Calibration**  
May-09

**Monitoring Personnel:**  
Sean Madigan

**Weather Conditions**  
Dull/overcast

**Barometric Pressure**  
981

**RESULTS**

| Sample Station ID      | Borehole / Vent | Survey Depth | CH4% v/v | CO2% v/v | O2% v/v | Temp Celcius | Comments |
|------------------------|-----------------|--------------|----------|----------|---------|--------------|----------|
| <b>Cell Wells</b>      |                 |              |          |          |         |              |          |
| LFG1                   | Gas Vent        | n/a          | 76.60%   | 24.90%   | 0.00%   | 981          |          |
| LFG2                   | Gas Vent        | n/a          | 75.80%   | 24.60%   | 0.30%   | 981          |          |
| LFG3                   | Gas Vent        | n/a          | 69.10%   | 28.40%   | 0.20%   | 981          |          |
| LFG4                   | Gas Vent        | n/a          | 67.40%   | 28.70%   | 0.10%   | 981          |          |
| LFG5                   | Gas Vent        | n/a          | 63.40%   | 33.30%   | 0.40%   | 981          |          |
| LFG6                   | Gas Vent        | n/a          | 63.30%   | 32.10%   | 0.30%   | 981          |          |
| <b>Perimeter Wells</b> |                 |              |          |          |         |              |          |
| MP2                    | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 20.20%  | 981          |          |
| MP3                    | Gas Borehole    | 1m           | 0.00%    | 0.90%    | 19.80%  | 981          |          |
| MP4                    | Gas Borehole    | 1m           |          |          |         |              |          |
| MP6                    | Gas Borehole    | 1m           | 0.00%    | 0.10%    | 18.40%  | 981          |          |
| MP7                    | Gas Borehole    | 1m           | 0.00%    | 0.00%    | 18.70%  | 981          |          |
| MP8                    | Gas Borehole    | 1m           | 0.00%    | 0.10%    | 19.10%  | 981          |          |
| MP15                   | Gas Borehole    | 1m           | 0.00%    | 0.10%    | 19.20%  | 981          |          |
| MP16                   | Gas Borehole    | 1m           | 0.00%    | 0.10%    | 19.00%  | 981          |          |
| MP17                   | Gas Borehole    | 1m           | 0.00%    | 0.20%    | 18.60%  | 981          |          |
| MP18                   | Gas Borehole    | 1m           | 0.00%    | 0.10%    | 20.20%  | 981          |          |
| MP19                   | Gas Borehole    | 1m           | 0.00%    | 0.10%    | 19.50%  | 981          |          |
| MP20                   | Gas Borehole    | 1m           |          |          |         |              |          |

WATER QUALITY STANDARDS - A SYNOPSIS

Environmental Protection Agency,  
Regional Water Laboratory, Kilkenny

Synopsis only - for details refer to the EU Directives and Irish Statutory Instruments.

| PARAMETERS  | UNITS                                | SURFACE ABSTRACTION               |         | DRINKING WATER                   |                       | FRESHWATER FISH                  |                         |          |           |          |  |          |
|---|--------------------------------------|-----------------------------------|---------|----------------------------------|-----------------------|----------------------------------|-------------------------|----------|-----------|----------|--|----------|
|   |                                      | Directive 75/440/EEC A1-Treatment |         | Irish Standard SI No.294 of 1989 | EC Directive 98/83/EC | Irish Standard SI No.439 of 2000 | EC Directive 78/659/EEC |          |           |          |  |          |
|   |                                      | Guide                             | M.A.C.* |                                  |                       |                                  | SALMONID                |          | CYPRINID  |          | Irish Salmonid Stde. SI No 293 of 1988 |          |
|   |                                      |                                   |         | Guide                            | M.A.C.*               | Guide                            | M.A.C.*                 |          |           |          |  |          |
| Temperature   | °C                                   | 22                                | 25      | 25                               | —                     | —                                | —                       | 21.5(a)  | —         | 28(a)    | —                                      | 21.5(b)  |
| Dissolved Oxygen                                      | mg/l O <sub>2</sub>                  | —                                 | —       | —                                | —                     | —                                | —                       | 50%>9    | 50%>9     | 50%>8    | 50%>7                                  | 50%>9    |
| Dissolved Oxygen                                      | mg/l O <sub>2</sub>                  | —                                 | —       | —                                | —                     | —                                | —                       | 100%>7   | —         | 100%>5   | —                                      | —        |
| Dissolved Oxygen                                      | % Sat                                | >70%                              | —       | >60%                             | —                     | —                                | —                       | —        | —         | —        | —                                      | —        |
| OD  | mg/l O <sub>2</sub>                  | 3                                 | —       | 5                                | —                     | —                                | —                       | —        | —         | 6        | —                                      | 55%<5    |
| Conductivity  | µS/cm                                | 1000                              | —       | 1000                             | 2500                  | 2500                             | —                       | —        | —         | —        | —                                      | —        |
| pH  |                                      | 6.5 - 8.5                         | —       | 5.5 - 8.5                        | 6.5 - 9.5             | 6.5 - 9.5                        | —                       | —        | 6 - 9     | —        | —                                      | 6 - 9    |
| Colour  | Hazen                                | 10                                | 20      | 20                               | Acceptable            | Acceptable                       | —                       | —        | —         | —        | —                                      | —        |
| Turbidity   | NTU                                  | —                                 | —       | —                                | Acceptable            | Acceptable                       | —                       | —        | —         | —        | —                                      | —        |
| Phosphorus  | mg/l P                               | 0.17                              | —       | 0.22                             | —                     | —                                | —                       | —        | 0.065 (c) | —        | 0.13                                   | —        |
| Nitrate   | mg/l N                               | 5.65                              | 11.3    | 11.3                             | 11.3                  | 11.3                             | —                       | —        | —         | —        | —                                      | —        |
| Nitrite   | mg/l NO <sub>2</sub>                 | —                                 | —       | —                                | 0.5                   | 0.5                              | 0.01                    | —        | —         | 0.03     | —                                      | 95%<0.05 |
| Sulphate  | mg/l SO <sub>4</sub>                 | 150                               | 250     | 200                              | 250                   | 250                              | —                       | —        | —         | —        | —                                      | —        |
| Suspended Solids                                      | mg/l                                 | 25                                | —       | 50                               | —                     | —                                | 25                      | —        | —         | 25       | —                                      | 25       |
| Tour  | Dilution                             | 3@25°C                            | —       | 5@25°C                           | Acceptable            | Acceptable                       | —                       | —        | —         | —        | —                                      | —        |
| Acid  | Dilution                             | —                                 | —       | —                                | Acceptable            | Acceptable                       | —                       | —        | —         | —        | —                                      | —        |
| Fluoride  | mg/l F                               | 0.7-1.0                           | 1.5     | 1                                | 1.5                   | 1.0 (d)                          | —                       | —        | —         | —        | —                                      | —        |
| Chloride  | mg/l Cl                              | 200                               | —       | 250                              | 250                   | 250                              | —                       | —        | —         | —        | —                                      | —        |
| Cyanide   | mg/l CN                              | —                                 | 0.05    | 0.05                             | 0.05                  | 0.05                             | —                       | —        | —         | —        | —                                      | —        |
| Sulphide  | mg/l S                               | —                                 | —       | —                                | —                     | —                                | —                       | —        | —         | —        | —                                      | —        |
| Ammonia (Total)                                       | mg/l NH <sub>4</sub>                 | 0.05                              | —       | 0.2                              | 0.5                   | 0.3                              | 0.04                    | 1        | 0.2       | 1        | 1                                      | 1        |
| Ion-ionised   | mg/l NH <sub>3</sub>                 | —                                 | —       | —                                | —                     | —                                | 0.005                   | 0.025    | 0.005     | 0.03     | 0.03                                   | 0.02     |
| Nitrogen (Kjeldahl)                                   | mg/l N                               | 1                                 | —       | 1                                | —                     | —                                | —                       | —        | —         | —        | —                                      | —        |
| Residual Chlorine                                     | mg/l Cl <sub>2</sub>                 | —                                 | —       | —                                | —                     | —                                | —                       | 0.005    | —         | —        | 0.01                                   | 0.005    |
| Oxidisability (KMnO <sub>4</sub> )                    | mg/l O <sub>2</sub>                  | —                                 | —       | —                                | 5.0                   | 5.0                              | —                       | —        | —         | —        | —                                      | —        |
| DOC   | mg/l C                               | —                                 | —       | —                                | No change             | No change                        | —                       | —        | —         | —        | —                                      | —        |
| Formate   | µg/l                                 | —                                 | —       | —                                | 10                    | 10                               | —                       | —        | —         | —        | —                                      | —        |
| Crylamide   | µg/l                                 | —                                 | —       | —                                | 0.10                  | 0.10                             | —                       | —        | —         | —        | —                                      | —        |
| Benzene   | µg/l                                 | —                                 | —       | —                                | 1.0                   | 1.0                              | —                       | —        | —         | —        | —                                      | —        |
| Benzo(a)pyrene  | µg/l                                 | —                                 | —       | —                                | 0.01                  | 0.01                             | —                       | —        | —         | —        | —                                      | —        |
| 2-dichloroethane                                      | µg/l                                 | —                                 | —       | —                                | 3.0                   | 3.0                              | —                       | —        | —         | —        | —                                      | —        |
| 1,1-dichloroethene                                    | µg/l                                 | —                                 | —       | —                                | 0.1                   | 0.1                              | —                       | —        | —         | —        | —                                      | —        |
| 1,1,1-trichloroethane                                 | µg/l                                 | —                                 | —       | —                                | 100                   | 100                              | —                       | —        | —         | —        | —                                      | —        |
| 1,1,2-trichloroethane                                 | µg/l                                 | —                                 | —       | —                                | 0.5                   | 0.5                              | —                       | —        | —         | —        | —                                      | —        |
| 1,1,1,2-tetrachloroethane & 1,1,2,2-tetrachloroethane | µg/l                                 | —                                 | —       | —                                | 10                    | 10                               | —                       | —        | —         | —        | —                                      | —        |
| Trichloroethene                                       | µg/l                                 | —                                 | —       | —                                | —                     | —                                | —                       | —        | —         | —        | —                                      | —        |
| Surfactants (MBAS)                                    | mg/l                                 | 0.2                               | —       | 0.2                              | —                     | —                                | —                       | —        | —         | —        | —                                      | —        |
| Phenol  | mg/l C <sub>6</sub> H <sub>5</sub> O | —                                 | 0.001   | 0.0005                           | —                     | —                                | —                       | No taste | —         | No taste | —                                      | No taste |
| Hydrocarbons  | mg/l                                 | —                                 | 0.05    | 0.01                             | —                     | —                                | —                       | (e)      | —         | (e)      | —                                      | (e)      |
| Aromatic (PAH)  | mg/l                                 | —                                 | 0.0002  | 0.0002                           | 0.0001                | 0.0001                           | —                       | —        | —         | —        | —                                      | —        |
| Pesticides (total)                                    | mg/l                                 | —                                 | 0.001   | 0.0005                           | 0.0005                | 0.0005                           | —                       | —        | —         | —        | —                                      | —        |
| Pesticides (single)                                   | mg/l                                 | —                                 | —       | —                                | 0.0001                | 0.0001                           | —                       | —        | —         | —        | —                                      | —        |
| HCls Extract  | mg/l                                 | 0.1                               | —       | 0.2                              | —                     | —                                | —                       | —        | —         | —        | —                                      | —        |
| Total Coliforms                                       | /100ml                               | 50                                | —       | 5000                             | 0                     | 0                                | —                       | —        | —         | —        | —                                      | —        |
| Fecal Coliforms                                       | /100ml                               | 20                                | —       | 1000                             | 0                     | 0                                | —                       | —        | —         | —        | —                                      | —        |
| Fecal Streptococci                                    | /100ml                               | 20                                | —       | 200                              | —                     | —                                | —                       | —        | —         | —        | —                                      | —        |
| Salmonella  | /5000ml                              | NR                                | —       | NR/500ml                         | —                     | —                                | —                       | —        | —         | —        | —                                      | —        |
| Enterococci   | /100ml                               | —                                 | —       | —                                | 0                     | 0                                | —                       | —        | —         | —        | —                                      | —        |
| Clostridia  | /100ml                               | —                                 | —       | —                                | 0                     | 0                                | —                       | —        | —         | —        | —                                      | —        |
| Total Bacteria  | /ml @ 22°C                           | —                                 | —       | —                                | No change             | No change                        | —                       | —        | —         | —        | —                                      | —        |
| Calcium   | mg/l Ca                              | —                                 | —       | —                                | —                     | —                                | —                       | —        | —         | —        | —                                      | —        |
| Magnesium   | mg/l Mg                              | —                                 | —       | —                                | —                     | —                                | —                       | —        | —         | —        | —                                      | —        |
| Sodium  | mg/l Na                              | —                                 | —       | —                                | 200                   | 200                              | —                       | —        | —         | —        | —                                      | —        |
| Potassium   | mg/l K                               | —                                 | —       | —                                | —                     | —                                | —                       | —        | —         | —        | —                                      | —        |
| Iron  | mg/l Fe                              | 0.1                               | 0.3     | 0.2                              | 0.2                   | 0.2                              | —                       | —        | —         | —        | —                                      | —        |
| Copper  | mg/l Cu                              | 0.02                              | 0.05    | 0.05                             | 0.002                 | 0.002                            | 0.04 (f)                | —        | 0.04 (f)  | —        | —                                      | 0.04 (f) |
| Manganese   | mg/l Mn                              | 0.05                              | —       | 0.05                             | 0.05                  | 0.05                             | —                       | —        | —         | —        | —                                      | —        |
| Zinc  | mg/l Zn                              | 0.5                               | 3       | 3                                | —                     | —                                | —                       | 0.3 (f)  | —         | 1.0 (f)  | —                                      | 0.3 (f)  |
| Chromium  | mg/l Cr                              | —                                 | 0.05    | 0.05                             | 0.05                  | 0.05                             | —                       | —        | —         | —        | —                                      | —        |
| Lead  | mg/l Pb                              | —                                 | 0.05    | 0.05                             | 0.01                  | 0.01                             | —                       | —        | —         | —        | —                                      | —        |
| Nickel  | mg/l Ni                              | —                                 | —       | —                                | 0.02                  | 0.02                             | —                       | —        | —         | —        | —                                      | —        |
| Aluminium   | mg/l Al                              | —                                 | —       | —                                | 0.2                   | 0.2                              | —                       | —        | —         | —        | —                                      | —        |
| Cadmium   | mg/l Cd                              | 0.001                             | 0.005   | 0.005                            | 0.005                 | 0.005                            | —                       | —        | —         | —        | —                                      | —        |
| Arsenic   | mg/l As                              | 0.01                              | 0.05    | 0.05                             | 0.01                  | 0.01                             | —                       | —        | —         | —        | —                                      | —        |
| Mercury   | mg/l Hg                              | 0.0005                            | 0.001   | 0.001                            | 0.001                 | 0.001                            | —                       | —        | —         | —        | —                                      | —        |
| Boron   | mg/l B                               | 1                                 | —       | 2                                | 1.0                   | 1.0                              | —                       | —        | —         | —        | —                                      | —        |
| Silver  | mg/l Ag                              | —                                 | —       | —                                | —                     | —                                | —                       | —        | —         | —        | —                                      | —        |
| Antimony  | mg/l Sb                              | —                                 | —       | —                                | 0.005                 | 0.005                            | —                       | —        | —         | —        | —                                      | —        |
| Selenium  | mg/l Se                              | —                                 | 0.01    | 0.01                             | 0.01                  | 0.01                             | —                       | —        | —         | —        | —                                      | —        |
| Barium  | mg/l Ba                              | —                                 | 0.1     | 0.1                              | —                     | —                                | —                       | —        | —         | —        | —                                      | —        |

NOTES: (a) 10° Limit for certain periods - See Directive. (b) 10°C Limit - November to April inclusive. (c) Indicative level - In order to reduce eutrophication for lake water see formula in the Directive. (d) Max level of 1.5 mg/l F allowed where fluoride is naturally present. (e) None Visible. (f) Standards for Copper and Zinc vary with Hardness. \* M.A.C. = Maximum Admissible Concentration.

## **APPENDIX D**

### **Water Balance Calculation**

| Water Balance Calculation - Ballaghveny Landfill (April 2009) |      |                                |                                  |                            |              |              |                               |  |                                    |                                      |                                    |   |  |   |   |
|---|------|--------------------------------|----------------------------------|----------------------------|--------------|--------------|-------------------------------|--|------------------------------------|--------------------------------------|------------------------------------|---|--|---|---|
| Year  | Year | Active Cell                    | Active area<br>(m <sup>2</sup> ) | Annual<br>Rainfall<br>(mm) | P.E.<br>(mm) | A.E.<br>(mm) | Effective<br>Rainfall<br>(mm) | Active area<br>infiltration<br>(m <sup>2</sup> ) | Restored Phase No.                 | Liquid<br>Waste<br>(m <sup>3</sup> ) | Restored area<br>(m <sup>2</sup> ) | Infiltration to<br>restored area<br>(%) | Restored area<br>infiltration<br>(m <sup>2</sup> ) | Annual<br>Leachate<br>(m <sup>3</sup> ) | Cumulative<br>leachate<br>(m <sup>3</sup> ) |
| 2007  | 4    | 6,7,8,9,10, W                  | 50,459                           | 804                        | 0            | 0            | 804                           | 40,569   | 3,4,5                              | 0                                    | 13,070                             | 20                                      | 2,102  | 42,671                                  | 132,153                                     |
| 2008  | 5    | (50% 6,7,8) 9,10,W             | 40,468                           | 804                        | 0            | 0            | 804                           | 32,536   | 3,4,5 (50% 6,7,8)                  | 0                                    | 23,062                             | 20                                      | 3,708  | 36,244                                  | 168,397                                     |
| 2009  | 6    | 9,10,W                         | 30,476                           | 804                        | 0            | 0            | 804                           | 24,503   | 3,4,5,6,7,8                        | 0                                    | 33,053                             | 20                                      | 5,315  | 29,818                                  | 198,214                                     |
| 2010  | 7    | 10 (50%),W (33%)               | 6,261                            | 804                        | 0            | 0            | 804                           | 5,034  | 3,4,5,6,7,8,9                      | 0                                    | 48,735                             | 20                                      | 7,837  | 12,870                                  | 211,085                                     |
| 2011  | 8    | 10, W (66%)                    | 12,522                           | 804                        | 0            | 0            | 804                           | 10,068   | 3,4,5,6,7,8,9                      | 0                                    | 48,735                             | 20                                      | 7,837  | 17,904                                  | 228,989                                     |
| 2012  | 9    | 11 (50%), W (33%)              | 6,261                            | 804                        | 0            | 0            | 804                           | 5,034  | 3,4,5,6,7,8,9,10, W(66%)           | 0                                    | 61,257                             | 20                                      | 9,850  | 14,884                                  | 243,873                                     |
| 2013  | 10   | 11, W (33%)                    | 9,054                            | 804                        | 0            | 0            | 804                           | 7,279  | 3,4,5,6,7,8,9,10,                  | 0                                    | 61,257                             | 20                                      | 9,850  | 17,130                                  | 261,003                                     |
| 2014  | 11   | 11(50%), W (33%)               | 5,630                            | 804                        | 0            | 0            | 804                           | 4,526  | 3,4,5,6,7,8,9,10,11 (50%), W (33%) | 0                                    | 64,712                             | 20                                      | 10,406   | 14,932                                  | 275,935                                     |
| 2015  | 12   | none                           | 0                                | 804                        | 0            | 0            | 804                           | 0  | 3,4,5,6,7,8,9,10,11, W             | 0                                    | 70,378                             | 20                                      | 11,317   | 11,317                                  | 287,252                                     |
| 2016  | 13   | none                           | 0                                | 804                        | 0            | 0            | 804                           | 0  | 3,4,5,6,7,8,9,10,11, W             | 0                                    | 70,378                             | 20                                      | 11,317   | 11,317                                  | 298,568                                     |
| 2017  | 14   | none                           | 0                                | 804                        | 0            | 0            | 804                           | 0  | 3,4,5,6,7,8,9,10,11, W             | 0                                    | 70,378                             | 20                                      | 11,317   | 11,317                                  | 309,885                                     |
| 2018  | 15   | none                           | 0                                | 804                        | 0            | 0            | 804                           | 0  | 3,4,5,6,7,8,9,10,11, W             | 0                                    | 70,378                             | 20                                      | 11,317   | 11,317                                  | 321,202                                     |
| 2019  | 16   | none                           | 0                                | 804                        | 0            | 0            | 804                           | 0  | 3,4,5,6,7,8,9,10,11, W             | 0                                    | 70,378                             | 20                                      | 11,317   | 11,317                                  | 332,519                                     |
| 2020  | 17   | none                           | 0                                | 804                        | 0            | 0            | 804                           | 0  | 3,4,5,6,7,8,9,10,11, W             | 0                                    | 70,378                             | 20                                      | 11,317   | 11,317                                  | 343,836                                     |
| 2021  | 18   | none                           | 0                                | 804                        | 0            | 0            | 804                           | 0  | 3,4,5,6,7,8,9,10,11, W             | 0                                    | 70,378                             | 20                                      | 11,317   | 11,317                                  | 355,152                                     |
| 2022  | 19   | none                           | 0                                | 804                        | 0            | 0            | 804                           | 0  | 3,4,5,6,7,8,9,10,11, W             | 0                                    | 70,378                             | 20                                      | 11,317   | 11,317                                  | 366,469                                     |
| 2023  | 20   | none                           | 0                                | 804                        | 0            | 0            | 804                           | 0  | 3,4,5,6,7,8,9,10,11, W             | 0                                    | 70,378                             | 20                                      | 11,317   | 11,317                                  | 377,786                                     |
| 2024  | 21   | none                           | 0                                | 804                        | 0            | 0            | 804                           | 0  | 3,4,5,6,7,8,9,10,11, W             | 0                                    | 70,378                             | 20                                      | 11,317   | 11,317                                  | 389,103                                     |
| 2025  | 22   | none                           | 0                                | 804                        | 0            | 0            | 804                           | 0  | 3,4,5,6,7,8,9,10,11, W             | 0                                    | 70,378                             | 20                                      | 11,317   | 11,317                                  | 400,419                                     |
| 2026  | 23   | none                           | 0                                | 804                        | 0            | 0            | 804                           | 0  | 3,4,5,6,7,8,9,10,11, W             | 0                                    | 70,378                             | 20                                      | 11,317   | 11,317                                  | 411,736                                     |
| 2027  | 24   | none                           | 0                                | 804                        | 0            | 0            | 804                           | 0  | 3,4,5,6,7,8,9,10,11, W             | 0                                    | 70,378                             | 20                                      | 11,317   | 11,317                                  | 423,053                                     |
| 2028  | 25   | none                           | 0                                | 804                        | 0            | 0            | 804                           | 0  | 3,4,5,6,7,8,9,10,11, W             | 0                                    | 70,378                             | 20                                      | 11,317   | 11,317                                  | 434,370                                     |
| 2029  | 26   | none                           | 0                                | 804                        | 0            | 0            | 804                           | 0  | 3,4,5,6,7,8,9,10,11, W             | 0                                    | 70,378                             | 20                                      | 11,317   | 11,317                                  | 445,687                                     |
| 2030  | 27   | none                           | 0                                | 804                        | 0            | 0            | 804                           | 0  | 3,4,5,6,7,8,9,10,11, W             | 0                                    | 70,378                             | 20                                      | 11,317   | 11,317                                  | 457,003                                     |
| 2031  | 28   | none                           | 0                                | 804                        | 0            | 0            | 804                           | 0  | 3,4,5,6,7,8,9,10,11, W             | 0                                    | 70,378                             | 20                                      | 11,317   | 11,317                                  | 468,320                                     |
| 2032  | 29   | none                           | 0                                | 804                        | 0            | 0            | 804                           | 0  | 3,4,5,6,7,8,9,10,11, W             | 0                                    | 70,378                             | 20                                      | 11,317   | 11,317                                  | 479,637                                     |
| 2033  | 30   | none                           | 0                                | 804                        | 0            | 0            | 804                           | 0  | 3,4,5,6,7,8,9,10,11, W             | 0                                    | 70,378                             | 20                                      | 11,317   | 11,317                                  | 490,954                                     |
| 2034  | 31   | none                           | 0                                | 804                        | 0            | 0            | 804                           | 0  | 3,4,5,6,7,8,9,10,11, W             | 0                                    | 70,378                             | 20                                      | 11,317   | 11,317                                  | 502,270                                     |
|   |      |                                |                                  |                            |              |              |                               |  |                                    |                                      |                                    |   |  |   |   |
|   |      |                                |                                  |                            |              |              |                               |  | <b>Cell Areas</b>                  |                                      |                                    |   |  |   |   |
|   |      | <b>Annual Rainfall (mm):</b>   | 804                              | mm                         |              |              |                               |  | Cell 3,4,5                         | 13,070                               | m <sup>2</sup>                     |   |  |   |   |
|   |      |                                |                                  |                            |              |              |                               |  | Cells 6,7,8                        | 19,983                               | m <sup>2</sup>                     |   |  |   |   |
|   |      |                                |                                  |                            |              |              |                               |  | Cell 9                             | 15,682                               | m <sup>2</sup>                     |   |  |   |   |
|   |      |                                |                                  |                            |              |              |                               |  | Cell 10                            | 8,112                                | m <sup>2</sup>                     |   |  |   |   |
|   |      |                                |                                  |                            |              |              |                               |  | Cell 11                            | 6,849                                | m <sup>2</sup>                     |   |  |   |   |
|   |      | <b>Leachate Lagoon volume:</b> | 694                              | m <sup>3</sup>             |              |              |                               |  | Wedge Area (W)                     | 6682                                 | m <sup>2</sup>                     |   |  |   |   |