BALLAGHVENY LANDFILL,
TIPPERARY COUNTY COUNCIL
BALLYMACKEY,
NENAGH
COUNTY TIPPERARY

ANNUAL ENVIRONMENTAL REPORT 2014

INDUSTRIAL EMISSIONS LICENCE REG. NO. W0078-03

Prepared by:

Tipperary County Council
Environment Section
Civic Office
Clonmel
Co. Tipperary

May 2015

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1. Executive Summary

This is the fourteenth Annual Environmental Report (AER) produced for Ballaghveny Landfill Site, Ballymackey, Nenagh, Co. Tipperary and has been complied in accordance with the requirements of Schedule G of Waste Licence 0078-03.

The purpose of the report is to summarise the interaction of the facility with the local environment.

The Annual Environmental Report includes where applicable the information specified in Schedule G of the Waste Licence and in accordance with the various EPA publications on Landfills.

2. Introduction

Waste Licence Register Number: W0078-03

Name of Operator, Name and Address of Facility in 2013.

Tipperary County Council,

Ballaghveny Landfill Site,

Ballymackey,

Nenagh,

Co. Tipperary

Reporting period

The reporting period for the purposes of this AER is the 1st January 2014 to the 31st of December 2014.

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 is located in the townslands of Ballymackey and Woodville approximately 4km north of Toomevara and 11km north-east of Nenagh. The site is approximately 16.3 Ha in size and is situated on the eastern side of approximately 40 Ha of Land owned by Tipperary County Council (TCC) which also includes Woodville House.

The original site, approximately 5.3 Ha in size, was purchased as a disused quarry by Tipperary County Council following an investigation by An Foras Forbartha in 1985. A total of 5 Cells were developed with cells 3-5 lined. In 2000 TCC 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.

Current Status of Ballaghveny Landfill and Civic Amenity Site.

Landfilling of waste in Ballaghveny Landfill ceased on the 26th of February 2011 when a temporary closure of the landfill was initiated.

The Civic Amenity Site was open to the public on Fridays and Saturdays only for recycling and bags of domestic waste but this facility closed on Saturday 30th June 2012.

3. Waste Activities

No waste was landfilled in Ballaghveny Landfill during 2014.

The Civic Amenity Facility was closed to the public and as such no waste was accepted in 2014 at the Facility.

4. Waste during the Previous Years

Table 1 below illustrates the tonnage of waste landfilled at Ballaghveny Landfill since 2001.

Table 1 Waste Accepted for Disposal at Ballaghveny Landfill

Year	Total tonnage accepted at Ballaghveny Landfill
2001	28,588
2002	35,787
2003	36,612
2004	32,622
2005	26,115
2006	31,802
2007	28,470
2008	25,096
2009	21,442
2010	17,004
2011	7,386
2012	0
2013	0
2014	0

Total tonnage of materials recycled at the Ballaghveny Landfill Facility are listed in Table 2.

Ballaghveny Landfill constructed its Civic Amenity Site in March 2003. The construction of this facility allowed for the expansion of recycling services. The Facility accepted the following for recycling

- Scrap metal
- Plastic
- Carbboard
- Newspaper and Magazines
- Batteries
- Bottle Banks
- Clothes Bank
- Fridge/Freezers
- WEEE
- Flousescent bulbs
- Gas cyclinders
- Christmas trees

Table 2 Tonnage of material recycled at Ballaghveny Civic Amenity Site since 2001.

Year	Total tonnage recycled at Ballaghveny Landfill and Civic Amenity Site
2001	112
2002	123
2003	101
2004	78
2005	67
2006	272
2007	287
2008	319
2009	265
2010	206
2011	58
2012	10
2013	0
2014	0

5. Remaining Facility Capacity

The most recent topographical survey of Ballaghveny was carried out in August 2014.

A proposed filling plan was produced in January 2010. See Appendix 1 for the topographical survey and the filling plan.

Cell 10b

The floor plan area of Cell 10b is 3,797m^2

This cell has a filling capacity of 46,376m^3

The most recent compaction rate was 0.71t/m^3

A total of 32,927tonnes of waste can be landfilled in this cell.

Cell 11a

The floor plan area of Cell 11a is 2,992m^2

This cell has a filling capacity of 30,441m^3

The most recent compaction rate was 0.71t/m^3

A total of 21,613 tonnes of waste can be landfilled in this cell.

Cell 11b

The floor plan area of Cell 11b is 3,536m^2

This cell has a filling capacity of 34,776m^3

The most recent compaction rate was 0.71t/m^3

A total of 24,691 tonnes of waste can be landfilled in this cell.

The Wedge

The floor plan area of the Wedge is 2,345m^2

This cell has a filling capacity of 70,160m^3

The most recent compaction rate was 0.71t/m^3

A total of 49,814 tonnes of waste can be landfilled in this cell.

This gives a total void space of 129,045m^3.

6. Summary Report of Emissions

The required monitoring programme at Ballaghveny Landfill Facility is specified in Schedule C of Waste Licence W0078/03. The Environmental monitoring period for this AER is 1st January 2014 to the 31st of December 2014.

Drawing DG 0001-01, Rev F06 in Appendix 2 shows the locations of all monitoring points. Appendix 3 has a copy of all relevant reports that relate to:

- Ground water
- Landfill Gas
- Surface water
- Leachate
- PRTR Emission Data

Issues relating to exceedances were reported on EDEN. Refer to Appendix 4 for a list of same.

7. Resource & Energy Consumption

Resource and energy consumption on site can be summarised approximately as follows

Diesel Fuel:

The landfill has a tractor and Quad, which used approximately 500 litres of Diesel in 2014.

Water Consumption:

A total of 14m3 of water was used at the site in 2013. Approximately 17m3 was used at the site in 2014.

Energy Audit:

An audit of Tipperary County Council's Ballaghveny Landfill and Civic Amenity Site was carried out by Tipperary Energy Agency in 2009.

Based on this Energy Audit, a number of improvements were carried out at the Site.

57888kWh of power was used at Ballaghveny landfill in 2014.

8. Leachate

All Leachate is pumped to the Leachate storage lagoon to the north of cells 6-8. The existing Leachate lagoon has a capacity of 1,020m3. Allowing for a free board of 0.5m in accordance with the waste licence, the Leachate storage capacity of the lagoon is 694m3. Leachate volumes removed from the site for treatment in 2014 are included in Appendix 5. An overview of the leachate removed from site for treatment since 2001 is included in Table 3.

In 2014 leachate was tankered from the lagoon to

- Limerick Main Drainage
- Thurles WWTP
- Rilta Treatment Plant, Dublin
- Kilkenny Waste Water Treatment Plant

Table 3 Leachate Removed from Ballaghveny Landfill

Year	Total Leachate removed from Ballaghveny Landfill for treatment at WWTPs
2001	6,210
2002	14,466
2003	12,217
2004	13,273
2005	18,672
2006	16,657
2007	26,016
2008	40,232
2009	22,313
2010	17,203
2011	15,670
2012	6,804
2013	7,112
2014	13,579

In accordance with Condition 6.2 of waste licence 0078-03 leachate levels and the freeboard in the leachate storage lagoon are to be monitored continuously. A Scada System is in place and is monitoring same.

Additional date is available in the following appendices

- Details of Leachate composition analysis are given in Appendix 3 –Quarterly analysis
- Leachate monitoring locations are identified in Appendix 2 – Monitoring locations reference drawing DG 0001-01 (F06)

9. Development Works

Cells 1 -10a have a final cap in place.

Tipperary County Council initiated a temporary closure at Ballaghveny Landfill on Saturday the 26th of February 2011. No waste has been landfilled in Ballaghveny since March 2011 and all filled cells have been capped. A Temporary Closure Plan was submitted to the Agency in 2011 and subsequently extended to March 2015.

10. Restoration of Completed Cells/Phases

Cells 1-8 of the Landfill have been capped and restored as per waste licence W0078-02. The filling of Cell 9 was completed in November 2009. This cell was capped during 2011. Cell 10a was closed in March 2011 and capped during 2011. All filled cells in Ballaghveny Landfill are now permanently capped. A green protective geotextile is currently covering the liners at the side of cells 6-8 and cell 10a.

A decision will be made regarding the future of Ballaghveny Landfill in later half of 2015 when it will be decided if the facility will reopen for waste disposal of if a permanent closure and restoration will be implemented.

11. Site Survey

The topographical survey of Ballaghveny Landfill is included in Appendix 1.

12. Landfill Gas

Gas Collection and Flaring

The Landfill gas flare which was originally installed in 2002 was re-commissioned in June 2008. The enclosed flare has a maximum capacity of 500m3/hr.

Landfill gas is now collected in 34 vertical wells throughout the landfill and directed to the gas flare. A Fugitive VOC survey of the landfill survey was carried out in July 2014 and is attached in Appendix 6.

13. Water Balance

A revised water balance calculation was carried out in April 2014. See Appendix 7 attached.

The estimated Leachate generation figure for 2014 was 6,977m3. As referred to in Section 9 above, the actual quantity of leachate tankered from the landfill in 2014 was 13578.57t.

14. Procedures

The list of procedures developed up to December 2013 are outlined below.

Tipperary North and South Local Authorities are amalgamated in 2014 and a new incorporated set of procedures were subsequently developed.

Doc. No.	Operational Procedure Title	Date of Revision	Date Procedure Reviewed
SCP/4001/03	Competence, Awareness and Training Procedure	June 2014	25-06-14
SCP/4002/08	Complaints Procedure	June 2014	25-06-14
SCP/4003/06	Corrective Action Procedure	June 2014	25-06-14
SCP/4004/10	Emergency Response Procedure	June 2014	25-06-14
SCP/4005/08	Environmental Monitoring Procedure	June 2014	25-06-14
SCP/4009/05	Landfill Gas Management Procedure	June 2014	25-06-14
SCP/4011/08	Leachate Procedure	June 2014	25-06-14
SCP/4013/03	Waste Handling and Litter Picking Procedure	June 2014	25-06-14
SCP/4015/02	Monitoring and Measurement Procedure	June 2014	25-06-14
SCP/4017/03	Odour Impact Assessment Procedure	June 2014	25-06-14
SCP/4018/05	Communication Procedure	June 2014	25-06-14
SCP/4019/02	Record and Document Control Procedure	June 2014	25-06-14
SCP/4020/02	Resources, Roles and Responsibilities Procedure	June 2014	25-06-14
SCP/4021/06	Site Inspection Procedure	June 2014	25-06-14
SCP/4022/03	Site Supervision and Lone Working Procedure	June 2014	25-06-14
SCP/4023/02	Surface Water Lagoon Management Procedure	June 2014	25-06-14
SCP/4024/10	Vehicle Movement Procedure	June 2014	25-06-14
SCP/4025/04	Waste Acceptance Procedure	June 2014	25-06-14
SCP/4028/02	Working at the Lagoon Enclosure Procedure	June 2014	25-06-14
SCP/4029/02	Site Visitors Procedure	June 2014	25-06-14
SCP/4030/02	Site Welfare Facilities	June 2014	25-06-14
SCP/4031/01	CCTV Procedure	June 2014	25-06-14

15. Environmental Objectives and Targets

A Temporary Closure Plan is in place for the Ballaghveny Landfill Site and if any works are to be carried out in 2014 the Agency will be notified in advance as per the waste licence.

16. Tank, Pipeline and Bund Testing and Inspection Report

The Leachate rising main from Cell 9 to the Leachate lagoon was pressure tested in 2012 and passed.

17. Incidents and Complaints

Please find a list of same in Appendix 4.

18. Nuisance

The vermin control programme has been scaled back to quarterly as the facility is now closed and the cells have been capped. The latest report from the Pest Control Company is in Appendix 8.

19. Financial Provisions, Staffing and Public Information

Financial Provision

Tipperary County Council has made the necessary provisions to ensure that there is adequate funding for the management, development and restoration of the Ballaghveny Landfill.

An Environmental Liability Risk Assessment (ELRA) has been completed for the Facility and this is available for inspection at the site.

Section 53A reports have been returned to the Agency detailing Financial Provisions for the site.

The Temporary Closure Plan highlights the financial provisions for the site going forward.

Staffing Structure of the Facility in 2014-

North Tipperary County Council and South Tipperary County Council merged on the 1st of June 2014 to become Tipperary County Council. Following amalgamation staff have been moved into new positions.

Details of Management Structure:

- Tipperary County Council has overall responsibility for management and operation of the Ballaghveny Landfill Site.
- Acting Senior Executive Engineer, Ms. Anne Peters, has overall responsibility for the management of waste infrastructure in Tipperary.
- Ms Louise Ryan, Landfill Manager is responsible for Ballaghveny Landfill
- Site Caretaker: Mr. Michael Haverty is based at the site for 2 days per week.

Public Information, Monitoring and Reporting Requirements

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

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

Public Information Documentation Index

- Complaints Register
- Corrective Actions Procedure
- Training Records

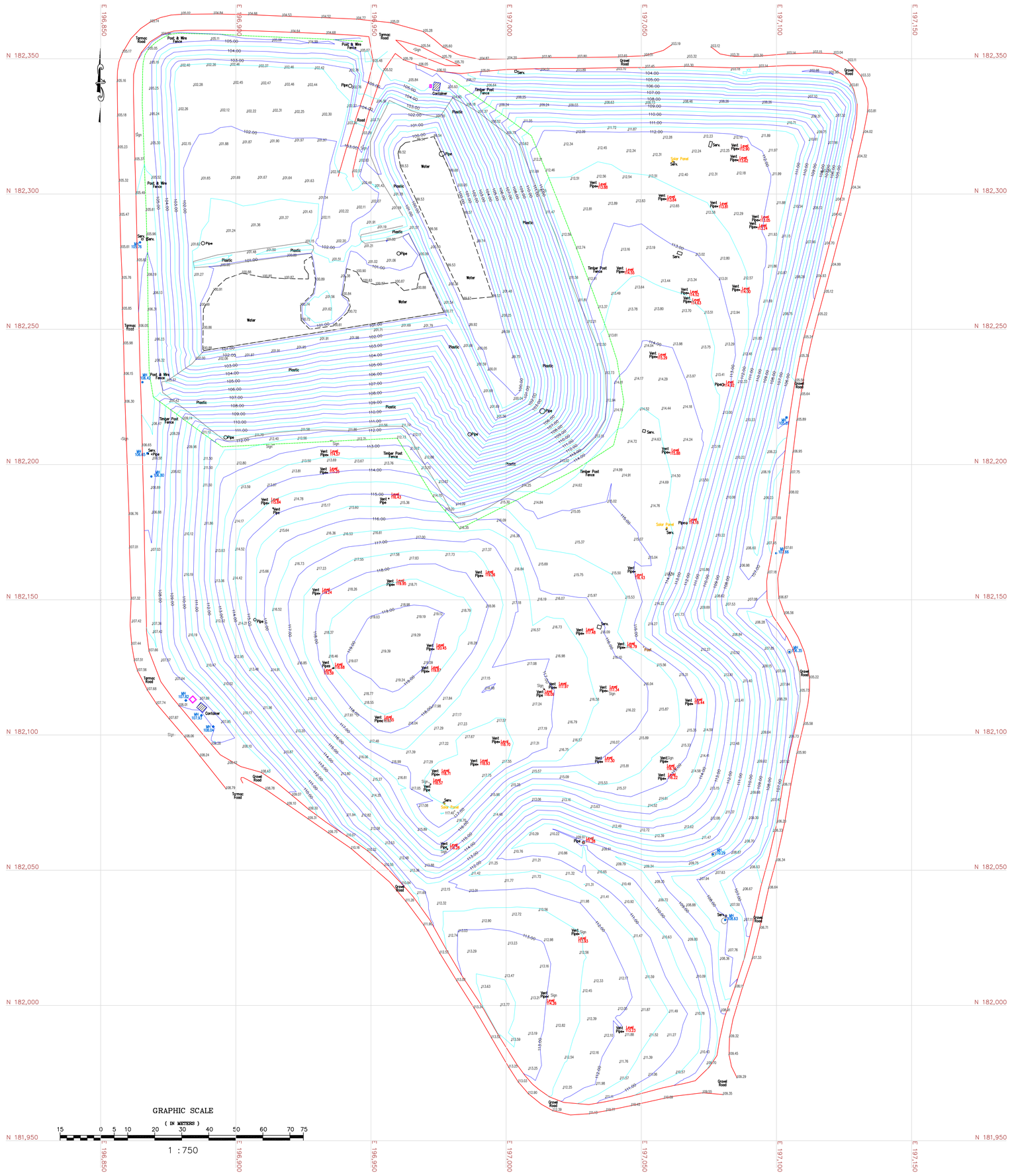
Environmental Monitoring Records

- Monthly Landfill gas composition
- Quarterly surface water composition
- Weekly surface water visual inspections
- Quarterly Leachate composition
- Monthly groundwater levels
- Quarterly groundwater composition
- Annual Biological Assessment for Ballaghveny Stream

Other Monitoring Activity

- Accident/First Aid Report Form
- Leachate Consignment Register
- Waste Licence
- EIS for Landfill Extension Report
- Annual Environmental Report
- Environmental Management Programme
- Management Structure
- Licence requirement Action Plan
- Operational Procedures/Forms
- Document Control
- Calibration Register
- Contingency Plans
- Maintenance Register
- Non - conformances

APPENDIX 1



NOTES:
1. All levels are relative to Ordnance Datum Malin Head
2. 50m sq grid relative to Irish Grid (1970) Co-ordinate reference system
3. Contours are at 0.50m intervals

SYMBOL LEGEND

AV	Air Valve	SV	Sluice Valve
V	Valve	WV	Water Valve
FH	Fire Hydrant	WM	Water Meter
IC	Inspection Chamber	Post	Post
TCD	Telecom Duct	ESBD	ESB Duct
TCB	Telcom Box	ESB	ESB Box
T	Tree	EP	ESB Pole
	Tree Spread	TP	Telecom Pole
	Bush/Shrub	LS	Lamp Standard
Sign	Sign	TSign	Traffic Sign
AJ	Armstrong Junction	GY	Gully
ER	Earth Rod	Gas	Gas
TL	Traffic Light	B	Bollard
CATV	Cable TV Duct	Bin	Bin
	Gate	Stay	Stay
MH	Manhole & Cover Level	Serv	Service
	Survey Station	Pipe	Pipe
	Ridge Height	Coping	Coping Height
	Finished Floor Level	Gutter	Gutter Height
	Eaves Height	Roof	Roof Height
6.75	Boundary Height	5.55	Spot Height

LINE TYPE LEGEND

	Wall		Concrete Edge
	Fence		Centerline of Trees
	Footpath		Hedge
	Drain/River		Step
	Flower Bed		Plinth
	ESB Line		Telecom Line
	Mound		Mound Center
	Kerb		Road
11.00	Contour Major	10.75	Contour Minor
	Building		Plinth
	Bottom of Bank		Top of Bank
	Yellow Line		White Line

REVISIONS

No.	Date	Description

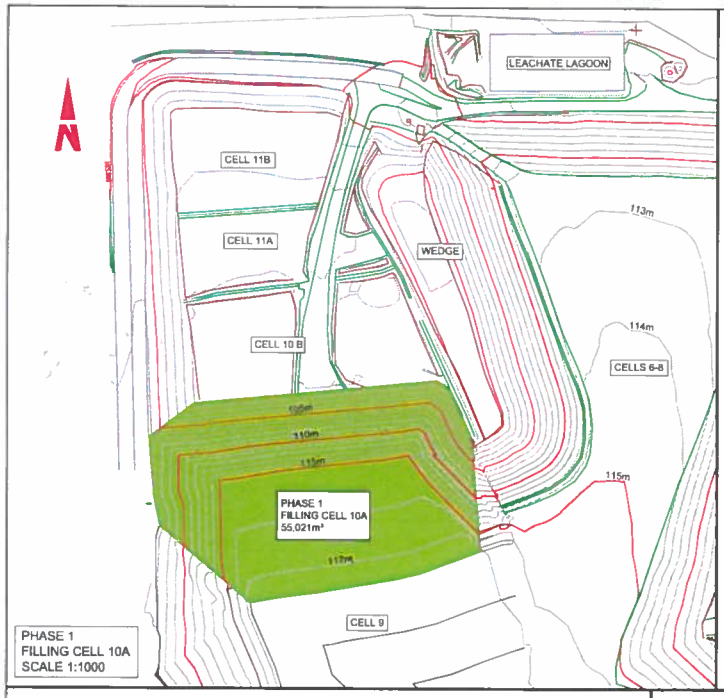
Control Surveys
land and building surveyors
No. 562
6 Crestwood, Kilteragh, Dooradoyle, Limerick.
Tel: 087 2659112 email: cian@controlsurveys.ie
website: www.controlsurveys.ie
• Topographical Surveys • As Built Surveys
• Measured Building Surveys • GPS Surveys
• Legal Mapping • Setting Out

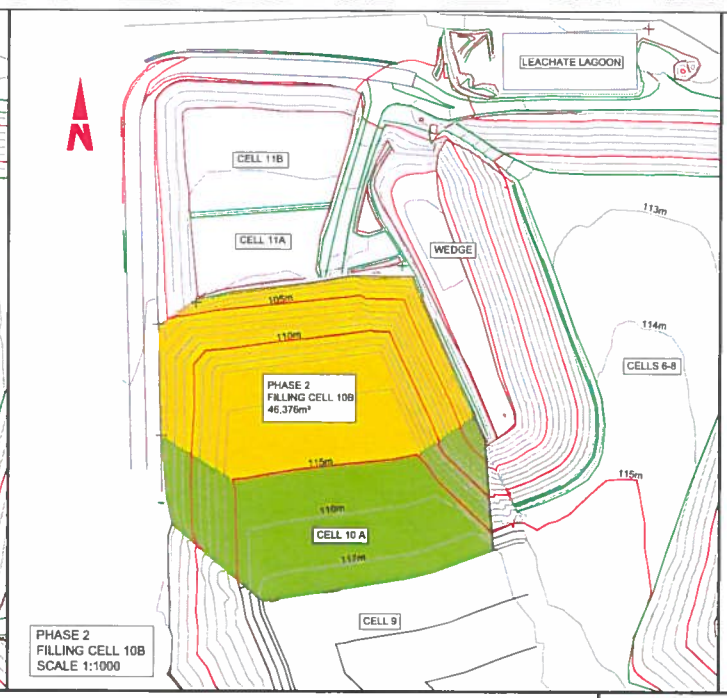
Client:
Tipperary County Council

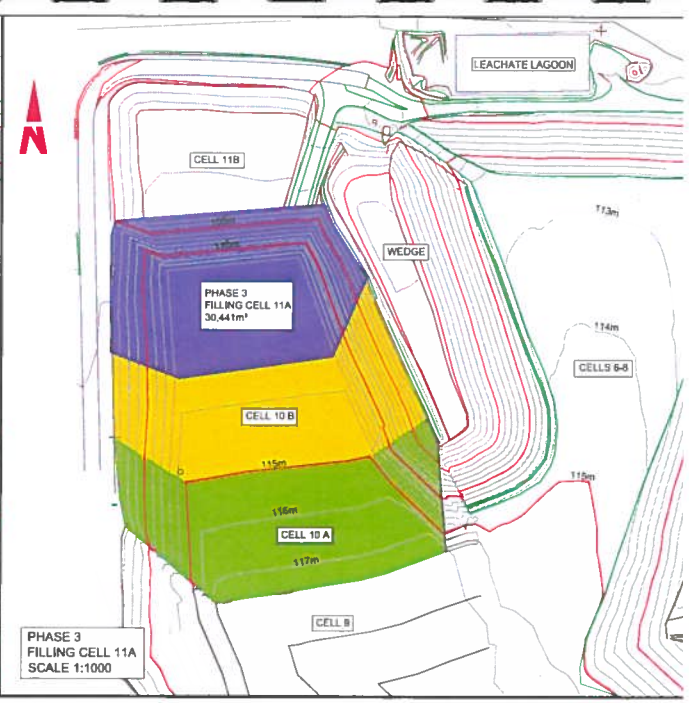
Professional:

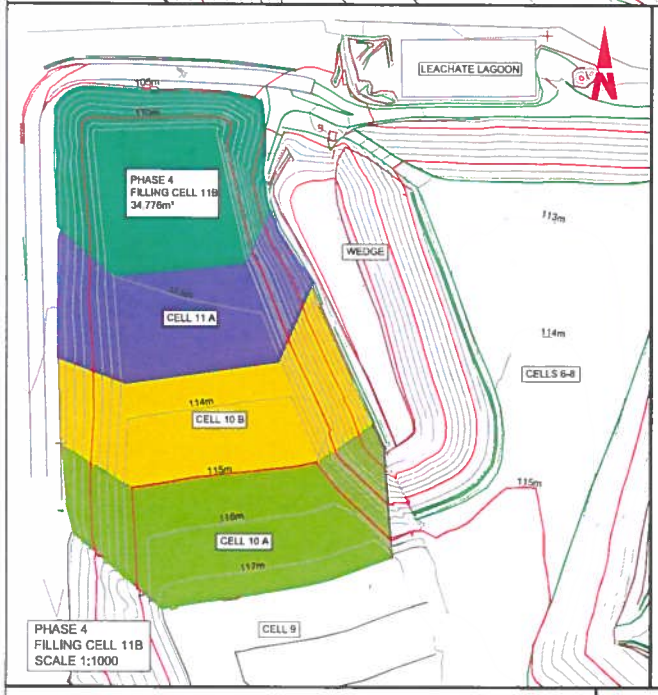
Project Title:
Topographical Survey of Ballyhveny Landfill, Nenagh, Co. Tipperary.

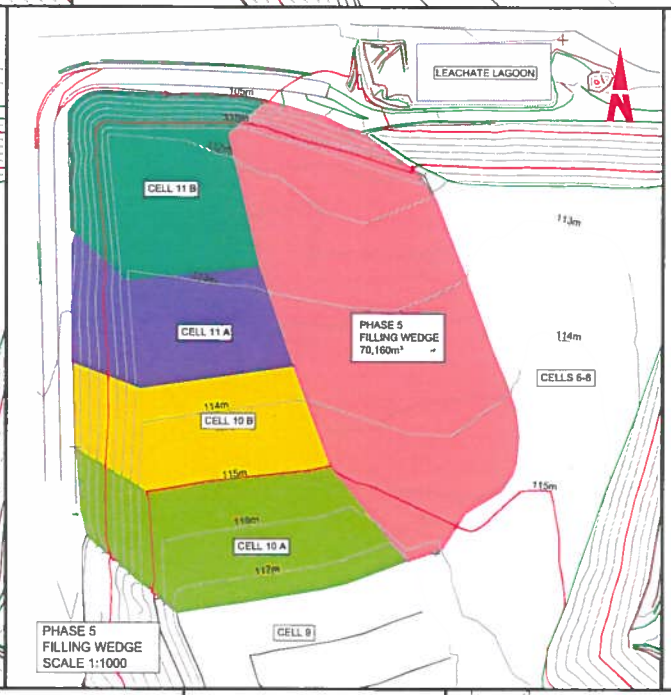
Drawn:	C O'S	**Dwg No:**	14-174-01
Scale:	1:750	**Date:**	18-08-14











Ballaghveny Landfill - Remaining Capacity and Filling Life (from November 2009)

	Floor Plan Area (m2)	Filling Capacity (m3)	Tonnage Available (t) 0.71 t/m3 Comp. Rate	Tonnage Available (t) 0.76 t/m3 Comp. Rate	Filling time (months) Filling @ 30,000tpa 0.71 t/m3 Comp. Rate	Filling time (months) Filling @ 30,000tpa 0.76 t/m3 Comp. Rate	Filling time (months) Filling @ 18,000tpa 0.71 t/m3 Comp. Rate	Filling time (months) Filling @ 18,000tpa 0.76 t/m3 Comp. Rate
Cell 10 A	4,935	55,011	39,059	41,808	15.6	16.7	26.0	27.9
Cell 10 B	3,797	48,376	32,927	35,246	13.2	14.1	22.0	23.5
Cell 11 A	2,992	30,441	21,613	23,135	8.6	9.3	14.4	15.4
Cell 11 B	3,530	34,776	24,691	26,430	9.9	10.6	16.5	17.6
Wedge	2,345	70,160	49,814	53,322	19.9	21.3	33.2	35.5
Total	17,005	236,764	168,102	179,941	67	72	112	120
			Total Years remaining		5.6	6.0	9.3	10.0
			Year of Closure		2015	2015	2019	2019

0.00km 40m 80m 120m 160m 200m
Scale Bar

Comhairle Contae Thiobraid Arann Thuaidh
North Tipperary County Council

RPS Consulting Engineers
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T: +353 91 534100 - F: +353 91 534199
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NOTES

1. 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.
2. All Levels refer to Ordnance Survey Datum, Malin Head.
3. DO NOT SCALE, use figured dimensions only. If in doubt ask.

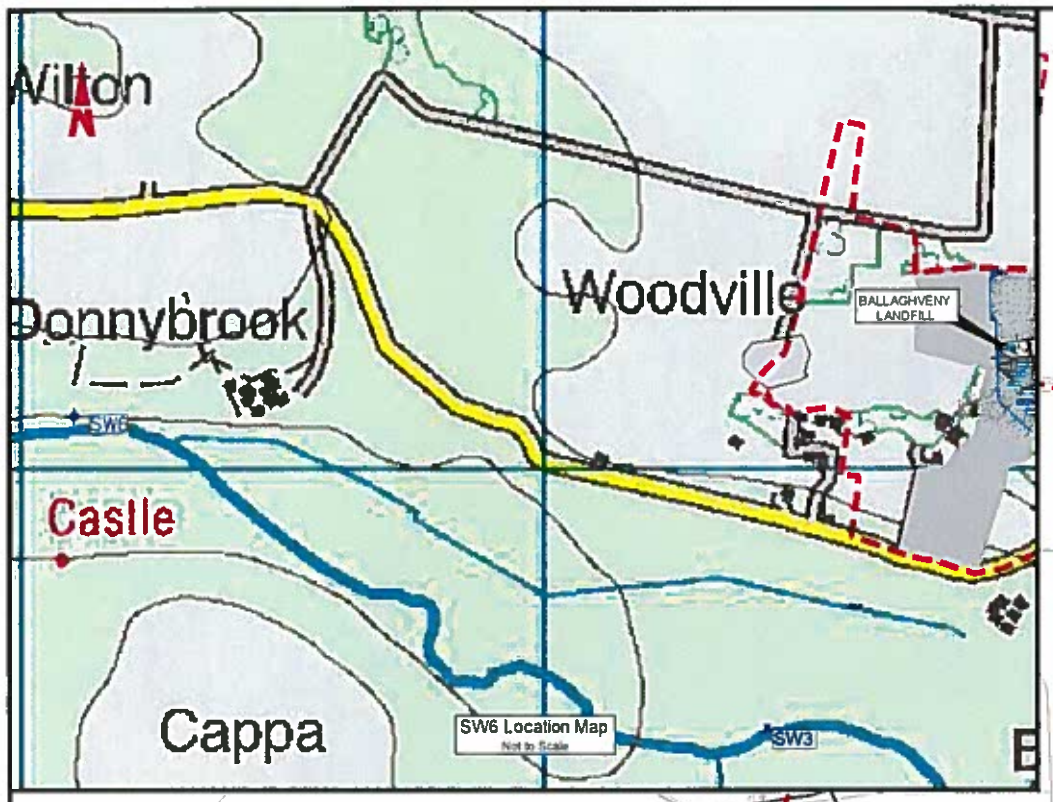
No.	Date	By	Amendment / Issue	Appr.
A02	29.01.10	W.L.	REVISED FILLING SEQUENCE	W.M.
A01	27.01.10	W.L.	ISSUE FOR APPROVAL	W.M.

Project:
BALLAGHVENY LANDFILL- WASTE LICENCE COMPLIANCE

Title:
PROPOSED FILLING PLAN

Drawn by:	W.L.	Job No:	MGE0001
Checked by:	K.G.	File No:	MGE0001DG0171
Approved by:	W.M.	Drg. No:	DG0171
Scale:	1:1000 @ A1	Rev:	A0
Date:	Jan. '10		

APPENDIX 2



LEGEND

- Waste Licence Compliance Boundary
- LS Leachate Chambers
- LFG Landfill Gas Monitoring Point
- LM Leachate Monitoring Points

Leachate Monitoring Points

Point ID	Eastings	Northings
LM01	197140.808	181918.180
LM02	197050.312	181811.121
LM03	197015.242	182004.649
LM04	197024.950	182027.811
LM05	196878.124	182057.758
LM06	197037.747	182111.874
LM07	197013.849	182115.719
LM08	197044.047	182131.719
LM09	197056.659	182098.500
LM10	197037.680	182115.586
LM11	197047.571	182162.104
LM12	197061.719	182204.740
LM13	197054.326	182240.931
LM14	197098.670	182291.969
LM15	197078.583	182295.163
LM16	197086.721	182313.968
LM17	196907.308	182142.340
LM18	196871.402	182123.953
LM19	196898.584	182209.620
LM20	196859.486	182187.125
Leachate Lagoon	197027.888	182367.680

Leachate Sump Points

Point ID	Eastings	Northings
LS1	197030.429	182057.539
LS2	197084.763	182033.251
LS3	196982.888	182317.809
LS4	197018.789	182221.710
LS5	196981.681	182215.364
LS6	196812.728	182144.348
LS7	196801.301	182212.701
LS8	196908.358	182280.865
LS9	196894.048	182285.345
LS10	196949.090	182343.109

Emission Monitoring Points

Point ID	Eastings	Northings
Surface Water Discharge Points		
SWO 1	197234.467	181983.124
SWO 2	197122.680	182168.564
SWO 3	197148.218	182368.397
Gas Flare		
GF 1	197088.284	182357.215

Noise Monitoring Points

Point ID	Eastings	Northings
B 1	197084.813	181988.341
B 2	197111.806	182136.590
B 3	196981.566	182123.457
B 4	197078.313	181877.428
B 5	197144.437	182360.328
B 6	196880.365	182225.658
NSL 1	197360.363	181988.585
NSL 2	196847.807	181793.641

Surface Water Monitoring Points

Point ID	Eastings	Northings
SW 1	197365.676	181991.260
SW 2	196586.950	181739.935
SW 3	196427.752	181505.857
SW 4	197291.036	182493.311
SW 6	195103.271	182100.095
SW 7	196873.146	182372.186

Landfill Gas Monitoring Points (perimeter)

Point ID	Eastings	Northings
MP 2	196983.181	182359.419
MP 3	196879.551	182014.591
MP 4	196954.505	181924.288
MP 6	196631.068	182341.538
MP 7	196641.444	196641.444
MP 8	196809.636	182168.823
MP 15	197268.393	181838.878
MP 16	197052.532	181859.208
MP 17	197284.017	181904.508
MP 18	197141.967	182330.573
MP 19	197131.998	182180.580

Landfill Gas Monitoring Points (within waste)

Point ID	Eastings	Northings
LFG-01	197140.808	181918.180
LFG-02	197117.785	181918.773
LFG-03	197050.312	181811.121
LFG-04	197058.329	181841.927
LFG-05	197043.257	181960.018
LFG-06	197015.242	182004.649
LFG-07	197024.950	182027.811
LFG-08	197035.571	182090.676
LFG-09	197058.028	182083.886
LFG-10	197069.280	182111.313
LFG-11	196997.559	182087.446
LFG-12	196988.311	182088.307
LFG-13	197027.840	182137.685
LFG-14	196953.917	182104.936
LFG-15	196871.380	182123.457
LFG-16	196890.803	182159.005
LFG-17	197047.571	182162.104
LFG-18	197061.719	182204.740
LFG-19	197054.326	182240.931
LFG-20	197098.670	182291.969
LFG-21	197043.324	182278.586
LFG-22	197032.371	182302.594
LFG-23	197078.583	182295.163
LFG-24	197094.316	182288.223
LFG-25	197086.721	182313.968
LFG-26	197086.981	182264.280
LFG-27	197080.065	182229.364
LFG-28	197068.804	182178.029
LFG-29	196858.354	182124.483
LFG-30	196831.048	182152.334
LFG-31	196956.880	182188.405
LFG-32	196912.206	182165.422
LFG-33	196958.488	182187.125
LFG-34	196933.964	182203.348

Groundwater Monitoring Points

Point ID	Eastings	Northings
GW 3	196809.636	182160.823
GW 5	196631.085	182341.539
GW 6 (TAP)	196703.514	182032.840
GW 9	197268.393	181836.676
GW 10	197052.532	181859.208
GW 12	196950.643	181765.364
BH 3	197284.017	181904.508
GW 13	196788.797	182110.341
GW 14	196809.489	182078.188
GW 15	196873.722	182107.296
GW 16	196833.956	182375.736
GW 17	197161.378	182342.301
GW 18	197111.278	182164.296
GW 19	196873.688	181847.139
GW 20	196945.542	181845.379

Dust Monitoring Points

Point ID	Eastings	Northings
DSP 1	197084.524	181983.811
DSP 2	197014.042	181828.817
DSP 3	197075.151	182128.059
DSP 4	196901.058	181962.034

Comhairle Contae Thiobraid Árann Tímaoth
North Tipperary County Council

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NOTES

1. 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.
2. All Levels refer to Ordnance Survey Datum, Malin Head.
3. DO NOT SCALE, use figured dimensions only, if in doubt ask.

No.	Date		Amendment / Issue	App.
F06	12.06.12	DC	Updated following Cell 9 & 10A Capping	DC
F05	12.12.10	DC	Updated following NTCC check	D.C.

Project: BALLAGHVENY LANDFILL- WASTE LICENCE COMPLIANCE

Title: Monitoring Location Reference Drawing

Drawn by	J.O'B.	Job No	060504001
Checked by	D.C.	File No	060504007DG0001
Approved by	W.M.	Drg. No	DG0001-01
Scale	1:2000 @ A1	Rev	F06
Date	Apr. 2002		

APPENDIX 3

Unit W10C, Tougher Business Park, Naas, Co. Kildare. IRELAND.
✆ +353 (0) 45 409 314 Web: www.irishbiotechsystems.ie
🖷 +353 (0)1 6865 012 Email: Info@irishbiotechsystems.ie

Flare & Ancillary Equipment Inspection/Service Record

Site/Location:	Ballaghveny
Technician:	James Fagan
Date:	18/4/2014

Equipment details / Reference #. Organics 500 Enclosed Flare

Item	*Readings to be taken daily or fed to SCADA*	Data Recorded		Item Checked			Condition		Comment
1) Daily Inspection				**Y**	**N**	**N/A**	**OK**	**Fault**	
001	CH4	39.1	% Vol.						
002	CO2	24.3	% Vol.						
003	O2	3.1	% Vol.						
004	CO	4	PPM						
005	Record booster operational hours	45819	Hrs						
006	Flow rate	240	M3/hr						
007	Suction pressure	-15	Mbar						
008	Flare Temperature	1000	C°						
2) Weekly Inspection									
009	Is pilot line free of condensate?			✓			✓		
010	Is emissions sample line clear?			✓			✓		
011	Is there adequate flow through the analysers?			✓			✓		
012	Is the UV sensor free of dirt and aimed correctly?			✓			✓		Cleaned
013	Check flare temp and louver operation			✓			✓		
014	Check pots for condensate build up			✓			✓		
015	Check for any obvious defects			✓			✓		
016	Condensate Pump (Hour Clock / Cycle Counter)			✓				✓	Fittings were corroded-replaced
017	Compressor - pressure & condensate check	7	Bar					✓	Compressor failure (see comments)
3) Monthly Inspection (to include items above)									
018	Calibrate Rosemount analyser or Equivalent			✓			✓		
019	Are there any gas leaks in or around the skid?			✓			✓		
020	Is the ignition probe correctly positioned?			✓			✓		Removed/decoked and repositioned
021	Are the condensate collection tanks empty?			✓			✓		
022	Pressure drops across the flame traps	6	mbar				✓		
023	Clean the pilot flame trap			✓			✓		
024	Check for any obvious defects throughout			✓			✓		
025	Abnormal Noise			✓			✓		
026	Oil / Grease stains or leaks			✓			✓		

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4) Quarterly Inspection ***(to include items above)***		**Data Recorded**		**Y**	**N**	**N/A**	**OK**	**Fault**	**Comment**
			Units						
027	Blow down compressor			✓			✓		
028	Check pressure relief valve			✓			✓		
029	Check Air Dryer operation & condition					✓			
030	Clean flame arresters			✓			✓		Cleaned
031	Examine burner tips for deterioration			✓			✓		
032	Calibrate Rosemount analyser or Equivalent			✓			✓		
033	Check safety chain			✓			✓		
034	Change oil in booster					✓			
035	Check belt tension					✓			
036	Clean pilot solenoid filter			✓			✓		
037	Clean Demister Filter			✓			✓		Cleaned
038	Check for excess vibration/noise in skid			✓			✓		
039	Check temp. in skid and extractor fan operation					✓			
040	Any obvious defects			✓			✓		
041	Check integrity of wiring/connections			✓			✓		
042	Grease Motor bearings & Shaft Seals			✓			✓		Greased
5) Annual Inspection ***(to include items above)***									
043	Change drive belts								
6) Every Three years ***(to include items above)***									
044	Motor / booster bearings & shaft seals								
045	Inspect anti vibration mounts								

Type of Inspection Performed	**No.**	4	**General Comments & Recommendations**
There was a pipe off in the field on arrival due to expansion			
Removed the compressor from site for service- oil change/filters/belts			
Installed a new compressor housing			
Replaced corroded air fittings on the pump in the KO pot at the flare			

Signed:

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Flare & Ancillary Equipment Inspection/Service Record

Site/Location:	Ballaghveny
Technician:	James Fagan
Date:	28/1/2014

Equipment details / Reference #. Organics 500 Enclosed Flare

Item	*Readings to be taken daily or fed to SCADA*	Data Recorded		Item Checked			Condition		Comment
1) Daily Inspection				Y	N	N/A	OK	Fault	
001	CH4	46.6	% Vol.						
002	CO2	27.1	% Vol.						
003	O2	3.1	% Vol.						
004	CO	4	PPM						
005	Record booster operational hours	43931	Hrs						
006	Flow rate	235	M3/hr						
007	Suction pressure	-18	Mbar						
008	Flare Temperature	1000	C°						TC replaced
2) Weekly Inspection									
009	Is pilot line free of condensate?			✓			✓		
010	Is emissions sample line clear?			✓			✓		
011	Is there adequate flow through the analysers?			✓			✓		
012	Is the UV sensor free of dirt and aimed correctly?			✓			✓		Cleaned
013	Check flare temp and louver operation			✓			✓		
014	Check pots for condensate build up			✓			✓		
015	Check for any obvious defects			✓			✓		
016	Condensate Pump (Hour Clock / Cycle Counter)								Condensate discharge was damaged during construction of fence
017	Compressor - pressure & condensate check	7	Bar				✓		
3) Monthly Inspection (to include items above)									
018	Calibrate Rosemount analyser or Equivalent			✓			✓		
019	Are there any gas leaks in or around the skid?			✓			✓		
020	Is the ignition probe correctly positioned?			✓			✓		Removed/decoked and repositioned
021	Are the condensate collection tanks empty?			✓			✓		
022	Pressure drops across the flame traps	6	mbar				✓		
023	Clean the pilot flame trap			✓			✓		
024	Check for any obvious defects throughout			✓			✓		
025	Abnormal Noise			✓			✓		
026	Oil / Grease stains or leaks			✓			✓		

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		Data Recorded		Y	N	N/A	OK	Fault	Comment
			Units						
027	Blow down compressor			✓			✓		
028	Check pressure relief valve			✓			✓		
029	Check Air Dryer operation & condition					✓			
030	Clean flame arresters			✓			✓		Cleaned
031	Examine burner tips for deterioration			✓			✓		
032	Calibrate Rosemount analyser or Equivalent			✓			✓		
033	Check safety chain			✓			✓		
034	Change oil in booster					✓			
035	Check belt tension					✓			
036	Clean pilot solenoid filter			✓			✓		
037	Clean Demister Filter			✓			✓		Cleaned
038	Check for excess vibration/noise in skid			✓			✓		
039	Check temp. in skid and extractor fan operation					✓			
040	Any obvious defects			✓			✓		
041	Check integrity of wiring/connections			✓			✓		
042	Grease Motor bearings & Shaft Seals			✓			✓		Greased
5) Annual Inspection *(to include items above)*									
043	Change drive belts								
6) Every Three years *(to include items above)*									
044	Motor / booster bearings & shaft seals								
045	Inspect anti vibration mounts								

Type of Inspection Performed	**No.**	4	**General Comments & Recommendations**
The flare was down on arrival due to a power failure and would not restart because the ko pot was full. The discharge pipe has been damaged near the lagoon during			
Construction of the fence around the lagoon. Tee'd the discharge from the pump into the discharge from the wells in the field and put the pipes back into the lagoon.			
New gaskets on the pilot flame arrestor			
Calibrated the flow transmitter			

Signed:

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Gas Field Balance Results

Site:	**Ballaghveny Waste Facility Licence #.**													**Date:**	30/01/2014
Flare _ Set 01	**Ch_4**	**29.2**	**CO_2**	**21.9**	**O_2**	**5.4**	**H_2S ppm**	**44**	**Total Flow m^3**	**265**	**Suction**	**-21**		**Technician:**	J. Smyth
Flare _ Set 02	**Ch_4**	**32.6**	**CO_2**	**22.6**	**O_2**	**3.4**	**H_2S ppm**	**59**	**Total Flow m^3**	**285**	**Suction**	**-15**		**Atm. Press.**	1000

	Sample	Ch_4		CO_2		O_2		Control valve position				Leachate		Comment
Cell /Region	**Point**	**Set 1**	**Set 2**	**Set 1**	**Set 2**	**Set 1**	**Set 2**	**Adj. 1 %**	**Adj.2 %**	**Suction (-) mbar**	**Final %**	**Well Dpt.(m)**	**Leachate Level (m)**	
LM-01	**LFG 1-A**	65.1		22.7		0.0				0.0	5			
LM-02	**LFG 2-A**	8.1		18.4		0.3				-7	2			
LM-03	**LFG 3-A**	19.5		22.9		0.0				-9	2			
LM-04	**LFG 4-A**	14.1		22.6		0.0				-9	2			
	LFG 5-A	17.5		21.1		0.0				-13	2			
	LFG 6-A	64.1		25.6		0.0				-13	2			
	LFG 7-A	20.1		20.9		0.0				-13	2			
	LFG 8-A	12.7		20.7		0.0				-15	1			Water in line
	LFG 9-A	68.9		24.5		0.0				-0.5	100			Water in line
	LFG 10-A	55.5		22.2		4.1				-3	100			Water in line
	LFG 11-A	11.5		15.4		5.3				-15	50			
	LFG 12-A	28.6		24.1		0.0				-15	100			
	LFG 13-A	30.9		24.3		0.4				-17	100			
Cell-09	**LFG 14-A**	65.7		32.1		1.3				-13	100			
	LFG 15-A	68.1		34.5		0.1				-14	100			
	LFG 15-B	40.1		27.5		4.7				-1	2			
	LFG 16-A	57.5		31.5		0.2				-13	100			De-watered
LM-11	**LFG 17-A**	20.5		23.2		0.0				-16	20			
LM-12	**LFG 18-A**	65.7		34.9		0.1				-16	2			De-watered
	LFG 19-A	66.1		32.3		0.3				-16	100			
LM-14	**LFG 20-B**	31.2		18.4		8.6				-0.5				
	LFG 21-A	64.5		34.9		0.3				-17	100			
	LFG 22-A	64.7		33.7		0.3				-18	100			
LM-15	**LFG 23-A**	67.4		31.5		0.7				-18	50			
	LFG 23-B	44.5		20.2		6.9				-0.5	0			
LM-16	**LFG 24-B**	66.4		33.9		0.1				-2	5			

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Cell /Region	Sample Point	Ch_4		CO_2		O_2		Control valve position				Leachate		Comment
		Set 1	Set 2	Set 1	Set 2	Set 1	Set 2	Adj. 1 %	Adj.2 %	Suction (-) mbar	Final %	Well Dpt.(m)	Leachate Level (m)	
	LFG 25-A	57.3		31.6		0.1				-18	50			
	LFG 26-A	65.0		31.3		0.3				-17	100			
LM-05														
LM-06/28		36.6		27.0		0.0				-13	100			Water in line
LM-08														
	B – Line 1	25.4		20.1		0.0				-14	5			
Bottom	Horiz-01	53.4		32.6		3.5					5%			
Top	Horiz-02	53.4		32.6		3.5					10%			
Cell 09	31	51.4		28.4		1.5				-13	100			
Cell 09	30	61.5		31.7		0.5				-12	100			De watered
Cell 09	29	62.7		35.2		0.3				-9	100			
Cell 09	L - Chmb	63.4		33.2		1.4				-8	100			
Cell 09	B-Line	32.3		21.6		4.9				-9	100			
Cell 10A	33	67.5		34.4		0.0				-3	100			
Cell 10A	34	49.3		29.8		0.5				-2	100			
Cell 10A	34-B	40.7		27.8		0.0				-2	100			
Cell 10A	32	62.5		33.3		0.2				-2	100			
Cell 10A	32-B	49.9		27.1		3.7				-2	100			
Cell 10A	B-Line	66.4		34.1		0.6				-3	5			
Cell 10	L - Chmb	52.5		28.5		2.5				-17	50			

Comment:

Cell 10a piping needs attention due to settlement

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Gas Field Balance Results

Site:	**Ballaghveny Waste Facility Licence #.**													**Date:**	28/02/2014
Flare _ Set 01	**Ch_4**	**32.0**	**CO_2**	**20.7**	**O_2**	**6.0**	**H_2S ppm**	**47**	**Total Flow m^3**	**215**	**Suction**	**-12**		**Technician:**	J. Smyth
Flare _ Set 02	**Ch_4**	**36.7**	**CO_2**	**23.6**	**O_2**	**4.5**	**H_2S ppm**	**83**	**Total Flow m^3**	**225**	**Suction**	**-10**		**Atm. Press.**	998

	Sample	Ch_4		CO_2		O_2		Control valve position				Leachate		Comment
Cell /Region	**Point**	**Set 1**	**Set 2**	**Set 1**	**Set 2**	**Set 1**	**Set 2**	**Adj. 1 %**	**Adj.2 %**	**Suction (-) mbar**	**Final %**	**Well Dpt.(m)**	**Leachate Level (m)**	
LM-01	**LFG 1-A**	62.6		19.6		1.7				-8	5			
LM-02	**LFG 2-A**	22.4		18.6		0.1				-8	2			
LM-03	**LFG 3-A**	30.8		21.9		0.2				-5	2			
LM-04	**LFG 4-A**	29.1		21.8		0.2				-5	2			
	LFG 5-A	24.2		20.3		0.4				-3	2			
	LFG 6-A	23.8		20.1		1.1				-3	2			
	LFG 7-A	23.7		20.2		0.1				-3	2			
	LFG 8-A	23.1		22.4		0.1				-9	1			Water in line
	LFG 9-A	68.5		23.4		0.5				-0.2	100			Water in line
	LFG 10-A	58.5		20.7		3.9				-2	100			Water in line
	LFG 11-A	26.3		22.4		0.2				-10	50			
	LFG 12-A	41.4		24.3		0.0				-10	100			
	LFG 13-A	38.5		23.4		1.6				-10	100			
Cell-09	**LFG 14-A**	55.8		30.4		2.3				-9	100			
	LFG 15-A	60.1		35.2		0.1				-9	100			
	LFG 15-B	43.1		27.1		5.9				-0.5	2			
	LFG 16-A	57.5		31.3		0.2				-8	100			De-watered
LM-11	**LFG 17-A**	40.5		29.7		0.1				-10	20			
LM-12	**LFG 18-A**	18.9		11.9		13.9				-6	2			De-watered
	LFG 19-A	68.9		31.7		0.4				-7	100			
LM-14	**LFG 20-B**	56.1		30.1		1.6				-0.5				
	LFG 21-A	59.3		33.1		0.1				-7	100			
	LFG 22-A	60.3		33.2		0.1				-8	100			
LM-15	**LFG 23-A**	64.4		30.3		1.2				-8	50			
	LFG 23-B	41.1		17.7		8.2				-0.5	0			
LM-16	**LFG 24-B**	10.7		5.3		17.7				-0.1	5			

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Cell /Region	Sample Point	Ch_4		CO_2		O_2		Control valve position				Leachate		Comment
		Set 1	Set 2	Set 1	Set 2	Set 1	Set 2	Adj. 1 %	Adj.2 %	Suction (-) mbar	Final %	Well Dpt.(m)	Leachate Level (m)	
	LFG 25-A	62.5		31.7		0.1				-8	50			
	LFG 26-A	61.5		30.8		0.5				-8	100			
LM-05														
LM-06/28		49.5		27.2		0.1				-5	100			Water in line
LM-08														
	B – Line 1	29.2		18.8		0.2				-4	5			
Bottom	Horiz-01	53.4		32.6		3.5					5%			
Top	Horiz-02	53.4		32.6		3.5					10%			
Cell 09	31	51.4		29.1		2.8				-6	100			
Cell 09	30	58.7		31.7		2.1				-5	100			De watered
Cell 09	29	65.8		35.0		0.2				-5	100			
Cell 09	L - Chmb	61.9		33.6		0.3				-6.5	100			
Cell 09	B-Line	54.8		30.4		2.7				-7.0	100			
Cell 10A	33	59.4		33.5		0.5				-2.5	100			
Cell 10A	34	40.1		29.3		0.1				-2.5	100			
Cell 10A	34-B	30.8		26.2		0.4				-2.0	100			
Cell 10A	32	58.9		33.1		0.0				-2.5	100			
Cell 10A	32-B	44.1		25.3		6.0				-2.5	100			
Cell 10A	B-Line	24.6		19.3		6.3				-2.5	5			
Cell 10	L - Chmb	-		-		-				-	1			Flooded

Comment:

Cell 10a piping needs attention due to settlement

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Gas Field Balance Results

Site:	**Ballaghveny Waste Facility Licence #.**													**Date:**	24/03/2014
Flare _ Set 01	**Ch_4**	**33.4**	**CO_2**	**21.8**	**O_2**	**4.7**	**H_2S ppm**	**35**	**Total Flow m^3**	**215**	**Suction**	**-11**		**Technician:**	J. Smyth
Flare _ Set 02	**Ch_4**	**40.4**	**CO_2**	**26.0**	**O_2**	**2.4**	**H_2S ppm**	**46**	**Total Flow m^3**	**250**	**Suction**	**-13**		**Atm. Press.**	984

	Sample	Ch_4		CO_2		O_2		Control valve position				Leachate		Comment
Cell /Region	**Point**	**Set 1**	**Set 2**	**Set 1**	**Set 2**	**Set 1**	**Set 2**	**Adj. 1 %**	**Adj.2 %**	**Suction (-) mbar**	**Final %**	**Well Dpt.(m)**	**Leachate Level (m)**	
LM-01	**LFG 1-A**	11.9		7.5		16.7				-3	5			
LM-02	**LFG 2-A**	12.7		17.4		0.4				-4	2			
LM-03	**LFG 3-A**	24.0		20.3		0.2				-4	2			
LM-04	**LFG 4-A**	17.7		20.5		0.2				-4	2			
	LFG 5-A	21.3		19.8		0.2				-4	2			
	LFG 6-A	18.1		18.9		0.2				-4	2			
	LFG 7-A	67.1		31.7		0.2				-4	2			
	LFG 8-A	27.8		22.8		0.3				-7	1			Water in line
	LFG 9-A	-		-		-				-	100			Flooded
	LFG 10-A	65.3		22.4		0.3				0.0	100			Water in line
	LFG 11-A	28.9		21.5		0.3				-7	50			
	LFG 12-A	42.3		24.3		0.3				-7	100			
	LFG 13-A	41.8		24.2		0.7				-7	100			
Cell-09	**LFG 14-A**	57.4		31.4		2.1				-7	100			
	LFG 15-A	62.3		34.4		0.2				-7	100			
	LFG 15-B	64.6		34.2		0.2				-0.5	2			
	LFG 16-A	61.6		32.4		0.3				-4	100			De-watered
LM-11	**LFG 17-A**	32.5		26.5		0.1				-8	20			
LM-12	**LFG 18-A**	11.5		9.1		16.4				-8	2			De-watered
	LFG 19-A	69.2		31.3		0.3				-8	100			
LM-14	**LFG 20-B**	67.0		33.1		0.0				-0.5				
	LFG 21-A	63.7		32.3		0.2				-8	100			
	LFG 22-A	64.5		33.4		0.3				-8	100			
LM-15	**LFG 23-A**	64.6		31.2		0.2				-8	50			
	LFG 23-B	42.1		20.1		6.5				-0.5	0			
LM-16	**LFG 24-B**	65.1		33.7		0.2				-8	5			

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Cell /Region	Sample Point	Ch_4		CO_2		O_2		Control valve position				Leachate		Comment
		Set 1	Set 2	Set 1	Set 2	Set 1	Set 2	Adj. 1 %	Adj.2 %	Suction (-) mbar	Final %	Well Dpt.(m)	Leachate Level (m)	
	LFG 25-A	59.3		32.1		0.1				-10	50			
	LFG 26-A	64.9		32.1		0.2				-9	100			
LM-05														
LM-06/28		52.3		27.3		0.4				-4	100			Water in line
LM-08														
	B – Line 1	35.9		22.8		0.2				-4	5			
Bottom	Horiz-01	53.4		32.6		3.5					5%			
Top	Horiz-02	53.4		32.6		3.5					10%			
Cell 09	31	56.3		30.8		1.9				-5	100			
Cell 09	30	64.1		34.2		0.2				-5	100			De watered
Cell 09	29	54.8		34.7		0.1				-7	100			
Cell 09	L - Chmb	60.3		32.7		1.6				-7	100			
Cell 09	B-Line	52.4		30.3		3.3				-8	100			
Cell 10A	33	60.4		33.4		0.1				-2	100			
Cell 10A	34	51.5		29.5		0.3				-2	100			
Cell 10A	34-B	40.5		28.1		0.1				-2	100			
Cell 10A	32	52.5		30.0		2.3				-2	100			
Cell 10A	32-B	44.9		24.2		6.5				-0.5	100			
Cell 10A	B-Line	31.1		22.1		5.0				-2	5			
Cell 10	L - Chmb	-		-		-				-	1			Flooded
B-Line Mod	Temp	43.2		28.5		0.7				-7	50			

Comment:

Modified 180mm line to bypass Cell 10a temporarily until pipe modification is undertaken.

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Gas Field Balance Results

Site:	**Ballaghveny Waste Facility Licence #.**													**Date:**	24/04/2014
Flare _ Set 01	**Ch_4**	**25.9**	**CO_2**	**20.6**	**O_2**	**5.8**	**H_2S ppm**	**28**	**Total Flow m^3**	**205**	**Suction**	**-12**		**Technician:**	J. Smyth
Flare _ Set 02	**Ch_4**	**31.5**	**CO_2**	**24.6**	**O_2**	**4.5**	**H_2S ppm**	**32**	**Total Flow m^3**	**239**	**Suction**	**-14**		**Atm. Press.**	1001

	Sample	Ch_4		CO_2		O_2		Control valve position				Leachate		Comment
Cell /Region	**Point**	**Set 1**	**Set 2**	**Set 1**	**Set 2**	**Set 1**	**Set 2**	**Adj. 1 %**	**Adj.2 %**	**Suction (-) mbar**	**Final %**	**Well Dpt.(m)**	**Leachate Level (m)**	
LM-01	**LFG 1-A**	0.0		0.3		20.8				-9	5			
LM-02	**LFG 2-A**	7.4		15.5		0.5				-3	2			
LM-03	**LFG 3-A**	18.2		18.4		0.2				-4	2			
LM-04	**LFG 4-A**	12.5		18.6		0.1				-6	2			
	LFG 5-A	14.3		18.0		0.3				-6	2			
	LFG 6-A	8.5		16.1		1.7				-4	2			
	LFG 7-A	10.9		18.5		3.3				-4	2			
	LFG 8-A	1.9		8.9		10.2				-7	1			Water in line
	LFG 9-A	64.5		22.2		0.1				-	100			Flooded
	LFG 10-A	49.5		17.8		4.5				0.0	100			Water in line
	LFG 11-A	22.7		20.1		0.3				-12	50			
	LFG 12-A	35.2		22.9		0.5				-10	100			
	LFG 13-A	37.5		22.4		0.6				-10	100			
Cell-09	**LFG 14-A**	59.8		29.2		2.1				-10	100			
	LFG 15-A	65.6		34.3		0.1				-7	100			
	LFG 15-B	55.8		29.3		0.4				-0.5	2			
	LFG 16-A	11.5		20.9		0.7				-5	100			De-watered
LM-11	**LFG 17-A**	66.6		33.3		0.0				-6	20			
LM-12	**LFG 18-A**	66.9		30.6		0.2				-6	2			De-watered
	LFG 19-A	20		12.3		11.8				-6	100			
LM-14	**LFG 20-B**	65.8		33.7		0.0				-0.5				
	LFG 21-A	66.3		33.4		0.1				-6	100			
	LFG 22-A	64.6		29.4		1.3				-6	100			
LM-15	**LFG 23-A**	67.8		31.7		0.0				-6	50			
	LFG 23-B	3.6		2.4		18.9				-0.5	0			
LM-16	**LFG 24-B**	7.4		15.5		0.5				-6	5			

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Cell /Region	Sample Point	Ch_4		CO_2		O_2		Control valve position				Leachate		Comment
		Set 1	Set 2	Set 1	Set 2	Set 1	Set 2	Adj. 1 %	Adj.2 %	Suction (-) mbar	Final %	Well Dpt.(m)	Leachate Level (m)	
	LFG 25-A	59.3		32.1		0.1				-10	50			
	LFG 26-A	67.9		30.9		0.1				-12	100			
LM-05														
LM-06/28		45.6		26.7		0.1				-4	100			Water in line
LM-08														
	B – Line 1	12.5		17.8		0.5				-6	5			
Bottom	Horiz-01	53.4		32.6		3.5					5%			
Top	Horiz-02	53.4		32.6		3.5					10%			
Cell 09	31	52.3		31.0		2.1				-5	100			
Cell 09	30	60.4		33.2		0.6				-5	100			De watered
Cell 09	29	52.3		32.8		0.5				-11	100			
Cell 09	L - Chmb	60.3		32.7		1.6				-7	100			Flooded
Cell 09	B-Line	45.9		24.6		0.5				-8	100			
Cell 10A	33	58.1		33.9		0.0				-2	100			
Cell 10A	34	51.0		30.1		0.1				-4	100			
Cell 10A	34-B	42.3		28.1		0.3				-4	100			
Cell 10A	32	52.5		31.6		1.6				-2	100			
Cell 10A	32-B	43.0		25.2		5.6				-0.5	100			
Cell 10A	B-Line	33.0		24.0		6.2				-2	5			
Cell 10	L - Chmb	-		-		-				-	1			Flooded
B-Line Mod	Temp	41.9		27.8		0.7				-10	50			

Comment:

Modified 180mm line to bypass Cell 10a temporarily until pipe modification is undertaken.

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Gas Field Balance Results

Site:	**Ballaghveny Waste Facility Licence #.**													**Date:**	30/05/2014
Flare _ Set 01	**Ch_4**	**31.6**	**CO_2**	**22.9**	**O_2**	**4.2**	**H_2S ppm**	**12**	**Total Flow m^3**	**245**	**Suction**	**-15**		**Technician:**	J. Smyth
Flare _ Set 02	**Ch_4**	**35.2**	**CO_2**	**24.2**	**O_2**	**2.9**	**H_2S ppm**	**22**	**Total Flow m^3**	**260**	**Suction**	**-14**		**Atm. Press.**	1009

	Sample	Ch_4		CO_2		O_2		Control valve position				Leachate		Comment
Cell /Region	**Point**	**Set 1**	**Set 2**	**Set 1**	**Set 2**	**Set 1**	**Set 2**	**Adj. 1 %**	**Adj.2 %**	**Suction (-) mbar**	**Final %**	**Well Dpt.(m)**	**Leachate Level (m)**	
LM-01	**LFG 1-A**	46.1		16.2		5.4				-4	5			
LM-02	**LFG 2-A**	9.2		18.1		0.2				-4	2			
LM-03	**LFG 3-A**	18.4		19.4		0.1				-4	2			
LM-04	**LFG 4-A**	12.1		19.7		0.0				-4	2			
	LFG 5-A	13.4		18.9		0.3				-3	2			
	LFG 6-A	10.4		16.9		2.1				-3	2			
	LFG 7-A	15.7		21.1		1.6				-4	2			
	LFG 8-A	14.1		21.2		0.2				-11	1			Water in line
	LFG 9-A	68.1		22.0		0.6				0	100			Flooded
	LFG 10-A	28.2		12.5		8.0				-2	100			Water in line
	LFG 11-A	17.0		20.7		0.2				-11	50			
	LFG 12-A	26.7		22.6		0.3				-11	100			
	LFG 13-A	30.5		22.6		0.4				-11	100			
Cell-09	**LFG 14-A**	50.2		29.2		2.6				-11	100			
	LFG 15-A	55.7		31.9		1.1				-11	100			
	LFG 15-B	24.1		15.0		11.3				-0.5	2			
	LFG 16-A	50.5		29.4		0.2				-8	100			De-watered
LM-11	**LFG 17-A**	25.1		23.4		0.2				-10	20			
LM-12	**LFG 18-A**	64.8		32.3		0.5				-10	2			De-watered
	LFG 19-A	66.3		30.0		0.3				-10	100			
LM-14	**LFG 20-B**	14.3		8.8		14.9				-0.5				
	LFG 21-A	65.1		33.7		0.2				-10	100			
	LFG 22-A	65.6		33.1		0.1				-11	100			
LM-15	**LFG 23-A**	62.8		29.2		1.5				-11	50			
	LFG 23-B	64.1		24.6		1.9				-2	0			
LM-16	**LFG 24-B**	4.0		2.6		19.3				-1	5			

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Cell /Region	Sample Point	Ch_4		CO_2		O_2		Control valve position				Leachate		Comment
		Set 1	Set 2	Set 1	Set 2	Set 1	Set 2	Adj. 1 %	Adj.2 %	Suction (-) mbar	Final %	Well Dpt.(m)	Leachate Level (m)	
	LFG 25-A	63.8		31.7		0.1				-11	50			
	LFG 26-A	66.7		30.5		0.5				-10	100			
LM-05														
LM-06/28		33.9		25.6		0.6				-8	100			Water in line
LM-08														
	B – Line 1	11.6		18.0		1.2				-3.5	5			
Bottom	Horiz-01	53.4		32.6		3.5					5%			
Top	Horiz-02	53.4		32.6		3.5					10%			
Cell 09	31	35.3		24.7		4.2				-8	100			
Cell 09	30	54.3		32.1		1.1				-9	100			De watered
Cell 09	29	59.3		31.8		0.8				-11	100			
Cell 09	L - Chmb	53.2		29.9		2.4				-8	100			Flooded
Cell 09	B-Line	46.9		28.0		2.9				-10	100			
Cell 10A	33	40.3		28.1		0.7				-10	100			
Cell 10A	34	36.7		26.9		0.1				-10	100			
Cell 10A	34-B	26.1		20.3		4.7				-1	100			
Cell 10A	32	35.1		24.3		3.4				-9	100			
Cell 10A	32-B	5.0		3.6		18.5				-3	100			
Cell 10A	B-Line										5			
Cell 10	L - Chmb	-		-		-				-	1			Flooded
B-Line Mod	Temp	46.1		27.8		0.7				-10	50			

Comment:

Modified 180mm line to bypass Cell 10a temporarily until pipe modification is undertaken.

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Gas Field Balance Results

Site:	**Ballaghveny Waste Facility Licence #.**													**Date:**	13/06/2014
Flare _ Set 01	**Ch_4**	**30.7**	**CO_2**	**22.9**	**O_2**	**3.6**	**H_2S ppm**	**13**	**Total Flow m^3**	**245**	**Suction**	**-16**		**Technician:**	J. Smyth
Flare _ Set 02	**Ch_4**	**34.8**	**CO_2**	**24.1**	**O_2**	**2.2**	**H_2S ppm**	**56**	**Total Flow m^3**	**255**	**Suction**	**-13**		**Atm. Press.**	1016

	Sample	Ch_4		CO_2		O_2		Control valve position				Leachate		Comment
Cell /Region	**Point**	**Set 1**	**Set 2**	**Set 1**	**Set 2**	**Set 1**	**Set 2**	**Adj. 1 %**	**Adj.2 %**	**Suction (-) mbar**	**Final %**	**Well Dpt.(m)**	**Leachate Level (m)**	
LM-01	**LFG 1-A**	32.3		14.9		9.9				-3.5	5			
LM-02	**LFG 2-A**	9.4		17.7		0.2				-3.5	2			
LM-03	**LFG 3-A**	16.1		18.4		0.1				-3.5	2			
LM-04	**LFG 4-A**	10.7		19.1		0.1				-3.5	2			
	LFG 5-A	12.4		18.2		0.1				-3.5	2			
	LFG 6-A	67.5		30.7		0.1				-3.5	5			
	LFG 7-A	4.9		14.6		4.9				-3.5	2			
	LFG 8-A	11.5		19.0		0.8				-12	1			Water in line
	LFG 9-A	61.6		21.8		0.6				0	100			Flooded
	LFG 10-A	25.4		17.9		8.3				0	20			Water in line
	LFG 11-A	11.7		18.3		0.3				-12	10			
	LFG 12-A	21.1		21.0		0.3				-12	100			
	LFG 13-A	25.5		21.5		0.1				-12	50			
Cell-09	**LFG 14-A**	59.5		32.2		0.2				-12	100			
	LFG 15-A	56.8		31.8		0.7				-12	100			
	LFG 15-B	29.3		17.5		8.7				-1	2			
	LFG 16-A	45.3		27.6		0.3				-9	100			De-watered
LM-11	**LFG 17-A**	21.8		21.3		0.9				-12	20			
LM-12	**LFG 18-A**	65.5		32.5		0.1				-9	5			De-watered
	LFG 19-A	61.5		29.1		0.2				-9	100			
LM-14	**LFG 20-B**	17.5		10.4		12.6				-0.5	2			
	LFG 21-A	64.1		32.9		0.0				-9	100			
	LFG 22-A	62.3		31.2		0.1				-10	100			
LM-15	**LFG 23-A**	61.4		28.5		1.3				-10	100			
	LFG 23-B	28.2		15.4		10.1				-0.5	2			
LM-16	**LFG 24-B**	12.1		6.7		14.9				-0.5	5			

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Cell /Region	Sample Point	Ch_4		CO_2		O_2		Control valve position				Leachate		Comment
		Set 1	Set 2	Set 1	Set 2	Set 1	Set 2	Adj. 1 %	Adj.2 %	Suction (-) mbar	Final %	Well Dpt.(m)	Leachate Level (m)	
	LFG 25-A	63.4		32.0		0.2				-10	50			
	LFG 26-A	60.2		26.8		0.9				-10	100			
LM-05														
LM-06/28		28.3		24.6		0.3				-10	100			Water in line
LM-08														
	B – Line 1	12.5		18.2		0.8				-3.5	5			
Bottom	Horiz-01	53.4		32.6		3.5					5%			
Top	Horiz-02	53.4		32.6		3.5					10%			
Cell 09	31	29.6		21.5		5.1				-8	100			
Cell 09	30	58.7		32.1		1.2				-9	100			De watered
Cell 09	29	59.0		32.8		0.5				-11	100			
Cell 09	L - Chmb	64.5		33.6		0.0				-11	100			De-watered
Cell 09	B-Line	48.7		27.2		3.1				-8	100			
Cell 10A	33	35.5		26.3		0.8				-12	100			
Cell 10A	34	33.4		26.5		0.1				-12	-20			
Cell 10A	34-B	18.9		15.2		8.4				-0.5	-2			
Cell 10A	32	33.7		23.7		3.1				-10	100			
Cell 10A	32-B	2.7		2.0		18.7				-1	2			
Cell 10A	B-Line	32.4		24.1		2.1				-8	5			
Cell 10	L - Chmb	-		-		-				-	-			
B-Line Mod	Temp													

Comment:

Cell 10 wedge region: Overall depth to base of chamber = 4.0m Depth of leachate from chamber base = 3.0m. Measured 15.50pm 13/06/2014

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Gas Field Balance Results

Site:	**Ballaghveny Waste Facility Licence #.**													**Date:**	11/07/2014
Flare _ Set 01	**Ch_4**	**28.9**	**CO_2**	**22.3**	**O_2**	**3.9**	**H_2S ppm**	**27**	**Total Flow m^3**	**250**	**Suction**	**-14**		**Technician:**	J. Smyth
Flare _ Set 02	**Ch_4**	**35.3**	**CO_2**	**24.7**	**O_2**	**2.6**	**H_2S ppm**	**105**	**Total Flow m^3**	**270**	**Suction**	**-14**		**Atm. Press.**	1011

	Sample	Ch_4		CO_2		O_2		Control valve position				Leachate		Comment
Cell /Region	**Point**	**Set 1**	**Set 2**	**Set 1**	**Set 2**	**Set 1**	**Set 2**	**Adj. 1 %**	**Adj.2 %**	**Suction (-) mbar**	**Final %**	**Well Dpt.(m)**	**Leachate Level (m)**	
LM-01	**LFG 1-A**	56.2		21.7		2.7				-3.0	5			
LM-02	**LFG 2-A**	13.4		18.4		0.1				-3.0	2			
LM-03	**LFG 3-A**	18.1		18.4		0.1				-3.0	2			
LM-04	**LFG 4-A**	12.6		19.5		0.1				-3.0	2			
	LFG 5-A	12.5		16.7		2.6				-2.0	2			
	LFG 6-A	12.8		18.5		0.1				-3.5	5			
	LFG 7-A	6.9		17.3		2.0				-3.5	2			
	LFG 8-A	5.1		7.0		13.5				-10.5	1			Flooded
	LFG 9-A	68.7		20.8		5.8				0.0	100			Flooded
	LFG 10-A	42.1		18.8		3.3				0.0	20			Water in line
	LFG 11-A	20.1		20.3		0.4				-12	10			
	LFG 12-A	26.8		22.2		0.3				-11	100			
	LFG 13-A	29.1		21.3		1.0				-11	50			
Cell-09	**LFG 14-A**	56.8		32.3		0.2				-11	100			
	LFG 15-A	60.7		33.5		0.1				-10.5	100			
	LFG 15-B	41.3		25.6		4.6				-0.5	2			
	LFG 16-A	50.5		29.7		0.2				-9	100			De-watered
LM-11	**LFG 17-A**	10.7		17.6		2.3				-11	20			
LM-12	**LFG 18-A**	51.9		29.8		1.5				-10	5			De-watered
	LFG 19-A	61.4		29.5		0.1				-10	100			
LM-14	**LFG 20-B**	24.9		15.5		9.8				-0.5	2			
	LFG 21-A	59.7		32.4		0.1				-11	100			
	LFG 22-A	61.4		31.3		0.1				-12	100			
LM-15	**LFG 23-A**	61.8		30.6		0.0				-11	100			
	LFG 23-B	61.4		33.2		0.0				-0.5	2			
LM-16	**LFG 24-B**	37.2		22.9		5.4				-0.2	5			

Unit W10C, Tougher Business Park, Naas, Co. Kildare. IRELAND.
✆ +353 (0) 45 409 314 Web: www.irishbiotechsystems.ie
🖷 +353 (0)1 6865 012 Email: Info@irishbiotechsystems.ie

	Sample	Ch_4		CO_2		O_2		Control valve position				Leachate		Comment
Cell /Region	Point	Set 1	Set 2	Set 1	Set 2	Set 1	Set 2	Adj. 1 %	Adj.2 %	Suction (-) mbar	Final %	Well Dpt.(m)	Leachate Level (m)	
	LFG 25-A	58.8		31.6		0.6				-11	50			
	LFG 26-A	61.6		29.2		0.2				-11	100			
LM-05														
LM-06/28		31.1		24.2		0.5				-11	100			Water in line
LM-08														
	B – Line 1	12.8		18.4		0.3				-4.0	5			
Bottom	Horiz-01	53.4		32.6		3.5					5%			
Top	Horiz-02	53.4		32.6		3.5					10%			
Cell 09	31	32.2		23.2		4.6				-8	100			
Cell 09	30	57.3		32.3		0.6				-12	100			De watered
Cell 09	29	59.6		33.5		0.5				-12	100			
Cell 09	L - Chmb	62.4		33.4		0.0				-12	100			De-watered
Cell 09	B-Line	50.1		29.1		2.2				-10	100			
Cell 10A	33	37.0		26.9		0.8				-11	100			
Cell 10A	34	26.5		24.6		0.6				-11	-20			
Cell 10A	34-B	9.4		10.3		11.6				-1.0	-2			
Cell 10A	32	29.1		21.7		4.9				-11	100			
Cell 10A	32-B	0.0		0.2		20.5				-2.5	2			
Cell 10A	B-Line	30.5		24.1		2.2				-10	5			
Cell 10	L - Chmb	-		-		-				-	-			
B-Line Mod	Temp													

Comment:

Guidance to completing the PRTR workbook

AER Returns Workbook

Version 1.1.18

REFERENCE YEAR	2014

1. FACILITY IDENTIFICATION

Parent Company Name	Tipperary County Council
Facility Name	Ballaghveny Landfill
PRTR Identification Number	W0078
Licence Number	W0078-03

Classes of Activity

No.	class_name
-	Refer to PRTR class activities below

Address 1	Ballymackey
Address 2	
Address 3	
Address 4	
	Tipperary
Country	Ireland
Coordinates of Location	-7.46859 53.2333
River Basin District	IEGBNISH
NACE Code	3821
Main Economic Activity	Treatment and disposal of non-hazardous waste
AER Returns Contact Name	Louise Ryan
AER Returns Contact Email Address	louisem.ryan@tipperarycoco.ie
AER Returns Contact Position	Landfill Manager
AER Returns Contact Telephone Number	0761 065000
AER Returns Contact Mobile Phone Number	087 6598692
AER Returns Contact Fax Number	
Production Volume	0.0
Production Volume Units	
Number of Installations	0
Number of Operating Hours in Year	0
Number of Employees	1
User Feedback/Comments	Varience in Release to Air of CO is due to a difference in calculation method - in 2013 this was estimated by Gassim, but in 2014 the actual stack emission was measured and the annual flow was used with this figure to calulate the annual emission.
Web Address	www.tipperarycoco.ie

2. PRTR CLASS ACTIVITIES

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

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

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

4. WASTE IMPORTED/ACCEPTED ONTO SITE

Guidance on waste imported/accepted onto site

Do you import/accept waste onto your site for on-site treatment (either recovery or disposal activities) ?	No

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

Link to previous years emissions data

SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS

RELEASES TO AIR					Please enter all quantities in this section in KGs			
POLLUTANT		METHOD				QUANTITY		
			Method Used		Flare			
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
01	Methane (CH4)	C	OTH	Landgem Model & EPA Survey	470362.0	470362.0	0.0	0.0
02	Carbon monoxide (CO)	C	EN 15058:2004	NCIR By Horiba PG-250	8.18	8.18	0.0	0.0
08	Nitrogen oxides (NOx/NO2)	C	EN 14792:2005	Chemiluminescence	167.1	167.1	0.0	0.0
11	**Sulphur oxides (SOx/SO2)**	C	ALT	TGN 21	97.02	97.02	0.0	0.0

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

SECTION B : REMAINING PRTR POLLUTANTS

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

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

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

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

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

Additional Data Requested from Landfill operators

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

Landfill: Ballaghveny Landfill

Please enter summary data on the quantities of methane flared and / or utilised	**T (Total) kg/Year**	**M/C/E**	**Method Used**		**Facility Total Capacity m3 per hour**	
			Method Code	**Designation or Description**		
Total estimated methane generation (as per site model)	940825.0	C	OTH	Landgem	N/A	
Methane flared	470463.0	C	OTH	EPA LFG Survey	500.0	(Total Flaring Capacity)
Methane utilised in engine/s	0.0				0.0	(Total Utilising Capacity)
Net methane emission (as reported in Section A above)	470362.0	C	OTH	Landgem & EPA LFG Survey	N/A	

5. ONSITE TREATMENT & OFFSITE TRANSFERS OF WASTE

Please enter all quantities on this sheet in Tonnes

0

Transfer Destination	European Waste Code	Hazardous	Quantity (Tonnes per Year)	Description of Waste	Waste Treatment Operation	Method Used		Location of Treatment	Haz Waste : Name and Licence/Permit No of Next Destination Facility Non Haz Waste: Name and Licence/Permit No of Recover/Disposer	Haz Waste : Address of Next Destination Facility Non Haz Waste: Address of Recover/Disposer	Name and License / Permit No. and Address of Final Recoverer / Disposer (HAZARDOUS WASTE ONLY)	Actual Address of Final Destination i.e. Final Recovery / Disposal Site (HAZARDOUS WASTE ONLY)
						M/C/E	Method Used					
Within the Country	19 07 03	No	31.0	landfill leachate other than those mentioned in 19 07 02	D8	M	Weighed	Offsite in Ireland	Thurles WWTP,D0026-01	Thurles WWTP,Thurles WWTP,Co Tipperary,.,Ireland		
Within the Country	19 07 03	No	600.0	landfill leachate other than those mentioned in 19 07 02	D8	M	Weighed	Offsite in Ireland	Kilkenny City WWTP,W0018-01	Kilkenny City WWTP,Kilkenny ,Co. Kilkenny,.,Ireland	.,.,.,.,.,.,.,Ireland	.,.,.,.,Ireland
Within the Country	19 07 03	No	5943.25	landfill leachate other than those mentioned in 19 07 02	D8	M	Weighed	Offsite in Ireland	Limerick WWTP,D0013.01	Limerick WWTP,Bunlicky,Limerick ,.,Ireland		
Within the Country	19 07 03	No	7004.32	landfill leachate other than those mentioned in 19 07 02	D8	M	Weighed	Offsite in Ireland	Rilta Environmental Services,W0192-03	Rilta Environmental Services,Rathcoole,Dublin,.,Ireland		

* Select a row by double-clicking the Description of Waste then click the delete button

Link to previous years waste data
Link to previous years waste summary data & percentage change
Link to Waste Guidance

BIOLOGICAL MONITORING OF WATER QUALITY IN THE VICINITY OF BALLAGHVENY LANDFILL, COUNTY TIPPERARY

July 2014

Conservation Services, Tullaha, Glenflesk, Killarney, Co. Kerry
Tel/Fax 064 6630130 e-mail cs@conservation-services.ie

CONTENTS

1. INTRODUCTION

As part of the monitoring of water quality in the vicinity of Ballaghveny Landfill Site, Conservation Services, Ecological & Environmental Consultants have been commissioned by Tipperary N.R. County Council to carry out biological sampling and water quality assessment in accordance with EPA Q-rating methodology at five locations adjacent to the landfill site. The sites were most recently assessed by Conservation Services in August 2013 (Conservation Services 2013).

Sampling was carried out on 14th July 2014.

2. METHODOLOGY

2.1. SITE LOCATIONS

Biological sampling and water quality assessment was carried out at the following sites. Grid references were recorded at all sites using a GPS.

SITE	GRID REFERENCE (GPS)
Site A	R97281 82428*
Site A1	R97400 81947
Site B	R95298 82054
Site 1	R95481 81886
Site 2	R94193 81924

*N.B. Site A is located at the most suitable location which is upstream of the drain from the vicinity of the landfill to the stream. The small size and slow flow at this site renders it sub-optimal for the Q-rating method however it is the best that is available.

The location of the sites is shown on Map 1.

2.2. HABITAT ASSESSMENT

Habitat assessment was carried out at each of the five sites selected for invertebrate/water quality assessment. These sites were assessed in terms of:

- Stream width and depth
- Substrate type, listing substrate fractions in order of dominance, i.e. large rocks, cobble, gravel, sand, mud etc.
- Flow type, listing percentage of riffle, glide and pool in the sampling area

- Instream vegetation, listing plant species occurring and their percentage coverage of the stream bottom at the sampling site

- Dominant bankside vegetation, listing the main species overhanging the stream

- Estimated summer cover by bankside vegetation, giving percentage shade of the sampling site

- Rating of the site as habitat for trout adult, nursery and spawning on a scale of Poor/Fair/Good/Very Good/Excellent. This rating assesses the physical suitability of the habitat; the presence/absence/density of salmonids at the site will also depend on present and historical water quality and accessibility of the site to fish.

2.3. INVERTEBRATE SAMPLING AND WATER QUALITY ASSESSMENT

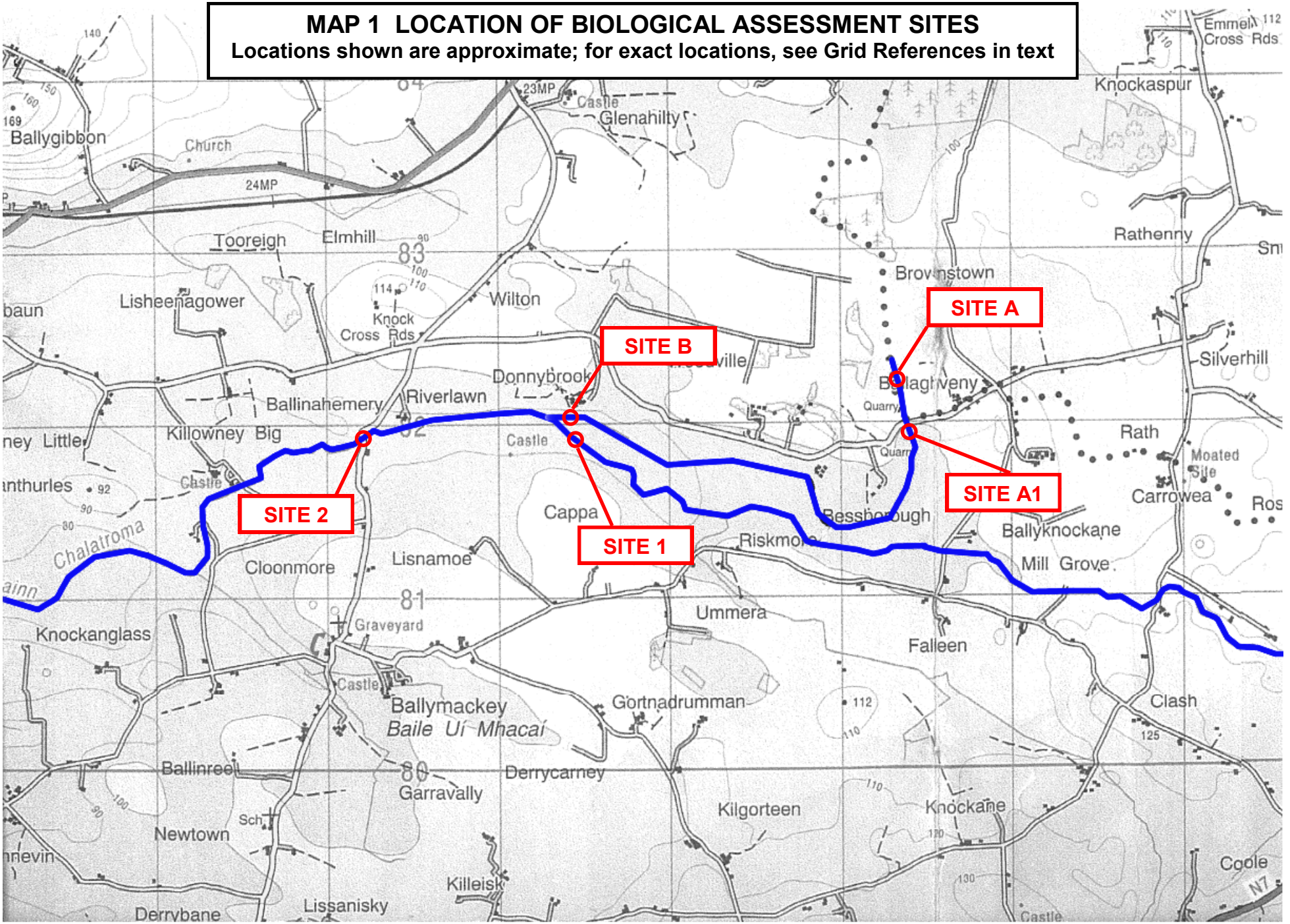
A kick and stone wash invertebrate sample was taken at each site (ISO 7828:1985) using standard methodology employed by EPA. Each sample was retained in a large plastic bag at the sampling site. Sample processing and preservation was carried out under laboratory conditions within 24 hours of sampling. Mud was removed from each sample by sieving under running water through a 500µ sieve. Sieved samples were then live sorted for 30 minutes in a white plastic sorting tray under a bench lamp (ISO 5667-3:1994) and if necessary using a magnifying lens. Macroinvertebrates were stored in 70% alcohol. Preserved invertebrates were identified to the level required for the EPA Q-rating method (McGarrigle *et al,* 2002) using high-power and low-power binocular microscopes when necessary. The preserved samples were archived for future examination or verification. Based on the relative abundance of indicator species, a biotic index (Q-rating) was determined for each site in accordance with the biological assessment procedure used by the

Environmental Protection Agency (Statutory Instruments No. 258 of 1998) and more detailed unpublished methodology (McGarrigle, Clabby and Lucey pers. comm.)

Biotic Index	**Water Framework Directive Ecological Quality**	**Quality Status**
Q5	High	Unpolluted Waters
Q4-5	High	
Q4	Good	
Q3-4	Moderate	Slightly Polluted Waters
Q3	Poor	Moderately Polluted Waters
Q2-3	Poor	
Q2	Bad	Seriously Polluted Waters
Q1-2	Bad	
Q1	Bad	

MAP 1 LOCATION OF BIOLOGICAL ASSESSMENT SITES

Locations shown are approximate; for exact locations, see Grid References in text



3. RESULTS

Detailed habitat assessment for each sampling site, including aquatic plant assessment, is contained in Appendix 1.

3.1. SITE A

As there was minimal water flow at the site, conditions were not optimal for the Q-rating method and the Q-value is tentative. The invertebrate community tabulated below merits a tentative Q-rating of Q2-3 indicating moderately polluted conditions and poor ecological quality.

INDICATOR GROUP	POLLUTION SENSITIVITY/TOLERANCE	TAXON	NUMBER 2014
A	Very Pollution Sensitive	None recorded	
B	Moderately Pollution Sensitive	Hydroptilidae	1
C	Moderately Pollution Tolerant	*Rhyacophila sp.*	2
		Veliidae	3
		Dytiscidae	22
		Gyrinidae	3
		Helophorus sp.	1
		Chironomidae (ex. *Chironomus*)	6
D	Very Pollution Tolerant	*Asellus aquaticus*	c.200
E	Most Pollution Tolerant	Tubificidae	1

3.2. SITE A1

The invertebrate community tabulated below merits a Q-rating of Q3 indicating moderately polluted conditions and poor ecological quality, with no significant change since 2013.

INDICATOR GROUP	POLLUTION SENSITIVITY/TOLERANCE	TAXON	NUMBER 2014
A	Very Pollution Sensitive	None Recorded	
B	Moderately Pollution Sensitive	Limnephilidae	2
		Sericostoma personatum	23
C	Moderately Pollution Tolerant	*Potamopyrgus antipodarum*	20
		Gammarus duebeni	c.400
		Plectrocnemia sp.	16
		Veliidae	1
		Dytiscidae	1
		Chironomidae (ex. *Chironomus*)	7
		Tipulidae - Pediciidae	5
		Tipulidae s.s.	1
D	Very Pollution Tolerant	*Glossiponia complanata*	2
		Asellus aquaticus	1
E	Most Pollution Tolerant	None Recorded	
-	Not assigned to an indicator group	Nematomorpha	1
		Lumbricidae	2

3.3. SITE B

The invertebrate community tabulated below merits a Q-rating of Q3 indicating moderately polluted conditions and poor ecological quality, with no significant change in water quality since 2013.

INDICATOR GROUP	POLLUTION SENSITIVITY/TOLERANCE	TAXON	NUMBER 2014
A	Very Pollution Sensitive	None recorded	
B	Moderately Pollution Sensitive	Limnephilidae	13
		Sericostoma personatum	10
C	Moderately Pollution Tolerant	*Piscicola geometra*	1
		Potamopyrgus antipodarum	5
		Gammarus duebeni	66
		Hydracarina	6
		Baetis rhodani	8
		Serratella ignita	6
		Plectrocnemia sp.	1
		Rhyacophila sp.	1
		Veliidae	2
		Dytiscidae	1
		Elmidae	4
		Haliplidae	7
		Chironomidae (ex. *Chironomus*)	4
		Simuliidae	1
		Tipulidae -Limnoniidae	4
		Tipulidae - Pediciidae	8
D	Very Pollution Tolerant	*Helobdella stagnalis*	2
E	Most Pollution Tolerant	None recorded	
-	Not assigned to indicator group	Lumbricidae	1
		Lumbriculidae	1

3.4. SITE 1

The invertebrate community tabulated below merits a Q-rating of Q4-5 indicating unpolluted conditions and high ecological quality, an improvement compared with Q4 in 2013.

INDICATOR GROUP	POLLUTION SENSITIVITY/TOLERANCE	TAXON	NUMBER 2014
A	Very Pollution Sensitive	*Isoperla grammatica*	1
		Ecdyonurus sp.	41
		Heptagenia sp.	1
		Heptageniidae (early instar/damaged)	8
		Rhithrogena sp.	4
B	Moderately Pollution Sensitive	*Leuctra sp.*	1
		Lepidostoma sp.	3
		Sericostoma sp.	1
C	Moderately Pollution Tolerant	*Piscicola geometra*	1
		Gammarus duebeni	49
		Baetis rhodani	26
		Serratella ignita	89
		Hydropsyche sp.	14
		Rhyacophila sp.	24
		Elmidae	18
		Chironomidae (excl. *Chironomus*)	1
		Simuliidae	21
		Tipulidae - Pediciidae	1
D	Very Pollution Tolerant	Erpobdellidae	1
		Sphaeriidae	1
E	Most Pollution Tolerant	None Recorded	

3.5. SITE 2

The invertebrate community tabulated below merits a Q-rating of Q4-5 indicating unpolluted conditions and high ecological quality, an improvement compared with Q4 in 2013.

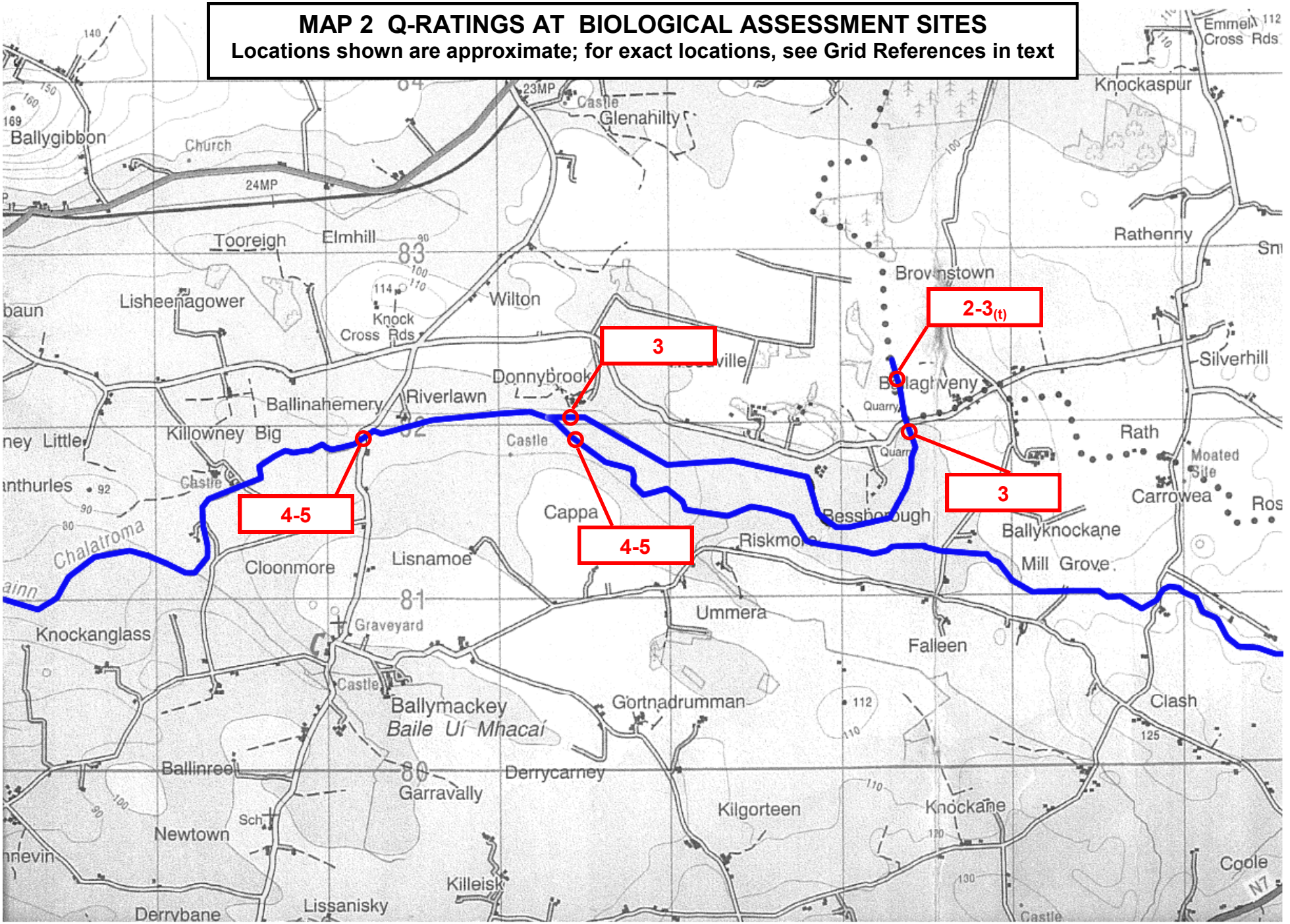
INDICATOR GROUP	POLLUTION SENSITIVITY/TOLERANCE	TAXON	NUMBER 2014
A	Very Pollution Sensitive	*Chloroperla sp.*	1
		Isoperla grammatica	4
		Ecdyonurus sp.	24
		Electrogena sp.	2
		Heptageniidae (early instar/damaged)	5
		Rhithrogena sp.	5
B	Moderately Pollution Sensitive	*Agapetus sp.*	1
		Lepidostoma sp.	1
C	Moderately Pollution Tolerant	*Ancylus fluviatilis*	1
		Potamopyrgus antipodarum	4
		Gammarus duebeni	19
		Baetis rhodani	18
		Serratella ignita	27
		Hydropsyche sp.	11
		Rhyacophila sp.	20
		Elmidae	83
		Haliplidae	2
		Chironomidae	10
		Simuliidae	c.120
		Tipulidae - Pediciidae	36
D	Very Pollution Tolerant	None Recorded	
E	Most Pollution Tolerant	Nine Recorded	
-	Not assigned to indicator group	Lumbricidae	1

4. SUMMARY OF MONITORING RESULTS 1998 - 2014

	SITE A	SITE A1	SITE B	SITE 1	SITE 2
Aug 1998	3-4	-	3-4	4	4
May 2002	2	-	3	4-5	4-5
March 2003	3/0	3	3-4	4-5	4-5
May 2004	3-4 (tentative)	3-4	3-4	3-4	3-4
June 2005	3 (tentative)	3	3	4	3-4
May 2006	3 or 3-4 (tentative)	3	3	4	4-5
July 2007	3 or 3-4 (tentative)	3	3	4	3-4
May 2008	3-4 (tentative)	3	3	4	4-5
July 2009	3 (tentative)	3	3	3-4	3-4
July 2010	2-3 (tentative)	3	3	4	4-5
July 2011	2-3 (tentative)	3	3	4-5	4-5
July 2012	2 (tentative)	3	3	4	4
Aug 2013	2-3 (tentative)	3	3	4	4
July 2014	2-3 (tentative)	3	3	4-5	4-5

MAP 2 Q-RATINGS AT BIOLOGICAL ASSESSMENT SITES

Locations shown are approximate; for exact locations, see Grid References in text



5. CONCLUSIONS

5.1. Ballaghveny Stream

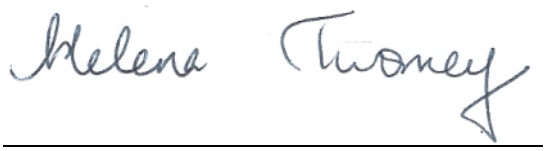
Habitat conditions at Site A upstream of the landfill are less than optimal for Q-rating assessment. Taking into account the flow and substrate conditions, the invertebrate data merit a tentative Q2-3 (moderately polluted) rating. The invertebrate data at Site A1, immediately downstream of the landfill, and at Site B c.3km downstream of the landfill, indicate Q3 moderately polluted conditions.

The results of the biological assessment contain no evidence of an impact from the landfill on the water quality of the Ballaghveny stream.

5.2. Ollatrim River

The Ollatrim River upstream and downstream of its confluence with the Ballaghveny Stream is unpolluted with a Q-value of Q4-5 at both the upstream site and the downstream site. The results of the present survey therefore contain no evidence of an adverse impact on the Ollatrim River from the Ballaghveny Stream.

Signed on behalf of Conservation Services



Helena Twomey BA(Mod.) PhD

4 September 2014

6. REFERENCES

Conservation Services (2013) Biological monitoring of water quality in the vicinity of Ballaghveny Landfill, County Tipperary. Unpublished Report to Tipperary North Riding County Council.

McGarrigle *et al* (2002) Water Quality in Ireland 1998-2000. Environmental Protection Agency.

APPENDIX 1

HABITAT ASSESSMENT AT SAMPLING SITES

Site Code	A
Site Location	Upstream of drain from the landfill area
Grid Reference	R97281 82428
Site Photograph	
Width	2.5 m
Depth	40 cm
Substrate	Mud
Flow Type	Slow glide (almost imperceptible flow)
Instream Vegetation	*Rorippa nasturtium-aquaticum agg.* 60% *Alisma plantago-aquaticum* <5% *Mentha aquatica* <5% *Sparganium erectum* 5%
Dominant Bankside Vegetation	Willow, Grass, Ash
Estimated % Summer Cover of Stream by Bankside Vegetation	15%
Trout Adult Habitat	None
Trout Nursery Habitat	None
Trout Spawning Habitat	None

Site Code	A1
Site Location	Downstream of road bridge.
Grid Reference	R97400 81947
Site Photographs	
Width	0.25-1 m
Depth	5-12 cm
Substrate	Mud, Cobble
Flow Type	Riffle 20% Glide 80%
Instream Vegetation	*Apium nodiflorum* 60% *Mentha aquatica* <5%
Dominant Bankside Vegetation	Willowherb, Hawthorn
Estimated % Summer Cover of Stream by Bankside Vegetation	30%
Trout Adult Habitat	None
Trout Nursery Habitat	Poor
Trout Spawning Habitat	Poor - None

Site Code	B
Site Location	At Donnybrook House
Grid Reference	R95298 82054
Site Photograph	
Width	1.5-2.5 m
Depth	10-20 cm
Substrate	Mud, Cobble (few)
Flow Type	Riffle 5% Glide 95%
Instream Vegetation	None
Dominant Bankside Vegetation	Ash, Beech
Estimated % Summer Cover of Stream by Bankside Vegetation	45%
Trout Adult Habitat	Poor
Trout Nursery Habitat	Poor
Trout Spawning Habitat	None

Site Code	1
Site Location	On the Ollatrim River at Donnybrook House upstream of the confluence with Ballaghveny Stream
Grid Reference	R95481 81886
Site Photograph	
Width	8-10 m
Depth	5-25 cm
Substrate	Gravel, Sand, Cobble
Flow Type	Riffle 70% Glide 30%
Instream Vegetation	*Apium nodiflorum* <5%
Dominant Bankside Vegetation	Bramble, Nettle
Estimated % Summer Cover of Stream by Bankside Vegetation	<5%
Trout Adult Habitat	Fair
Trout Nursery Habitat	Fair
Trout Spawning Habitat	Fair-Good

Site Code	2
Site Location	Downstream of Ballinahemery Bridge
Grid Reference	R94193 81924
Site Photograph	
Width	4-6 m
Depth	12-30 cm
Substrate	Gravel, Sand, Cobble
Flow Type	Riffle 50% Glide 50%
Instream Vegetation	Filamentous algae <5% Bryophyta <5% *Ranunculus* sp. <5% *Phalaris arundinacea* 5% *Apium nodiflorum* <5%
Dominant Bankside Vegetation	Grass, *Phalaris arundinacea*
Estimated % Summer Cover of Stream by Bankside Vegetation	<5%
Trout Adult Habitat	Fair-Good
Trout Nursery Habitat	Fair-Good
Trout Spawning Habitat	Fair-Good

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

Test Report

Report of:	Analysis of landfill site sample(s)
Report to:	North Tipperary County Council
Report date:	20/03/14

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

Date collected:	21/01/2014	Date received:	21/01/2014

			Laboratory Ref:	1420271	1420272	1420273	1420274	1420275	1420276	
			Type of sample:	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	
			Location code:	WST-W0078-01-SW4	WST-W0078-01-SW1	WST-W0078-01-SWD	WST-W0078-01-SW2	WST-W0078-01-SW6	WST-W0078-01 - SWD3	
			Sampling point:	Brownish	Slightly Brown	Clear	Clear	Clear	Clear	
			Sampled by:	DB/AT	DB/AT	DB/AT	DB/AT	DB/AT	DB/AT	
			Time Sampled:	10:10	10:25	12:50	13:55	14:10	14:30	
			Start/End - Dates of Analysis:	21-01-14/27-01-14	21-01-14/27-01-14	21-01-14/27-01-14	21-01-14/27-01-14	21-01-14/27-01-14	21-01-14/27-01-14	
			Status of results:	**Final Report**	**Final Report**	**Final Report**	**Final Report**	**Final Report**	**Final Report**	
Parameter		**Units**	**Limits**							
F	Temperature	℃		7.1	7.8	5.5	8.4	7.7	7.9	
F	Dissolved Oxygen (as %Sat)	% Saturation		67.0	75.0	95.0	85.0	99.0	98.7	
L	pH	pH		7.6	7.4	7.2	7.7	8.0	8.0	
L	Conductivity @25℃	µS/cm		712	706	285	791	481	413	
L	BOD	mg/l O2		<1.0	<1.0	1.7	<1.0	<1.0	<1.0	
L	Chemical Oxygen Demand	mg/l O2		38	31	39	26	29	<20	
L	Ammonia	mg/l N		0.12	0.14	0.1	<0.020	0.024	0.029	
L	Chloride	mg/l Cl		20	21	14	26	21	19	
L	Suspended Solids	mg/l		<7	<4	29	<4	10	8	

Comments:

1) **Results hilighted and in bold are outside specified limits.**
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5) **nr - "not reported".**
6) **tntc - "too numerous to count".**
7) **F - Field measured parameter.**
8) **L - Lab measured parameter.**
9) **Test Reports relate only to the samples tested and as described on the report form.**
10) **Test Reports shall not be reproduced, except in full, without consent of the EPA.**

Signed: PP  Date: 20/Mar/2014

Caroline Bowden, Regional Chemist

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

Test Report

Report of:	Analysis of landfill site sample(s)
Report to:	North Tipperary County Council
Report date:	20/03/14

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

Date collected:	21/01/2014	Date received:	21/01/2014

			Laboratory Ref:	1420277	1420278	1420279	1420280	1420281	1420282	
			Type of sample:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	
			Location code:	WST-W0078-01-BH3new	WST-W0078-01-GW9new	WST-W0078-01-GW10new	WST-W0078-01-Bressons	WST-W0078-01-GW12	WST-W0078-01-GW5new	
			Sampling point:	Clear	Clear	Clear	Clear	Clear	Clear	
			Sampled by:	DB/AT	DB/AT	DB/AT	DB/AT	DB/AT	DB/AT	
			Time Sampled:	10:45	11:15	11:40	11:25	11:45	13:35	
			Start/End - Dates of Analysis:	21-01-14/10-02-14	21-01-14/10-02-14	21-01-14/10-02-14	21-01-14/10-02-14	21-01-14/10-02-14	21-01-14/10-02-14	
			Status of results:	**Final Report**	**Final Report**	**Final Report**	**Final Report**	**Final Report**	**Final Report**	
Parameter		**Units**	**Limits**							
F	Depth of Borehole	m		12.3	13.5	13.3	-	-	14	
F	Water Level	m		8.3	9.5	10.7	-	-	12.8	
F	Temperature	℃		10.7	10.7	10.2	6.5	9.8	10.2	
F	Dissolved Oxygen (as %Sat)	% Saturation		39.8	50.2	85.0	76.0	97.0	23.0	
L	pH	pH		6.9	7.0	7.0	7.1	7.2	6.9	
L	Conductivity @25℃	µS/cm		950	1167	814	787	638	747	
L	Ammonia	mg/l N		0.049	5.3	<0.020	<0.020	<0.020	0.71	
L	Chloride	mg/l Cl		48	90	35	14	12	18	
L	Sulphate	mg/l SO4		12	23	19	9	5.9	28	
L	E Coli	per 100ml		-	-	-	<10	0	-	
L	Total coliforms	No/100 ml		-	-	-	<10	88	-	

Comments:

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Signed: PP  Date: 20/Mar/2014

Caroline Bowden, Regional Chemist

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

Test Report

Report of:	Analysis of landfill site sample(s)
Report to:	North Tipperary County Council
Report date:	20/03/14

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

Date collected:	21/01/2014	Date received:	21/01/2014

			Laboratory Ref:	1420284	1420285	1420286	1420287	1420288	1420289	1420290
			Type of sample:	Leachate	Leachate	Leachate	Leachate	Leachate	Leachate	Leachate
			Location code:	WST-W0078-01-LS3 Wedge Chamber	WST-W0078-01-LL2	WST-W0078-01-LS2	WST-W0078-01-LFG22	WST-W0078-01-LM8	WST-W0078-01-LM10	WST-W0078-01-LM5
			Sampling point:	Brownish- taken from chamber	Brownish- taken from lagoon	Dark Brown - taken from chamber	Dry, no sample	Dry, no sample	Dry, no sample	Dry, no sample
			Sampled by:	DB/AT	DB/AT	DB/AT	DB/AT	DB/AT	DB/AT	DB/AT
			Time Sampled:	12:30	12:40	12:55	13:10	13:18	13:20	13:00
			Start/End - Dates of Analysis:	21-01-14/27-01-14	21-01-14/27-01-14	21-01-14/27-01-14	21-01-14/19-03-14	21-01-14/19-03-14	21-01-14/19-03-14	21-01-14/19-03-14
			Status of results:	**Final Report**	**Final Report**	**Final Report**	**Final Report**	**Final Report**	**Final Report**	**Final Report**
F	Depth of Borehole	m		-	-	-	nm	nm	nm	nm
F	Temperature	℃		14.3	9.6	9.3	-	-	-	-
L	BOD	mg/l O2		<20	<20	<60	-	-	-	-
L	Chemical Oxygen Demand	mg/l O2		228	174	1040	-	-	-	-
L	pH	pH		7.1	7.3	7.9	-	-	-	-
L	Conductivity @25℃	µS/cm		4560	3390	10920	-	-	-	-
L	Ammonia	mg/l N		210	160	640	-	-	-	-

Comments:

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3) **nd - "none detected".**
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5) **nr - "not reported".**
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Signed: PP  Date: 20/Mar/2014

Caroline Bowden, Regional Chemist

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

Test Report

Report of: Analysis of landfill site sample(s)
Report to: North Tipperary County Council
Report date: 12/06/14

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

Date collected: 22/04/2014 Date received: 22/04/2014

			Laboratory Ref:	1421591	1421592	1421593
			Type of sample:	Surface Water	Surface Water	Surface Water
			Location code:	WST-W0078-01-SW1	WST-W0078-01-SW2	WST-W0078-01 - SWD3
			Sampling point:	clear	clear	clear
			Sampled by:	EH & DB	EH & DB	EH & DB
			Time Sampled:	10:15	13:25	13:55
			Start/End - Dates of Analysis:	22-04-14/22-05-14	22-04-14/22-05-14	22-04-14/22-05-14
			Status of results:	**Final Report**	**Final Report**	**Final Report**
Parameter		**Units**	**Limits**			
F **	Temperature	℃		9.9	10.5	11.0
F **	Dissolved Oxygen (as %Sat)	% Saturation		78.0	99.0	115.0
F	pH	pH		7.3	7.5	8.3
F	Conductivity @25℃	µS/cm		752	782	491
L	Ammonia	mg/l N		0.059	0.025	<0.020
L	Chloride	mg/l Cl		24	26	18
L	ortho-Phosphate	mg/l P		0.01	0.011	<0.010
L	Total Oxidised Nitrogen	mg/l N		3	6.3	3.7
L	Chemical Oxygen Demand	mg/l O2		28	<20	<20
L	BOD	mg/l O2		<1.0	<1.0	<1.0
L	Fluoride	mg/l F		<0.25	<0.25	<0.25
L	Sulphate	mg/l SO4		15	16	8.3
L	Suspended Solids	mg/l		<4	5	<4
L **	E Coli	per 100ml		610	550	260
L **	Total coliforms	No/100 ml		1600	2100	570
L **	1,1,1,2-Tetrachloroethane	µg/l		<0.5	<0.5	<0.5
L **	1,1,1-Trichloroethane	µg/l		<0.5	<0.5	<0.5
L **	1,1,2,2-Tetrachloroethane	µg/l		<1	<1	<1
L **	1,1,2-Trichloroethane	µg/l		<0.5	<0.5	<0.5
L **	1,1-Dichloroethane	µg/l		<0.5	<0.5	<0.5
L **	1,1-Dichloroethene	µg/l		<0.5	<0.5	<0.5
L **	1,1-Dichloropropene	µg/l		<0.5	<0.5	<0.5

			Laboratory Ref:	1421591	1421592	1421593
			Type of sample:	Surface Water	Surface Water	Surface Water
			Location code:	WST-W0078-01-SW1	WST-W0078-01-SW2	WST-W0078-01 - SWD3
			Sampling point:	clear	clear	clear
			Sampled by:	EH & DB	EH & DB	EH & DB
			Time Sampled:	10:15	13:25	13:55
			Start/End - Dates of Analysis:	22-04-14/22-05-14	22-04-14/22-05-14	22-04-14/22-05-14
			Status of results:	**Final Report**	**Final Report**	**Final Report**
Parameter		**Units**	**Limits**			
L **	1,2,3-Trichlorobenzene	µg/l		<0.4	<0.4	<0.4
L **	1,2,3-Trichloropropane	µg/l		<0.6	<0.6	<0.6
L **	1,2,4-Trichlorobenzene	µg/l		<0.4	<0.4	<0.4
L **	1,2,4-Trimethylbenzene	µg/l		<0.5	<0.5	<0.5
L **	1,2-Dibromo-3-Chloropropane	µg/l		<1.3	<1.3	<1.3
L **	1,2-Dibromoethane	µg/l		<0.5	<0.5	<0.5
L **	1,2-Dichlorobenzene	µg/l		<0.5	<0.5	<0.5
L **	1,2-Dichloroethane	µg/l		<0.5	<0.5	<0.5
L **	1,2-Dichloropropane	µg/l		<0.5	<0.5	<0.5
L **	1,3,5-Trimethylbenzene	µg/l		<0.5	<0.5	<0.5
L **	1,3-Dichlorobenzene	µg/l		<0.5	<0.5	<0.5
L **	1,3-Dichloropropane	µg/l		<0.5	<0.5	<0.5
L **	1,4-Dichlorobenzene	µg/l		<0.5	<0.5	<0.5
L **	2,2-Dichloropropane	µg/l		<0.5	<0.5	<0.5
L **	2-Chlorotoluene	µg/l		<0.5	<0.5	<0.5
L **	4-Chlorotoluene	µg/l		<0.5	<0.5	<0.5
L **	4-Isopropyltoluene	µg/l		<0.5	<0.5	<0.5
L **	Benzene	µg/l		<0.5	<0.5	<0.5
L **	Bromobenzene	µg/l		<0.5	<0.5	<0.5
L **	Bromochloromethane	µg/l		<0.5	<0.5	<0.5
L **	Bromodichloromethane	µg/l		<0.5	<0.5	<0.5
L **	Bromoform	µg/l		<0.5	<0.5	<0.5
L **	Bromomethane	µg/l		<0.5	<0.5	<0.5
L **	c-1,2-Dichloroethene	µg/l		<0.5	<0.5	<0.5
L **	c-1,3-Dichloropropene	µg/l		<0.5	<0.5	<0.5
L **	Carbon Tetrachloride	µg/l		<0.5	<0.5	<0.5
L **	Chlorobenzene	µg/l		<0.5	<0.5	<0.5
L **	Chloroform	µg/l		<0.5	<0.5	<0.5
L **	Dibromochloromethane	µg/l		<0.5	<0.5	<0.5
L **	Dibromomethane	µg/l		<0.5	<0.5	<0.5
L **	Dichlorodifluoromethane	µg/l		<0.5	<0.5	<0.5
L **	Dichloromethane	µg/l		<0.5	<0.5	<0.5
L **	Ethylbenzene	µg/l		<0.5	<0.5	<0.5
L **	Hexachlorobutadiene	µg/l		<0.1	<0.1	<0.1
L **	Isopropylbenzene	µg/l		<0.5	<0.5	<0.5
L **	m,p-Xylene	µg/l		<0.5	<0.5	<0.5
L **	Naphthalene	µg/l		<0.5	<0.5	<0.5
L **	n-Butylbenzene	µg/l		<0.5	<0.5	<0.5
L **	n-Propylbenzene	µg/l		<0.5	<0.5	<0.5
L **	o-Xylene	µg/l		<0.5	<0.5	<0.5

			Laboratory Ref:	1421591	1421592	1421593
			Type of sample:	Surface Water	Surface Water	Surface Water
			Location code:	WST-W0078-01-SW1	WST-W0078-01-SW2	WST-W0078-01 - SWD3
			Sampling point:	clear	clear	clear
			Sampled by:	EH & DB	EH & DB	EH & DB
			Time Sampled:	10:15	13:25	13:55
			Start/End - Dates of Analysis:	22-04-14/22-05-14	22-04-14/22-05-14	22-04-14/22-05-14
			Status of results:	**Final Report**	**Final Report**	**Final Report**
Parameter		**Units**	**Limits**			
L **	sec-Butylbenzene	µg/l		<0.5	<0.5	<0.5
L **	Styrene	µg/l		<0.5	<0.5	<0.5
L **	t-1,2-Dichloroethene	µg/l		<0.5	<0.5	<0.5
L **	t-1,3-Dichloropropene	µg/l		<0.5	<0.5	<0.5
L **	tert-Butylbenzene	µg/l		<0.5	<0.5	<0.5
L **	Tetrachloroethene	µg/l		<0.5	<0.5	<0.5
L **	Toluene	µg/l		0.5	<0.5	<0.5
L **	Trichloroethene	µg/l		<0.5	<0.5	<0.5
L **	Trichlorofluoromethane	µg/l		<0.6	<0.6	<0.6
L **	Vinyl Chloride	µg/l		<0.5	<0.5	<0.5
L **	Mercury	ug/l		<0.50	<0.50	<0.50
L **	Aluminium	ug/l		12.21	26.43	25.49
L **	Arsenic	ug/l		0.81	0.39	0.25
L **	Barium	ug/l		34.95	63.91	98.66
L **	Beryllium	ug/l		0.03	0.02	-0.01
L **	Boron	ug/l		24.59	29.92	14.47
L **	Cadmium	ug/l		0.03	0.02	0.01
L **	Calcium	mg/l		149.03	150.77	87.3
L **	Cobalt	ug/l		0.56	0.38	0.16
L **	Iron	ug/l		343.81	97.46	36.01
L **	Lead	ug/l		0.06	0.06	0.06
L **	Magnesium	mg/l		9.72	11.36	8.92
L **	Manganese	ug/l		74.34	37.65	4.68
L **	Nickel	ug/l		3.54	0.66	-0.21
L **	Potassium	mg/l		3.71	6.71	1.99
L **	Selenium	ug/l		0.4	0.46	-0.02
L **	Sodium	mg/l		11.99	12.94	9.49
L **	Strontium	ug/l		207.34	211.32	136.21
L **	Thallium	ug/l		0.03	0.01	0
L **	Uranium	ug/l		1.32	1.62	0.52
L **	Vanadium	ug/l		0.45	0.32	0.31
L **	Antimony	ug/l		0.31	0.19	0.12
L **	Chromium	ug/l		0.59	0.03	0.04
L **	Copper	ug/l		1.33	0.8	0.35
L **	Molybdenum	ug/l		0.66	0.27	0.12
L **	Zinc	ug/l		10.47	10.31	8.7

Comments:

1) **Results hilighted and in bold are outside specified limits.**
2) **nm - "not measured".**
3) **nd - "none detected".**
4) **nt - "time not recorded".**
5) **nr - "not reported".**
6) **tntc - "too numerous to count".**
7) **F - Field measured parameter.**
8) **L - Lab measured parameter.**
9) **** - Results produced by non-accredited analytical methods.**
10) **Test Reports relate only to the samples tested and as described on the report form.**
11) **Test Reports shall not be reproduced, except in full, without consent of the EPA.**
12) **The laboratory is accredited by INAB only for the parameters listed in the Scope of Accreditation.**
13) **Opinions and interpretations are not included in the scope of INAB accreditation.**

Signed: PP 

Caroline Bowden, Regional Chemist

Date: 12/Jun/2014

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

Test Report

Report of: Analysis of landfill site sample(s)
Report to: North Tipperary County Council
Report date: 12/06/14

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

Date collected: 22/04/2014 Date received: 22/04/2014

			Laboratory Ref:	1421594	1421595	1421596
			Type of sample:	Surface Water	Surface Water	Surface Water
			Location code:	WST-W0078-01-SW4	WST-W0078-01-SWD	WST-W0078-01-SW6
			Sampling point:	clear	no flow, no sample	clear
			Sampled by:	EH & DB	EH & DB	EH & DB
			Time Sampled:	10:00	12:05	13:44
			Start/End - Dates of Analysis:	22-04-14/22-05-14	22-04-14/22-04-14	22-04-14/22-05-14
			Status of results:	**Final Report**	**Final Report**	**Final Report**
Parameter		**Units**	**Limits**			
F **	Temperature	℃		9.3	-	10.8
F **	Dissolved Oxygen (as %Sat)	% Saturation		65.0	-	115.0
F	pH	pH		7.0	-	8.1
F	Conductivity @25℃	µS/cm		712	-	535
L	Ammonia	mg/l N		0.081	-	0.025
L	Chloride	mg/l Cl		20	-	19
L	ortho-Phosphate	mg/l P		<0.010	-	<0.010
L	Total Oxidised Nitrogen	mg/l N		2.1	-	4.7
L	Chemical Oxygen Demand	mg/l O2		22	-	<20
L	BOD	mg/l O2		<1.0	-	<1.0
L	Fluoride	mg/l F		<0.25	-	<0.25
L	Sulphate	mg/l SO4		12	-	9.2
L	Suspended Solids	mg/l		<6.7	-	<4
L **	E Coli	per 100ml		52	-	170
L **	Total coliforms	No/100 ml		960	-	780
L **	1,1,1,2-Tetrachloroethane	µg/l		<0.5	-	<0.5
L **	1,1,1-Trichloroethane	µg/l		<0.5	-	<0.5
L **	1,1,2,2-Tetrachloroethane	µg/l		<1	-	<1
L **	1,1,2-Trichloroethane	µg/l		<0.5	-	<0.5
L **	1,1-Dichloroethane	µg/l		<0.5	-	<0.5
L **	1,1-Dichloroethene	µg/l		<0.5	-	<0.5
L **	1,1-Dichloropropene	µg/l		<0.5	-	<0.5

			Laboratory Ref:	1421594	1421595	1421596
			Type of sample:	Surface Water	Surface Water	Surface Water
			Location code:	WST-W0078-01-SW4	WST-W0078-01-SWD	WST-W0078-01-SW6
			Sampling point:	clear	no flow, no sample	clear
			Sampled by:	EH & DB	EH & DB	EH & DB
			Time Sampled:	10:00	12:05	13:44
			Start/End - Dates of Analysis:	22-04-14/22-05-14	22-04-14/22-04-14	22-04-14/22-05-14
			Status of results:	**Final Report**	**Final Report**	**Final Report**
Parameter		**Units**	**Limits**			
L **	1,2,3-Trichlorobenzene	µg/l		<0.4	-	<0.4
L **	1,2,3-Trichloropropane	µg/l		<0.6	-	<0.6
L **	1,2,4-Trichlorobenzene	µg/l		<0.4	-	<0.4
L **	1,2,4-Trimethylbenzene	µg/l		<0.5	-	<0.5
L **	1,2-Dibromo-3-Chloropropane	µg/l		<1.3	-	<1.3
L **	1,2-Dibromoethane	µg/l		<0.5	-	<0.5
L **	1,2-Dichlorobenzene	µg/l		<0.5	-	<0.5
L **	1,2-Dichloroethane	µg/l		<0.5	-	<0.5
L **	1,2-Dichloropropane	µg/l		<0.5	-	<0.5
L **	1,3,5-Trimethylbenzene	µg/l		<0.5	-	<0.5
L **	1,3-Dichlorobenzene	µg/l		<0.5	-	<0.5
L **	1,3-Dichloropropane	µg/l		<0.5	-	<0.5
L **	1,4-Dichlorobenzene	µg/l		<0.5	-	<0.5
L **	2,2-Dichloropropane	µg/l		<0.5	-	<0.5
L **	2-Chlorotoluene	µg/l		<0.5	-	<0.5
L **	4-Chlorotoluene	µg/l		<0.5	-	<0.5
L **	4-Isopropyltoluene	µg/l		<0.5	-	<0.5
L **	Benzene	µg/l		<0.5	-	<0.5
L **	Bromobenzene	µg/l		<0.5	-	<0.5
L **	Bromochloromethane	µg/l		<0.5	-	<0.5
L **	Bromodichloromethane	µg/l		<0.5	-	<0.5
L **	Bromoform	µg/l		<0.5	-	<0.5
L **	Bromomethane	µg/l		<0.5	-	<0.5
L **	c-1,2-Dichloroethene	µg/l		<0.5	-	<0.5
L **	c-1,3-Dichloropropene	µg/l		<0.5	-	<0.5
L **	Carbon Tetrachloride	µg/l		<0.5	-	<0.5
L **	Chlorobenzene	µg/l		<0.5	-	<0.5
L **	Chloroform	µg/l		<0.5	-	<0.5
L **	Dibromochloromethane	µg/l		<0.5	-	<0.5
L **	Dibromomethane	µg/l		<0.5	-	<0.5
L **	Dichlorodifluoromethane	µg/l		<0.5	-	<0.5
L **	Dichloromethane	µg/l		<0.5	-	<0.5
L **	Ethylbenzene	µg/l		0.6	-	<0.5
L **	Hexachlorobutadiene	µg/l		<0.1	-	<0.1
L **	Isopropylbenzene	µg/l		<0.5	-	<0.5
L **	m,p-Xylene	µg/l		<0.5	-	<0.5
L **	Naphthalene	µg/l		<0.5	-	<0.5
L **	n-Butylbenzene	µg/l		<0.5	-	<0.5
L **	n-Propylbenzene	µg/l		<0.5	-	<0.5
L **	o-Xylene	µg/l		<0.5	-	<0.5

			Laboratory Ref:	1421594	1421595	1421596
			Type of sample:	Surface Water	Surface Water	Surface Water
			Location code:	WST-W0078-01-SW4	WST-W0078-01-SWD	WST-W0078-01-SW6
			Sampling point:	clear	no flow, no sample	clear
			Sampled by:	EH & DB	EH & DB	EH & DB
			Time Sampled:	10:00	12:05	13:44
			Start/End - Dates of Analysis:	22-04-14/22-05-14	22-04-14/22-04-14	22-04-14/22-05-14
			Status of results:	**Final Report**	**Final Report**	**Final Report**
Parameter		**Units**	**Limits**			
L **	sec-Butylbenzene	µg/l		<0.5	-	<0.5
L **	Styrene	µg/l		<0.5	-	<0.5
L **	t-1,2-Dichloroethene	µg/l		<0.5	-	<0.5
L **	t-1,3-Dichloropropene	µg/l		<0.5	-	<0.5
L **	tert-Butylbenzene	µg/l		<0.5	-	<0.5
L **	Tetrachloroethene	µg/l		<0.5	-	<0.5
L **	Toluene	µg/l		0.5	-	<0.5
L **	Trichloroethene	µg/l		<0.5	-	<0.5
L **	Trichlorofluoromethane	µg/l		<0.6	-	<0.6
L **	Vinyl Chloride	µg/l		<0.5	-	<0.5
L **	Mercury	ug/l		<0.50	-	<0.50
L **	Aluminium	ug/l		29.21	-	13.77
L **	Arsenic	ug/l		0.93	-	0.26
L **	Barium	ug/l		31.87	-	96.62
L **	Beryllium	ug/l		0.04	-	0.02
L **	Boron	ug/l		21.71	-	16.08
L **	Cadmium	ug/l		0.02	-	0.01
L **	Calcium	mg/l		145.46	-	99.03
L **	Cobalt	ug/l		0.55	-	0.2
L **	Iron	ug/l		366.66	-	50.72
L **	Lead	ug/l		0.05	-	0.05
L **	Magnesium	mg/l		9.34	-	9.01
L **	Manganese	ug/l		61.63	-	14.27
L **	Nickel	ug/l		1.11	-	-0.13
L **	Potassium	mg/l		2.5	-	2.29
L **	Selenium	ug/l		0.13	-	-0.15
L **	Sodium	mg/l		9.48	-	10.34
L **	Strontium	ug/l		197.24	-	146.46
L **	Thallium	ug/l		0.01	-	0
L **	Uranium	ug/l		0.9	-	0.76
L **	Vanadium	ug/l		0.36	-	0.25
L **	Antimony	ug/l		0.14	-	0.14
L **	Chromium	ug/l		0.23	-	0.26
L **	Copper	ug/l		0.55	-	0.37
L **	Molybdenum	ug/l		0.41	-	0.13
L **	Zinc	ug/l		10.18	-	9.8

Comments:

1) **Results hilighted and in bold are outside specified limits.**
2) **nm - "not measured".**
3) **nd - "none detected".**
4) **nt - "time not recorded".**
5) **nr - "not reported".**
6) **tntc - "too numerous to count".**
7) **F - Field measured parameter.**
8) **L - Lab measured parameter.**
9) **** - Results produced by non-accredited analytical methods.**
10) **Test Reports relate only to the samples tested and as described on the report form.**
11) **Test Reports shall not be reproduced, except in full, without consent of the EPA.**
12) **The laboratory is accredited by INAB only for the parameters listed in the Scope of Accreditation.**
13) **Opinions and interpretations are not included in the scope of INAB accreditation.**

Signed: PP 

Caroline Bowden, Regional Chemist

Date: 12/Jun/2014

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

Test Report

Report of: Analysis of landfill site sample(s)
Report to: North Tipperary County Council
Report date: 12/06/14

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

Date collected:	22/04/2014	Date received:	22/04/2014

			Laboratory Ref:	1421597	1421598	1421599	1421600	
			Type of sample:	Groundwater	Groundwater	Groundwater	Groundwater	
			Location code:	WST-W0078-01-GW5new	WST-W0078-01-GW9new	WST-W0078-01-GW10new	WST-W0078-01-BH3new	
			Sampling point:	clear	clear	clear	clear	
			Sampled by:	EH & DB	EH & DB	EH & DB	EH & DB	
			Time Sampled:	12:00	10:40	11:10	10:25	
			Start/End - Dates of Analysis:	22-04-14/22-05-14	22-04-14/22-05-14	22-04-14/22-05-14	22-04-14/22-05-14	
			Status of results:	**Final Report**	**Final Report**	**Final Report**	**Final Report**	
Parameter		**Units**	**Limits**					
F **	Depth of Borehole	m		14	13.5	13.3	12.3	
F **	Water Level	m		12.5	8.5	3.3	8	
F **	Temperature	℃		9.9	10.9	9.9	9.6	
F **	Dissolved Oxygen (as %Sat)	% Saturation		22.0	25.0	85.0	20.5	
F	pH	pH		6.8	6.9	6.9	6.8	
F	Conductivity @25℃	µS/cm		676	1188	743	950	
L	Ammonia	mg/l N		0.49	7.1	0.024	0.037	
L	Chloride	mg/l Cl		18	96	34	46	
L	ortho-Phosphate	mg/l P		<0.010	<0.010	<0.010	<0.010	
L	Total Oxidised Nitrogen	mg/l N		<0.20	9.4	13	18	
L	Fluoride	mg/l F		<0.25	0.71	<0.25	<0.25	
L	Sulphate	mg/l SO4		23	26	19	15	
L **	E Coli	per 100ml		<10	<10	<10	<10	
L **	Total coliforms	No/100 ml		<10	<10	<10	<10	
L **	1,1,1,2-Tetrachloroethane	µg/l		<0.5	<0.5	<0.5	<0.5	
L **	1,1,1-Trichloroethane	µg/l		<0.5	<0.5	<0.5	<0.5	
L **	1,1,2,2-Tetrachloroethane	µg/l		<1	<1	<1	<1	
L **	1,1,2-Trichloroethane	µg/l		<0.5	<0.5	<0.5	<0.5	
L **	1,1-Dichloroethane	µg/l		<0.5	<0.5	5.1	<0.5	
L **	1,1-Dichloroethene	µg/l		<0.5	<0.5	<0.5	<0.5	
L **	1,1-Dichloropropene	µg/l		<0.5	<0.5	<0.5	<0.5	
L **	1,2,3-Trichlorobenzene	µg/l		<0.4	<0.4	<0.4	<0.4	
L **	1,2,3-Trichloropropane	µg/l		<0.6	<0.6	<0.6	<0.6	

			Laboratory Ref:	1421597	1421598	1421599	1421600	
			Type of sample:	Groundwater	Groundwater	Groundwater	Groundwater	
			Location code:	WST-W0078-01-GW5new	WST-W0078-01-GW9new	WST-W0078-01-GW10new	WST-W0078-01-BH3new	
			Sampling point:	clear	clear	clear	clear	
			Sampled by:	EH & DB	EH & DB	EH & DB	EH & DB	
			Time Sampled:	12:00	10:40	11:10	10:25	
			Start/End - Dates of Analysis:	22-04-14/22-05-14	22-04-14/22-05-14	22-04-14/22-05-14	22-04-14/22-05-14	
			Status of results:	**Final Report**	**Final Report**	**Final Report**	**Final Report**	
Parameter		**Units**	**Limits**					
L **	1,2,4-Trichlorobenzene	µg/l		<0.4	<0.4	<0.4	<0.4	
L **	1,2,4-Trimethylbenzene	µg/l		<0.5	<0.5	<0.5	<0.5	
L **	1,2-Dibromo-3-Chloropropane	µg/l		<1.3	<1.3	<1.3	<1.3	
L **	1,2-Dibromoethane	µg/l		<0.5	<0.5	<0.5	<0.5	
L **	1,2-Dichlorobenzene	µg/l		<0.5	<0.5	<0.5	<0.5	
L **	1,2-Dichloroethane	µg/l		<0.5	<0.5	<0.5	<0.5	
L **	1,2-Dichloropropane	µg/l		<0.5	<0.5	<0.5	<0.5	
L **	1,3,5-Trimethylbenzene	µg/l		<0.5	<0.5	<0.5	<0.5	
L **	1,3-Dichlorobenzene	µg/l		<0.5	<0.5	<0.5	<0.5	
L **	1,3-Dichloropropane	µg/l		<0.5	<0.5	<0.5	<0.5	
L **	1,4-Dichlorobenzene	µg/l		<0.5	<0.5	<0.5	<0.5	
L **	2,2-Dichloropropane	µg/l		<0.5	<0.5	<0.5	<0.5	
L **	2-Chlorotoluene	µg/l		<0.5	<0.5	<0.5	<0.5	
L **	4-Chlorotoluene	µg/l		<0.5	<0.5	<0.5	<0.5	
L **	4-Isopropyltoluene	µg/l		<0.5	<0.5	<0.5	<0.5	
L **	Benzene	µg/l		<0.5	<0.5	<0.5	<0.5	
L **	Bromobenzene	µg/l		<0.5	<0.5	<0.5	<0.5	
L **	Bromochloromethane	µg/l		<0.5	<0.5	<0.5	<0.5	
L **	Bromodichloromethane	µg/l		<0.5	<0.5	<0.5	<0.5	
L **	Bromoform	µg/l		<0.5	<0.5	<0.5	<0.5	
L **	Bromomethane	µg/l		<0.5	<0.5	<0.5	<0.5	
L **	c-1,2-Dichloroethene	µg/l		<0.5	<0.5	<0.5	<0.5	
L **	c-1,3-Dichloropropene	µg/l		<0.5	<0.5	<0.5	<0.5	

			Laboratory Ref:	1421597	1421598	1421599	1421600	
			Type of sample:	Groundwater	Groundwater	Groundwater	Groundwater	
			Location code:	WST-W0078-01-GW5new	WST-W0078-01-GW9new	WST-W0078-01-GW10new	WST-W0078-01-BH3new	
			Sampling point:	clear	clear	clear	clear	
			Sampled by:	EH & DB	EH & DB	EH & DB	EH & DB	
			Time Sampled:	12:00	10:40	11:10	10:25	
			Start/End - Dates of Analysis:	22-04-14/22-05-14	22-04-14/22-05-14	22-04-14/22-05-14	22-04-14/22-05-14	
			Status of results:	**Final Report**	**Final Report**	**Final Report**	**Final Report**	
Parameter		**Units**	**Limits**					
L **	Carbon Tetrachloride	µg/l		<0.5	<0.5	<0.5	<0.5	
L **	Chlorobenzene	µg/l		<0.5	<0.5	<0.5	<0.5	
L **	Chloroform	µg/l		<0.5	<0.5	<0.5	<0.5	
L **	Dibromochloromethane	µg/l		<0.5	<0.5	<0.5	<0.5	
L **	Dibromomethane	µg/l		<0.5	<0.5	<0.5	<0.5	
L **	Dichlorodifluoromethane	µg/l		<0.5	<0.5	<0.5	<0.5	
L **	Dichloromethane	µg/l		<0.5	<0.5	<0.5	<0.5	
L **	Ethylbenzene	µg/l		<0.5	<0.5	0.6	<0.5	
L **	Hexachlorobutadiene	µg/l		<0.1	<0.1	<0.1	<0.1	
L **	Isopropylbenzene	µg/l		<0.5	<0.5	<0.5	<0.5	
L **	m,p-Xylene	µg/l		<0.5	<0.5	<0.5	<0.5	
L **	Naphthalene	µg/l		<0.5	<0.5	<0.5	<0.5	
L **	n-Butylbenzene	µg/l		<0.5	<0.5	<0.5	<0.5	
L **	n-Propylbenzene	µg/l		<0.5	<0.5	<0.5	<0.5	
L **	o-Xylene	µg/l		<0.5	<0.5	<0.5	<0.5	
L **	sec-Butylbenzene	µg/l		<0.5	<0.5	<0.5	<0.5	
L **	Styrene	µg/l		<0.5	<0.5	<0.5	<0.5	
L **	t-1,2-Dichloroethene	µg/l		<0.5	<0.5	<0.5	<0.5	
L **	t-1,3-Dichloropropene	µg/l		<0.5	<0.5	<0.5	<0.5	
L **	tert-Butylbenzene	µg/l		<0.5	<0.5	<0.5	<0.5	
L **	Tetrachloroethene	µg/l		<0.5	<0.5	<0.5	<0.5	
L **	Toluene	µg/l		0.8	0.8	1.1	<0.5	
L **	Trichloroethene	µg/l		<0.5	<0.5	<0.5	<0.5	

			Laboratory Ref:	1421597	1421598	1421599	1421600	
			Type of sample:	Groundwater	Groundwater	Groundwater	Groundwater	
			Location code:	WST-W0078-01-GW5new	WST-W0078-01-GW9new	WST-W0078-01-GW10new	WST-W0078-01-BH3new	
			Sampling point:	clear	clear	clear	clear	
			Sampled by:	EH & DB	EH & DB	EH & DB	EH & DB	
			Time Sampled:	12:00	10:40	11:10	10:25	
			Start/End - Dates of Analysis:	22-04-14/22-05-14	22-04-14/22-05-14	22-04-14/22-05-14	22-04-14/22-05-14	
			Status of results:	**Final Report**	**Final Report**	**Final Report**	**Final Report**	
Parameter		**Units**	**Limits**					
L **	Trichlorofluoromethane	µg/l		<0.6	<0.6	<0.6	<0.6	
L **	Vinyl Chloride	µg/l		<0.5	<0.5	<0.5	<0.5	
L **	Mercury	ug/l		<0.50	<0.50	<0.50	<0.50	
L **	Aluminium	ug/l		3.28	15.6	14.9	39.98	
L **	Arsenic	ug/l		1	1.27	0.26	0.21	
L **	Barium	ug/l		31.23	72.27	26.74	35.4	
L **	Beryllium	ug/l		0.05	0	0.01	0.03	
L **	Boron	ug/l		13.57	135.01	38.35	75.6	
L **	Cadmium	ug/l		0	0.05	0.01	0.05	
L **	Calcium	mg/l		141.92	153.64	136.9	168.01	
L **	Cobalt	ug/l		0.54	2.19	0.28	0.86	
L **	Iron	ug/l		690.84	480.66	25.61	81.12	
L **	Lead	ug/l		0	0.77	0.11	0.25	
L **	Magnesium	mg/l		6.31	22.65	11.07	12.96	
L **	Manganese	ug/l		326.48	253.62	2.08	114.34	
L **	Nickel	ug/l		0.65	8.65	0.35	2.8	
L **	Potassium	mg/l		0.7	12.91	2.39	7.04	
L **	Selenium	ug/l		-0.19	0.17	0.34	0.21	
L **	Sodium	mg/l		7.36	67.16	14.65	28.63	
L **	Strontium	ug/l		198.85	282.37	241.66	253.21	
L **	Thallium	ug/l		0	0.01	0	0.01	
L **	Uranium	ug/l		1.35	0.76	0.56	0.7	
L **	Vanadium	ug/l		0.23	0.14	0.22	0.17	

			Laboratory Ref:	1421597	1421598	1421599	1421600
			Type of sample:	Groundwater	Groundwater	Groundwater	Groundwater
			Location code:	WST-W0078-01-GW5new	WST-W0078-01-GW9new	WST-W0078-01-GW10new	WST-W0078-01-BH3new
			Sampling point:	clear	clear	clear	clear
			Sampled by:	EH & DB	EH & DB	EH & DB	EH & DB
			Time Sampled:	12:00	10:40	11:10	10:25
			Start/End - Dates of Analysis:	22-04-14/22-05-14	22-04-14/22-05-14	22-04-14/22-05-14	22-04-14/22-05-14
			Status of results:	**Final Report**	**Final Report**	**Final Report**	**Final Report**
Parameter		**Units**	**Limits**				
L **	Antimony	ug/l		0.1	0.08	0.05	0.13
L **	Chromium	ug/l		0.29	0.45	0.18	0.1
L **	Copper	ug/l		0.18	0.76	0.24	1.7
L **	Molybdenum	ug/l		0.4	0.12	0.09	0.06
L **	Zinc	ug/l		15.71	11.11	10.41	17.57

Comments:

1) **Results hilighted and in bold are outside specified limits.**
2) **nm - "not measured".**
3) **nd - "none detected".**
4) **nt - "time not recorded".**
5) **nr - "not reported".**
6) **tntc - "too numerous to count".**
7) **F - Field measured parameter.**
8) **L - Lab measured parameter.**
9) **** - Results produced by non-accredited analytical methods.**
10) **Test Reports relate only to the samples tested and as described on the report form.**
11) **Test Reports shall not be reproduced, except in full, without consent of the EPA.**
12) **The laboratory is accredited by INAB only for the parameters listed in the Scope of Accreditation.**
13) **Opinions and interpretations are not included in the scope of INAB accreditation.**

Signed: PP 

Caroline Bowden, Regional Chemist

Date: 12/Jun/2014

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

Test Report

Report of: Analysis of landfill site sample(s)
Report to: North Tipperary County Council
Report date: 12/06/14

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

Date collected: 22/04/2014 Date received: 22/04/2014

			Laboratory Ref:	1421601	1421603	
			Type of sample:	Groundwater	Groundwater	
			Location code:	WST-W0078-01-Bressons	WST-W0078-01	
			Sampling point:	clear	Cullinans-point gone, no sample	
			Sampled by:	EH & DB	EH & DB	
			Time Sampled:	10:55	12:55	
			Start/End - Dates of Analysis:	22-04-14/22-05-14	22-04-14/22-04-14	
			Status of results:	**Final Report**	**Final Report**	
Parameter		**Units**	**Limits**			
F **	Temperature	℃		9.9	-	
F **	Dissolved Oxygen (as %Sat)	% Saturation		78.0	-	
F	pH	pH		6.8	-	
F	Conductivity @25℃	µS/cm		768	-	
L	Ammonia	mg/l N		<0.020	-	
L	Chloride	mg/l Cl		19	-	
L	ortho-Phosphate	mg/l P		<0.010	-	
L	Total Oxidised Nitrogen	mg/l N		3.5	-	
L	Fluoride	mg/l F		<0.25	-	
L	Sulphate	mg/l SO4		8.8	-	
L **	E Coli	per 100ml		<10	-	
L **	Total coliforms	No/100 ml		<10	-	
L **	1,1,1,2-Tetrachloroethane	µg/l		<0.5	-	
L **	1,1,1-Trichloroethane	µg/l		<0.5	-	
L **	1,1,2,2-Tetrachloroethane	µg/l		<1	-	
L **	1,1,2-Trichloroethane	µg/l		<0.5	-	
L **	1,1-Dichloroethane	µg/l		<0.5	-	
L **	1,1-Dichloroethene	µg/l		<0.5	-	
L **	1,1-Dichloropropene	µg/l		<0.5	-	
L **	1,2,3-Trichlorobenzene	µg/l		<0.4	-	
L **	1,2,3-Trichloropropane	µg/l		<0.6	-	
L **	1,2,4-Trichlorobenzene	µg/l		<0.4	-	

			Laboratory Ref:	1421601	1421603	
			Type of sample:	Groundwater	Groundwater	
			Location code:	WST-W0078-01-Bressons	WST-W0078-01	
			Sampling point:	clear	Cullinans-point gone, no sample	
			Sampled by:	EH & DB	EH & DB	
			Time Sampled:	10:55	12:55	
			Start/End - Dates of Analysis:	22-04-14/22-05-14	22-04-14/22-04-14	
			Status of results:	**Final Report**	**Final Report**	
Parameter		**Units**	**Limits**			
L **	1,2,4-Trimethylbenzene	µg/l		<0.5	-	
L **	1,2-Dibromo-3-Chloropropane	µg/l		<1.3	-	
L **	1,2-Dibromoethane	µg/l		<0.5	-	
L **	1,2-Dichlorobenzene	µg/l		<0.5	-	
L **	1,2-Dichloroethane	µg/l		<0.5	-	
L **	1,2-Dichloropropane	µg/l		<0.5	-	
L **	1,3,5-Trimethylbenzene	µg/l		<0.5	-	
L **	1,3-Dichlorobenzene	µg/l		<0.5	-	
L **	1,3-Dichloropropane	µg/l		<0.5	-	
L **	1,4-Dichlorobenzene	µg/l		<0.5	-	
L **	2,2-Dichloropropane	µg/l		<0.5	-	
L **	2-Chlorotoluene	µg/l		<0.5	-	
L **	4-Chlorotoluene	µg/l		<0.5	-	
L **	4-Isopropyltoluene	µg/l		<0.5	-	
L **	Benzene	µg/l		<0.5	-	
L **	Bromobenzene	µg/l		<0.5	-	
L **	Bromochloromethane	µg/l		<0.5	-	
L **	Bromodichloromethane	µg/l		5.6	-	
L **	Bromoform	µg/l		10	-	
L **	Bromomethane	µg/l		<0.5	-	
L **	c-1,2-Dichloroethene	µg/l		<0.5	-	
L **	c-1,3-Dichloropropene	µg/l		<0.5	-	
L **	Carbon Tetrachloride	µg/l		<0.5	-	
L **	Chlorobenzene	µg/l		<0.5	-	
L **	Chloroform	µg/l		1	-	
L **	Dibromochloromethane	µg/l		13	-	
L **	Dibromomethane	µg/l		<0.5	-	
L **	Dichlorodifluoromethane	µg/l		<0.5	-	
L **	Dichloromethane	µg/l		<0.5	-	
L **	Ethylbenzene	µg/l		<0.5	-	
L **	Hexachlorobutadiene	µg/l		<0.1	-	
L **	Isopropylbenzene	µg/l		<0.5	-	
L **	m,p-Xylene	µg/l		<0.5	-	
L **	Naphthalene	µg/l		<0.5	-	
L **	n-Butylbenzene	µg/l		<0.5	-	
L **	n-Propylbenzene	µg/l		<0.5	-	
L **	o-Xylene	µg/l		<0.5	-	
L **	sec-Butylbenzene	µg/l		<0.5	-	
L **	Styrene	µg/l		<0.5	-	
L **	t-1,2-Dichloroethene	µg/l		<0.5	-	

			Laboratory Ref:	1421601	1421603	
			Type of sample:	Groundwater	Groundwater	
			Location code:	WST-W0078-01-Bressons	WST-W0078-01	
			Sampling point:	clear	Cullinans-point gone, no sample	
			Sampled by:	EH & DB	EH & DB	
			Time Sampled:	10:55	12:55	
			Start/End - Dates of Analysis:	22-04-14/22-05-14	22-04-14/22-04-14	
			Status of results:	**Final Report**	**Final Report**	
Parameter		**Units**	**Limits**			
L **	t-1,3-Dichloropropene	µg/l		<0.5	-	
L **	tert-Butylbenzene	µg/l		<0.5	-	
L **	Tetrachloroethene	µg/l		<0.5	-	
L **	Toluene	µg/l		0.9	-	
L **	Trichloroethene	µg/l		<0.5	-	
L **	Trichlorofluoromethane	µg/l		<0.6	-	
L **	Vinyl Chloride	µg/l		<0.5	-	
L **	Mercury	ug/l		<0.50	-	
L **	Aluminium	ug/l		2.03	-	
L **	Arsenic	ug/l		0.01	-	
L **	Barium	ug/l		23.1	-	
L **	Beryllium	ug/l		0.02	-	
L **	Boron	ug/l		25.03	-	
L **	Cadmium	ug/l		0.01	-	
L **	Calcium	mg/l		160.55	-	
L **	Cobalt	ug/l		0.2	-	
L **	Iron	ug/l		-0.1	-	
L **	Lead	ug/l		0.48	-	
L **	Magnesium	mg/l		10.37	-	
L **	Manganese	ug/l		0.14	-	
L **	Nickel	ug/l		-0.54	-	
L **	Potassium	mg/l		2.79	-	
L **	Selenium	ug/l		0.56	-	
L **	Sodium	mg/l		8.8	-	
L **	Strontium	ug/l		214.71	-	
L **	Thallium	ug/l		0	-	
L **	Uranium	ug/l		0.96	-	
L **	Vanadium	ug/l		0.1	-	
L **	Antimony	ug/l		0.05	-	
L **	Chromium	ug/l		0.04	-	
L **	Copper	ug/l		9.02	-	
L **	Molybdenum	ug/l		0.07	-	
L **	Zinc	ug/l		16.56	-	

Comments:

1) **Results hilighted and in bold are outside specified limits.**
2) **nm - "not measured".**
3) **nd - "none detected".**
4) **nt - "time not recorded".**
5) **nr - "not reported".**
6) **tntc - "too numerous to count".**
7) **F - Field measured parameter.**
8) **L - Lab measured parameter.**
9) **** - Results produced by non-accredited analytical methods.**
10) **Test Reports relate only to the samples tested and as described on the report form.**
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13) **Opinions and interpretations are not included in the scope of INAB accreditation.**

Signed: PP 

Caroline Bowden, Regional Chemist

Date: 12/Jun/2014

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

Test Report

Report of: Analysis of landfill site sample(s)
Report to: North Tipperary County Council
Report date: 12/06/14

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

Sampling location: **WST-W0078-01-GW12, Ballaghveny Landfill Site - W0078-01 -- GW12 - Groundwater Well 3**

Date collected: 22/04/2014 Date received: 22/04/2014

			Laboratory Ref:	1421602
			Type of sample:	Groundwater
			Sampling point:	clear
			Sampled by:	EH & DB
			Time Sampled:	11:30
			Start/End - Dates of Analysis:	22-04-14/22-05-14
			Status of results:	**Final Report**
Parameter		**Units**	**Limits**	
F **	Depth of Borehole	m		nm
F **	Water Level	m		nm
F **	Temperature	℃		9.0
F **	Dissolved Oxygen (as %Sat)	% Saturation		94.0
F	pH	pH		7.0
F	Conductivity @25℃	µS/cm		818
L	Ammonia	mg/l N		<0.020
L	Chloride	mg/l Cl		63
L	ortho-Phosphate	mg/l P		<0.010
L	Total Oxidised Nitrogen	mg/l N		6.9
L	Fluoride	mg/l F		<0.25
L	Sulphate	mg/l SO4		14
L **	E Coli	per 100ml		0
L **	Total coliforms	No/100 ml		130
L **	1,1,1,2-Tetrachloroethane	µg/l		<0.5
L **	1,1,1-Trichloroethane	µg/l		1.1
L **	1,1,2,2-Tetrachloroethane	µg/l		<1
L **	1,1,2-Trichloroethane	µg/l		<0.5
L **	1,1-Dichloroethane	µg/l		1.9

			Laboratory Ref:	1421602
			Type of sample:	Groundwater
			Sampling point:	clear
			Sampled by:	EH & DB
			Time Sampled:	11:30
			Start/End - Dates of Analysis:	22-04-14/22-05-14
			Status of results:	**Final Report**
Parameter		**Units**	**Limits**	
L **	1,1-Dichloroethene	µg/l		<0.5
L **	1,1-Dichloropropene	µg/l		<0.5
L **	1,2,3-Trichlorobenzene	µg/l		<0.4
L **	1,2,3-Trichloropropane	µg/l		<0.6
L **	1,2,4-Trichlorobenzene	µg/l		<0.4
L **	1,2,4-Trimethylbenzene	µg/l		<0.5
L **	1,2-Dibromo-3-Chloropropane	µg/l		<1.3
L **	1,2-Dibromoethane	µg/l		<0.5
L **	1,2-Dichlorobenzene	µg/l		<0.5
L **	1,2-Dichloroethane	µg/l		<0.5
L **	1,2-Dichloropropane	µg/l		<0.5
L **	1,3,5-Trimethylbenzene	µg/l		<0.5
L **	1,3-Dichlorobenzene	µg/l		<0.5
L **	1,3-Dichloropropane	µg/l		<0.5
L **	1,4-Dichlorobenzene	µg/l		<0.5
L **	2,2-Dichloropropane	µg/l		<0.5
L **	2-Chlorotoluene	µg/l		<0.5
L **	4-Chlorotoluene	µg/l		<0.5
L **	4-Isopropyltoluene	µg/l		<0.5
L **	Benzene	µg/l		<0.5
L **	Bromobenzene	µg/l		<0.5
L **	Bromochloromethane	µg/l		<0.5
L **	Bromodichloromethane	µg/l		<0.5
L **	Bromoform	µg/l		<0.5
L **	Bromomethane	µg/l		<0.5
L **	c-1,2-Dichloroethene	µg/l		<0.5
L **	c-1,3-Dichloropropene	µg/l		<0.5
L **	Carbon Tetrachloride	µg/l		<0.5
L **	Chlorobenzene	µg/l		<0.5
L **	Chloroform	µg/l		<0.5
L **	Dibromochloromethane	µg/l		<0.5
L **	Dibromomethane	µg/l		<0.5
L **	Dichlorodifluoromethane	µg/l		<0.5
L **	Dichloromethane	µg/l		<0.5
L **	Ethylbenzene	µg/l		<0.5
L **	Hexachlorobutadiene	µg/l		<0.1
L **	Isopropylbenzene	µg/l		<0.5

			Laboratory Ref:	1421602
			Type of sample:	Groundwater
			Sampling point:	clear
			Sampled by:	EH & DB
			Time Sampled:	11:30
			Start/End - Dates of Analysis:	22-04-14/22-05-14
			Status of results:	**Final Report**
Parameter		**Units**	**Limits**	
L **	m,p-Xylene	µg/l		<0.5
L **	Naphthalene	µg/l		<0.5
L **	n-Butylbenzene	µg/l		<0.5
L **	n-Propylbenzene	µg/l		<0.5
L **	o-Xylene	µg/l		<0.5
L **	sec-Butylbenzene	µg/l		<0.5
L **	Styrene	µg/l		<0.5
L **	t-1,2-Dichloroethene	µg/l		<0.5
L **	t-1,3-Dichloropropene	µg/l		<0.5
L **	tert-Butylbenzene	µg/l		<0.5
L **	Tetrachloroethene	µg/l		<0.5
L **	Toluene	µg/l		1
L **	Trichloroethene	µg/l		<0.5
L **	Trichlorofluoromethane	µg/l		<0.6
L **	Vinyl Chloride	µg/l		<0.5
L **	Clostridia Perfringens	no./100ml		0
L **	Enterococci	No/100ml		1
L **	Total Organic Carbon	mg/l C		<1.0
L	Turbidity	FTU		0.2
L **	Mercury	ug/l		<0.50
L **	Aluminium	ug/l		3.13
L **	Arsenic	ug/l		0.11
L **	Barium	ug/l		20.8
L **	Beryllium	ug/l		0.01
L **	Boron	ug/l		13.91
L **	Cadmium	ug/l		0.01
L **	Calcium	mg/l		151.28
L **	Cobalt	ug/l		0.23
L **	Iron	ug/l		-3.18
L **	Lead	ug/l		0.06
L **	Magnesium	mg/l		7.32
L **	Manganese	ug/l		0.6
L **	Nickel	ug/l		-0.4
L **	Potassium	mg/l		1.31
L **	Selenium	ug/l		0.81
L **	Sodium	mg/l		21.25
L **	Strontium	ug/l		204.02

			Laboratory Ref:	1421602
			Type of sample:	Groundwater
			Sampling point:	clear
			Sampled by:	EH & DB
			Time Sampled:	11:30
			Start/End - Dates of Analysis:	22-04-14/22-05-14
			Status of results:	**Final Report**
Parameter		**Units**	**Limits**	
L **	Thallium	ug/l		0
L **	Uranium	ug/l		0.52
L **	Vanadium	ug/l		0.24
L **	Antimony	ug/l		0.05
L **	Chromium	ug/l		0.41
L **	Copper	ug/l		0.14
L **	Molybdenum	ug/l		0.06
L **	Zinc	ug/l		10.85

Comments:

1) **Results hilighted and in bold are outside specified limits.**
2) **nm - "not measured".**
3) **nd - "none detected".**
4) **nt - "time not recorded".**
5) **nr - "not reported".**
6) **tntc - "too numerous to count".**
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8) **L - Lab measured parameter.**
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Signed: PP  Date: 12/Jun/2014

Caroline Bowden, Regional Chemist

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

Test Report

Report of: Analysis of landfill site sample(s)
Report to: North Tipperary County Council
Report date: 12/06/14

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

Date collected:	22/04/2014	Date received:	22/04/2014

			Laboratory Ref:	1421604	1421605	1421606	1421607	
			Type of sample:	Leachate	Leachate	Leachate	Leachate	
			Location code:	WST-W0078-01	WST-W0078-01-LL2	WST-W0078-01	WST-W0078-01-LM5	
			Sampling point:	LS3,Wedge Chamber-clear	brown	LS2-brown	dry,no sample	
			Sampled by:	EH & DB	EH & DB	EH & DB	EH & DB	
			Time Sampled:	12:41	12:50	12:20	12:22	
			Start/End - Dates of Analysis:	22-04-14/22-05-14	22-04-14/22-05-14	22-04-14/22-05-14	22-04-14/22-04-14	
			Status of results:	**Final Report**	**Final Report**	**Final Report**	**Final Report**	
Parameter		**Units**	**Limits**					
F **	Depth of Borehole	m		-	-	nm	-	
F **	Leachate Level	m		-	-	nm	-	
F	pH	pH		7.0	8.4	7.8	-	
F	Conductivity @25°C	µS/cm		750	2980	11220	-	
F	Salinity	‰		-	-	nm	-	
L	Ammonia	mg/l N		1.3	160	600	-	
L	Chloride	mg/l Cl		21	230	1350	-	
L	ortho-Phosphate	mg/l P		<0.010	0.018	1.9	-	
L	Total Oxidised Nitrogen	mg/l N		0.55	<0.20	<0.20	-	
L	Chemical Oxygen Demand	mg/l O2		31	226	1080	-	
L	BOD	mg/l O2		4.9	37	46	-	
L	Fluoride	mg/l F		<0.25	<.75	4.2	-	
L	Sulphate	mg/l SO4		43	42	<37.5	-	
L **	1,1,1,2-Tetrachloroethane	µg/l		<0.5	<0.5	<0.5	-	
L **	1,1,1-Trichloroethane	µg/l		<0.5	<0.5	<0.5	-	
L **	1,1,2,2-Tetrachloroethane	µg/l		<1	<1	<1	-	
L **	1,1,2-Trichloroethane	µg/l		<0.5	<0.5	<0.5	-	
L **	1,1-Dichloroethane	µg/l		<0.5	<0.5	<0.5	-	
L **	1,1-Dichloroethene	µg/l		<0.5	<0.5	<0.5	-	
L **	1,1-Dichloropropene	µg/l		<0.5	<0.5	<0.5	-	
L **	1,2,3-Trichlorobenzene	µg/l		<0.4	<0.4	<0.4	-	
L **	1,2,3-Trichloropropane	µg/l		<0.6	<0.6	<0.6	-	
L **	1,2,4-Trichlorobenzene	µg/l		<0.4	<0.4	<0.4	-	

			Laboratory Ref:	1421604	1421605	1421606	1421607	
			Type of sample:	Leachate	Leachate	Leachate	Leachate	
			Location code:	WST-W0078-01	WST-W0078-01-LL2	WST-W0078-01	WST-W0078-01-LM5	
			Sampling point:	LS3,Wedge Chamber-clear	brown	LS2-brown	dry,no sample	
			Sampled by:	EH & DB	EH & DB	EH & DB	EH & DB	
			Time Sampled:	12:41	12:50	12:20	12:22	
			Start/End - Dates of Analysis:	22-04-14/22-05-14	22-04-14/22-05-14	22-04-14/22-05-14	22-04-14/22-04-14	
			Status of results:	**Final Report**	**Final Report**	**Final Report**	**Final Report**	
Parameter		**Units**	**Limits**					
L **	1,2,4-Trimethylbenzene	µg/l		<0.5	<0.5	9.4	-	
L **	1,2-Dibromo-3-Chloropropane	µg/l		<1.3	<1.3	<1.3	-	
L **	1,2-Dibromoethane	µg/l		<0.5	<0.5	<0.5	-	
L **	1,2-Dichlorobenzene	µg/l		<0.5	<0.5	<0.5	-	
L **	1,2-Dichloroethane	µg/l		<0.5	<0.5	<0.5	-	
L **	1,2-Dichloropropane	µg/l		<0.5	<0.5	<0.5	-	
L **	1,3,5-Trimethylbenzene	µg/l		<0.5	<0.5	1.2	-	
L **	1,3-Dichlorobenzene	µg/l		<0.5	<0.5	<0.5	-	
L **	1,3-Dichloropropane	µg/l		<0.5	<0.5	<0.5	-	
L **	1,4-Dichlorobenzene	µg/l		<0.5	<0.5	<0.5	-	
L **	2,2-Dichloropropane	µg/l		<0.5	<0.5	<0.5	-	
L **	2-Chlorotoluene	µg/l		<0.5	<0.5	<0.5	-	
L **	4-Chlorotoluene	µg/l		<0.5	<0.5	<0.5	-	
L **	4-Isopropyltoluene	µg/l		<0.5	<0.5	0.5	-	
L **	Benzene	µg/l		<0.5	<0.5	0.9	-	
L **	Bromobenzene	µg/l		<0.5	<0.5	<0.5	-	
L **	Bromochloromethane	µg/l		<0.5	<0.5	<0.5	-	
L **	Bromodichloromethane	µg/l		<0.5	<0.5	<0.5	-	
L **	Bromoform	µg/l		<0.5	<0.5	<0.5	-	
L **	Bromomethane	µg/l		<0.5	<0.5	<0.5	-	
L **	c-1,2-Dichloroethene	µg/l		<0.5	<0.5	<0.5	-	
L **	c-1,3-Dichloropropene	µg/l		<0.5	<0.5	<0.5	-	
L **	Carbon Tetrachloride	µg/l		<0.5	<0.5	<0.5	-	

			Laboratory Ref:	1421604	1421605	1421606	1421607	
			Type of sample:	Leachate	Leachate	Leachate	Leachate	
			Location code:	WST-W0078-01	WST-W0078-01-LL2	WST-W0078-01	WST-W0078-01-LM5	
			Sampling point:	LS3,Wedge Chamber-clear	brown	LS2-brown	dry,no sample	
			Sampled by:	EH & DB	EH & DB	EH & DB	EH & DB	
			Time Sampled:	12:41	12:50	12:20	12:22	
			Start/End - Dates of Analysis:	22-04-14/22-05-14	22-04-14/22-05-14	22-04-14/22-05-14	22-04-14/22-04-14	
			Status of results:	**Final Report**	**Final Report**	**Final Report**	**Final Report**	
Parameter		**Units**	**Limits**					
L **	Chlorobenzene	µg/l		<0.5	<0.5	0.8	-	
L **	Chloroform	µg/l		<0.5	<0.5	<0.5	-	
L **	Dibromochloromethane	µg/l		<0.5	<0.5	<0.5	-	
L **	Dibromomethane	µg/l		<0.5	<0.5	<0.5	-	
L **	Dichlorodifluoromethane	µg/l		<0.5	<0.5	<0.5	-	
L **	Dichloromethane	µg/l		<0.5	<0.5	<0.5	-	
L **	Ethylbenzene	µg/l		<0.5	<0.5	3	-	
L **	Hexachlorobutadiene	µg/l		<0.1	<0.1	<0.1	-	
L **	Isopropylbenzene	µg/l		<0.5	<0.5	1.5	-	
L **	m,p-Xylene	µg/l		<0.5	<0.5	4.2	-	
L **	Naphthalene	µg/l		<0.5	<0.5	0.8	-	
L **	n-Butylbenzene	µg/l		<0.5	<0.5	<0.5	-	
L **	n-Propylbenzene	µg/l		<0.5	<0.5	1.1	-	
L **	o-Xylene	µg/l		<0.5	<0.5	6	-	
L **	sec-Butylbenzene	µg/l		<0.5	<0.5	<0.5	-	
L **	Styrene	µg/l		<0.5	<0.5	<0.5	-	
L **	t-1,2-Dichloroethene	µg/l		<0.5	<0.5	<0.5	-	
L **	t-1,3-Dichloropropene	µg/l		<0.5	<0.5	<0.5	-	
L **	tert-Butylbenzene	µg/l		<0.5	<0.5	<0.5	-	
L **	Tetrachloroethene	µg/l		<0.5	<0.5	<0.5	-	
L **	Toluene	µg/l		<0.5	0.7	1.7	-	
L **	Trichloroethene	µg/l		<0.5	<0.5	<0.5	-	
L **	Trichlorofluoromethane	µg/l		<0.6	<0.6	<0.6	-	

			Laboratory Ref:	1421604	1421605	1421606	1421607	
			Type of sample:	Leachate	Leachate	Leachate	Leachate	
			Location code:	WST-W0078-01	WST-W0078-01-LL2	WST-W0078-01	WST-W0078-01-LM5	
			Sampling point:	LS3,Wedge Chamber-clear	brown	LS2-brown	dry,no sample	
			Sampled by:	EH & DB	EH & DB	EH & DB	EH & DB	
			Time Sampled:	12:41	12:50	12:20	12:22	
			Start/End - Dates of Analysis:	22-04-14/22-05-14	22-04-14/22-05-14	22-04-14/22-05-14	22-04-14/22-04-14	
			Status of results:	**Final Report**	**Final Report**	**Final Report**	**Final Report**	
Parameter		**Units**	**Limits**					
L **	Vinyl Chloride	µg/l		<0.5	<0.5	<0.5	-	
L **	Mercury	ug/l		<0.50	<0.50	<0.50	-	
L **	Aluminium	ug/l		5.52	12.55	140.08	-	
L **	Arsenic	ug/l		1.88	7.46	23.84	-	
L **	Barium	ug/l		78.09	163.49	239.85	-	
L **	Beryllium	ug/l		0.02	0.03	0.13	-	
L **	Boron	ug/l		50.53	831.69	3025.41	-	
L **	Cadmium	ug/l		0.01	0	<0.1	-	
L **	Calcium	mg/l		110.27	53.83	81.71	-	
L **	Cobalt	ug/l		1.57	4.5	17.96	-	
L **	Iron	ug/l		926.49	828.44	8603.77	-	
L **	Lead	ug/l		0.2	0.08	2.23	-	
L **	Magnesium	mg/l		11.03	40.12	135.96	-	
L **	Manganese	ug/l		295.69	250.56	582.64	-	
L **	Nickel	ug/l		3.96	26.1	110.24	-	
L **	Potassium	mg/l		8.29	133.94	529.71	-	
L **	Selenium	ug/l		-0.01	0.26	0.43	-	
L **	Sodium	mg/l		34.95	243.44	1085.98	-	
L **	Strontium	ug/l		228.02	285.78	470.89	-	
L **	Thallium	ug/l		0.05	0.01	0.02	-	
L **	Uranium	ug/l		0.97	0.34	0.14	-	
L **	Vanadium	ug/l		0.14	2.01	22.53	-	
L **	Antimony	ug/l		0.4	0.52	1.14	-	

			Laboratory Ref:	1421604	1421605	1421606	1421607	
			Type of sample:	Leachate	Leachate	Leachate	Leachate	
			Location code:	WST-W0078-01	WST-W0078-01-LL2	WST-W0078-01	WST-W0078-01-LM5	
			Sampling point:	LS3,Wedge Chamber-clear	brown	LS2-brown	dry,no sample	
			Sampled by:	EH & DB	EH & DB	EH & DB	EH & DB	
			Time Sampled:	12:41	12:50	12:20	12:22	
			Start/End - Dates of Analysis:	22-04-14/22-05-14	22-04-14/22-05-14	22-04-14/22-05-14	22-04-14/22-04-14	
			Status of results:	**Final Report**	**Final Report**	**Final Report**	**Final Report**	
Parameter		**Units**	**Limits**					
L **	Chromium	ug/l		0.57	8.16	40.65	-	
L **	Copper	ug/l		1.18	0.6	47.37	-	
L **	Molybdenum	ug/l		0.93	0.6	2.11	-	
L **	Zinc	ug/l		16.86	18.92	55.05	-	

Comments:

1) **Results hilighted and in bold are outside specified limits.**
2) **nm - "not measured".**
3) **nd - "none detected".**
4) **nt - "time not recorded".**
5) **nr - "not reported".**
6) **tntc - "too numerous to count".**
7) **F - Field measured parameter.**
8) **L - Lab measured parameter.**
9) **** - Results produced by non-accredited analytical methods.**
10) **Test Reports relate only to the samples tested and as described on the report form.**
11) **Test Reports shall not be reproduced, except in full, without consent of the EPA.**
12) **The laboratory is accredited by INAB only for the parameters listed in the Scope of Accreditation.**
13) **Opinions and interpretations are not included in the scope of INAB accreditation.**

Signed: PP

Caroline Bowden, Regional Chemist

Date: 12/Jun/2014

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

Test Report

Report of: Analysis of landfill site sample(s)
Report to: North Tipperary County Council
Report date: 12/06/14

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

Date collected: 22/04/2014 Date received: 22/04/2014

			Laboratory Ref:	1421608	1421609	1421610
			Type of sample:	Leachate	Leachate	Leachate
			Location code:	WST-W0078-01-LFG22	WST-W0078-01-LM8	WST-W0078-01
			Sampling point:	dry, no sample	dry, no sample	LM10-dry, no sample
			Sampled by:	EH & DB	EH & DB	EH & DB
			Time Sampled:	12:26	12:28	12:33
			Start/End - Dates of Analysis:	22-04-14/22-04-14	22-04-14/22-04-14	22-04-14/22-04-14
			Status of results:	**Final Report**	**Final Report**	**Final Report**
Parameter		**Units**	**Limits**			
L	Time sampled			12:26		

Comments:

1) **Results hilighted and in bold are outside specified limits.**
2) **nm - "not measured".**
3) **nd - "none detected".**
4) **nt - "time not recorded".**
5) **nr - "not reported".**
6) **tntc - "too numerous to count".**
7) **F - Field measured parameter.**
8) **L - Lab measured parameter.**
9) **** - Results produced by non-accredited analytical methods.**
10) **Test Reports relate only to the samples tested and as described on the report form.**
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13) **Opinions and interpretations are not included in the scope of INAB accreditation.**

Signed: PP _____ Date: 12/Jun/2014

Caroline Bowden, Regional Chemist

ALcontrol Laboratories

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Environmental Protection Agency
Seville Lodge
Callan Road
Kilkenny

Attention: Jean Smith

CERTIFICATE OF ANALYSIS

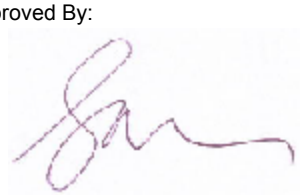
Date:	02 May 2014
Customer:	D_EPA_KKY
Sample Delivery Group (SDG):	140426-21
Your Reference:	
Location:	
Report No:	268659

We received 4 samples on Friday April 25, 2014 and 4 of these samples were scheduled for analysis which was completed on Friday May 02, 2014. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

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

All chemical testing (unless subcontracted) is performed at ALcontrol Hawarden Laboratories.

Approved By:



Sonia McWhan

Operations Manager

CERTIFICATE OF ANALYSIS

SDG:	140426-21	**Location:**		**Order Number:**	50399
Job:	D_EPA_KKY-22	**Customer:**	Environmental Protection Agency	**Report Number:**	268659
Client Reference:		**Attention:**	Jean Smith	**Superseded Report:**	

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
9194670	BLANK		0.00 - 0.00	22/04/2014
9194672	LL2-1605		0.00 - 0.00	22/04/2014
9194673	LS2-1606		0.00 - 0.00	22/04/2014
9194671	LS3-1604		0.00 - 0.00	22/04/2014

Only received samples which have had analysis scheduled will be shown on the following pages.

CERTIFICATE OF ANALYSIS

SDG:	140426-21	**Location:**		**Order Number:**	50399
Job:	D_EPA_KKY-22	**Customer:**	Environmental Protection Agency	**Report Number:**	268659
Client Reference:		**Attention:**	Jean Smith	**Superseded Report:**	

LIQUID

Results Legend

X Test

N No Determination Possible

			Lab Sample No(s)	Customer Sample Reference	AGS Reference	Depth (m)	Container
			9194670	BLANK		0.00 - 0.00	NaOH (ALE245)
			9194672	LL2-1605		0.00 - 0.00	NaOH (ALE245)
			9194673	LS2-1606		0.00 - 0.00	NaOH (ALE245)
			9194671	LS3-1604		0.00 - 0.00	NaOH (ALE245)
Cyanide Comp/Free/Total/Thiocyanate	All	NDPs: 0 Tests: 4	X	X	X	X	

CERTIFICATE OF ANALYSIS

SDG:	140426-21	**Location:**		**Order Number:**	50399
Job:	D_EPA_KKY-22	**Customer:**	Environmental Protection Agency	**Report Number:**	268659
Client Reference:		**Attention:**	Jean Smith	**Superseded Report:**	

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample R	BLANK	LL2-1605	LS2-1606	LS3-1604		
			Depth (m)	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00		
			Sample Type	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)		
			Date Sampled	22/04/2014	22/04/2014	22/04/2014	22/04/2014		
			Sample Time	.	.	.	.		
			Date Received	25/04/2014	25/04/2014	25/04/2014	25/04/2014		
			SDG Ref	140426-21	140426-21	140426-21	140426-21		
			Lab Sample No.(s)	9194670	9194672	9194673	9194671		
			AGS Reference						
Cyanide, Total	<0.05 mg/l	TM227		<0.05 @ #	<0.05 @ #	<0.05 @ #	<0.05 @ #		

CERTIFICATE OF ANALYSIS

SDG:	140426-21	**Location:**		**Order Number:**	50399
Job:	D_EPA_KKY-22	**Customer:**	Environmental Protection Agency	**Report Number:**	268659
Client Reference:		**Attention:**	Jean Smith	**Superseded Report:**	

Table of Results - Appendix

Method No	Reference	Description	Wet/Dry Sample [1]	Surrogate Corrected
TM227	Standard methods for the examination of waters and wastewaters 20th Edition, AWWA/APHA Method 4500.	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate		

[1] Applies to Solid samples only. DRY indicates samples have been dried at 35°C. NA = not applicable.

CERTIFICATE OF ANALYSIS

SDG:	140426-21	**Location:**		**Order Number:**	50399
Job:	D_EPA_KKY-22	**Customer:**	Environmental Protection Agency	**Report Number:**	268659
Client Reference:		**Attention:**	Jean Smith	**Superseded Report:**	

Test Completion Dates

Lab Sample No(s)	9194670	9194672	9194673	9194671
Customer Sample Ref.	BLANK	LL2-1605	LS2-1606	LS3-1604
AGS Ref.				
Depth	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
Type	LIQUID	LIQUID	LIQUID	LIQUID
Cyanide Comp/Free/Total/Thiocyanate	02-May-2014	02-May-2014	02-May-2014	02-May-2014

SDG:	140426-21	**Location:**		**Order Number:**	50399
Job:	D_EPA_KKY-22	**Customer:**	Environmental Protection Agency	**Report Number:**	268659
Client Reference:		**Attention:**	Jean Smith	**Superseded Report:**	

Appendix
General

1. Results are expressed on a dry weight basis (dried at 35ºC) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH4 by the BRE method, VOC TICS and SVOC TICS.

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

3. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALcontrol Laboratories reserve the right to charge for samples received and stored but not analysed.

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

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

6. When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as “Not detected”. If no asbestos fibre types are found all will be reported as “Not detected” and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible. The quantity of asbestos present is not determined unless specifically requested.

7. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.

9. NDP -No determination possible due to insufficient/unsuitable sample.

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

11. Results relate only to the items tested.

12. LODs for wet tests reported on a dry weight basis are not corrected for moisture content.

13. **Surrogate recoveries** -Most of our organic methods include surrogates, the recovery of which is monitored and reported. For EPH, MO, PAH, GRO and VOCs on soils the result is not surrogate corrected, but a percentage recovery is quoted. Acceptable limits for most organic methods are 70 -130 %.

14. **Product analyses** -Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors
employed.

15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethyphenol, 3,5 Dimethylphenol).

16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 15).

17. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

18. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

19. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

20. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

21. For all leachate preparations (NRA, DIN, TCLP, BSEN 12457-1, 2, 3) volatile loss may occur, as we do not employ zero headspace extraction.

22. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

23. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

Sample Deviations

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
4	Holding time exceeded before sample received
5	Samples exceeded holding time before presevation was performed
§	Sampled on date not provided
♦	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to sampled on date
&	Sample Holding Time exceeded - Late arrival of instructions.

Asbestos

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using Alcontrol Laboratories (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using Alcontrol Laboratories (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: -
Trace -Where only one or two asbestos fibres were identified.

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.

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

ISO 17025 IVNAB ACCREDITED TESTING DETAILED IN SCOPE REG NO.113T

Test Report

Report of: Analysis of landfill site sample(s)
Report to: Tipperary County Council
Report date: 21/08/14

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

Date collected:	09/07/2014	Date received:	09/07/2014

			Laboratory Ref:	1422622	1422623	1422624	1422625	1422626	1422627	
			Type of sample:	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	
			Location code:	WST-W0078-01-SW4	WST-W0078-01-SW1	WST-W0078-01-SWD	WST-W0078-01-SW2	WST-W0078-01-SW6	WST-W0078-01 - SWD3	
			Sampling point:	Clear with solids	Clear	No flow - no sample	Clear	Clear	Clear	
			Sampled by:	DB/MB	DB/MB	DB/MB	DB/MB	DB/MB	DB/MB	
			Time Sampled:	09:40	09:50	11:40	12:20	12:40	12:50	
			Start/End - Dates of Analysis:	09-07-14/15-07-14	09-07-14/15-07-14	09-07-14/09-07-14	09-07-14/15-07-14	09-07-14/15-07-14	09-07-14/15-07-14	
			Status of results:	**Final Report**	**Final Report**	**Final Report**	**Final Report**	**Final Report**	**Final Report**	
Parameter		**Units**	**Limits**							
F **	Temperature	℃		12.3	11.9	-	12.6	14.1	14.7	
F **	Dissolved Oxygen (as %Sat)	% Saturation		37.0	72.0	-	88.0	109.0	110.0	
F	pH	pH		7.5	7.5	-	7.2	8.0	8.1	
F	Conductivity @25℃	µS/cm		717	779	-	793	562	520	
L	BOD	mg/l O2		1.2	<1.0	-	<1.0	<1.0	<1.0	
L	Chemical Oxygen Demand	mg/l O2		70	23	-	<20	<20	<20	
L	Ammonia	mg/l N		0.14	0.031	-	0.027	0.03	0.026	
L	Chloride	mg/l Cl		20	24	-	27	20	19	
L	Suspended Solids	mg/l		26	7	-	10	<4	4	

Comments:

1) **Results hilighted and in bold are outside specified limits.**
2) **nm - "not measured".**
3) **nd - "none detected".**
4) **nt - "time not recorded".**
5) **nr - "not reported".**
6) **tntc - "too numerous to count".**
7) **F - Field measured parameter.**
8) **L - Lab measured parameter.**
9) **** - Results produced by non-accredited analytical methods.**
10) **Test Reports relate only to the samples tested and as described on the report form.**
11) **Test Reports shall not be reproduced, except in full, without consent of the EPA.**
12) **The laboratory is accredited by INAB only for the parameters listed in the Scope of Accreditation.**
13) **Opinions and interpretations are not included in the scope of INAB accreditation.**

Signed: PP 

Caroline Bowden, Regional Chemist

Date: 21/Aug/2014

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

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 113T

Test Report

Report of: Analysis of landfill site sample(s)
Report to: Tipperary County Council
Report date: 21/08/14

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

Date collected:	09/07/2014	Date received:	09/07/2014

			Laboratory Ref:	1422628	1422629	1422630	1422631	1422632	1422633	
			Type of sample:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	
			Location code:	WST-W0078-01-BH3new	WST-W0078-01-GW9new	WST-W0078-01-GW10new	WST-W0078-01-Bressons	WST-W0078-01-GW12	WST-W0078-01-GW5new	
			Sampling point:	Clear	Clear	Clear	Not sampled - connected to mains	clear	clear	
			Sampled by:	DB/MB	DB/MB	DB/MB	DB/MB	db/mb	db/mb	
			Time Sampled:	10:05	10:20	10:45	10:40	11:00	11:30	
			Start/End - Dates of Analysis:	09-07-14/18-07-14	09-07-14/18-07-14	09-07-14/21-07-14	09-07-14/09-07-14	09-07-14/18-07-14	09-07-14/18-07-14	
			Status of results:	**Final Report**	**Final Report**	**Final Report**	**Final Report**	**Final Report**	**Final Report**	
Parameter		**Units**	**Limits**							
F **	Depth of Borehole	m		12.3	13.5	13.3	-	nm	14	
F **	Water Level	m		7	8.7	9.3	-	nm	11.8	
F **	Temperature	℃		11.2	11.6	13.2	-	12.8	11.0	
F **	Dissolved Oxygen (as %Sat)	% Saturation		21.7	18.0	72.0	-	83.0	21.0	
F	pH	pH		6.7	6.8	6.7	-	6.4	6.5	
F	Conductivity @25℃	µS/cm		1037	1277	773	-	786	671	
L	Ammonia	mg/l N		0.079	9.2	<0.020	-	0.091	0.58	
L	Chloride	mg/l Cl		59	119	39	-	46	18	
L	Fluoride	mg/l F		<0.4	<0.4	<0.20	-	<0.20	<0.20	
L	Sulphate	mg/l SO4		22.3	28.9	19.4	-	15.1	21.8	
L **	E Coli	per 100ml		-	-	-	-	10	-	
L **	Total coliforms	No/100 ml		-	-	-	-	17000	-	

Comments:

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Signed: PP 

Caroline Bowden, Regional Chemist

Date: 21/Aug/2014

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

Test Report

Report of: Analysis of landfill site sample(s)
Report to: Tipperary County Council
Report date: 21/08/14

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

Date collected:	09/07/2014	Date received:	09/07/2014

			Laboratory Ref:	1422634	1422635	1422636	1422637	1422638	1422639	1422640
			Type of sample:	Leachate	Leachate	Leachate	Leachate	Leachate	Leachate	Leachate
			Location code:	WST-W0078-01-L	WST-W0078-01-LL2	WST-W0078-01-L	WST-W0078-01-LFG22	WST-W0078-01-L	WST-W0078-01-L	WST-W0078-01-L
			Sampling point:	LS3 Taken from chamber - clear	Green	LS2 Manhole - brown	Dry - no sample	LM08 - dry - no sample	LM10 dry - no sample	LM05 dry - no sample
			Sampled by:	DB/MB	DB/MB	DB/MB	DB/MB	DB/MB	DB/MB	DB/MB
			Time Sampled:	11:15	11:20	12:00	11:54	11:48	11:51	12:10
			Start/End - Dates of Analysis:	09-07-14/15-07-14	09-07-14/15-07-14	09-07-14/15-07-14	09-07-14/09-07-14	09-07-14/09-07-14	09-07-14/09-07-14	09-07-14/09-07-14
			Status of results:	**Final Report**	**Final Report**	**Final Report**	**Final Report**	**Final Report**	**Final Report**	**Final Report**
Parameter		**Units**	**Limits**							
F **	Depth of Borehole	m		nm	nm	nm	-	-	-	-
F **	Leachate Level	m		nm	nm	nm	-	-	-	-
F **	Temperature	℃		15.8	19.8	12.7	-	-	-	-
F	pH	pH		6.7	7.8	8.0	-	-	-	-
F	Conductivity @25℃	µS/cm		3360	3340	11260	-	-	-	-
L	BOD	mg/l O2		8.7	29	<60	-	-	-	-
L	Chemical Oxygen Demand	mg/l O2		145	312	1100	-	-	-	-
L	Ammonia	mg/l N		190	180	730	-	-	-	-
L	Chloride	mg/l Cl		231	279	1390	-	-	-	-

Comments:

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Signed: PP 

Caroline Bowden, Regional Chemist

Date: 21/Aug/2014

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

ISO 17025 IVNAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 113T

Test Report

Report of: Analysis of landfill site sample(s)
Report to: Tipperary County Council
Report date: 16/10/14

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

Date collected: 24/09/2014 Date received: 24/09/2014

			Laboratory Ref:	1423965	1423966	1423967
			Type of sample:	Leachate	Leachate	Leachate
			Location code:	WST-W0078-01-LS3	WST-W0078-01-LL2	WST-W0078-01-LS2
			Sampling point:	Brownish	Green	Dark
			Sampled by:	DB/SB	DB/SB	DB/SB
			Time Sampled:	12:30	12:40	12:15
			Start/End - Dates of Analysis:	24-09-14/30-09-14	24-09-14/30-09-14	24-09-14/30-09-14
			Status of results:	**Final Report**	**Final Report**	**Final Report**
	Parameter	**Units**	**Limits**			
F **	Depth of Borehole	m		NM	NM	NM
F **	Leachate Level	m		NM	NM	NM
F **	Temperature	°C		16.2	17.3	13.1
F	pH	pH		6.8	7.5	8.0
F	Conductivity @25°C	µS/cm		901	3040	11360
F **	Dissolved Oxygen (as %Sat)	% Saturation		nm	nm	nm
L	BOD	mg/l O2		4.9	41	60
L	Chemical Oxygen Demand	mg/l O2		38	337	1200
L	Ammonia	mg/l N		13	130	0.14

Comments:

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Signed: PP _____ Date: 16/Oct/2014

Caroline Bowden, Regional Chemist

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

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 113T

Test Report

Report of:	Analysis of landfill site sample(s)
Report to:	Tipperary County Council
Report date:	16/10/14

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

Date collected:	24/09/2014	Date received:	24/09/2014

			Laboratory Ref:	1423953	1423954	1423955	1423956	1423957	1423958	
			Type of sample:	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	
			Location code:	WST-W0078-01-SW4	WST-W0078-01-SW1	WST-W0078-01-SW2	WST-W0078-01 -SWD3	WST-W0078-01-SW6	WST-W0078-01-SWD	
			Sampling point:	Brown, low flow	Clear	Clear	Clear	Clear	Clear	
			Sampled by:	DB/SB	DB/SB	DB/SB	DB/SB	DB/SB	DB/SB	
			Time Sampled:	10:00	10:10	12:48	13:10	13:05	11:50	
			Start/End - Dates of Analysis:	24-09-14/30-09-14	24-09-14/30-09-14	24-09-14/30-09-14	24-09-14/30-09-14	24-09-14/30-09-14	24-09-14/30-09-14	
			Status of results:	**Final Report**	**Final Report**	**Final Report**	**Final Report**	**Final Report**	**Final Report**	
Parameter		**Units**	**Limits**							
F **	Temperature	°C		12.2	12.2	12.3	13.1	12.8	16.0	
F **	Dissolved Oxygen (as %Sat)	% Saturation		28.0	70.1	74.0	105.0	99.0	97.0	
F	pH	pH		7.2	7.5	7.6	8.0	7.6	7.6	
F	Conductivity @25°C	µS/cm		702	753	782	442	484	124	
L	BOD	mg/l O2		1.2	<1.0	<1.0	<1.0	<1.0	2.1	
L	Chemical Oxygen Demand	mg/l O2		59	26	23	<20	<20	20	
L	Ammonia	mg/l N		0.28	0.12	0.028	0.036	0.037	0.2	
L	Suspended Solids	mg/l		75	11	12	<4	<4	7	
L	Chloride	mg/l		-	-	-	-	-	4	
L	Chloride	mg/l Cl		19	20	25	16	17	-	

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Signed: PP _____ Date: 16/Oct/2014

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Kilkenny

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 113T

Test Report

Report of:	Analysis of landfill site sample(s)
Report to:	Tipperary County Council
Report date:	16/10/14

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

Date collected:	24/09/2014	Date received:	24/09/2014

			Laboratory Ref:	1423959	1423960	1423961	1423962	1423963	1423964	
			Type of sample:	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	
			Location code:	WST-W0078-01-BH3new	WST-W0078-01-GW9new	WST-W0078-01-GW10new	WST-W0078-01-GW12	WST-W0078-01-GW5new	WST-W0078-01-GW Cullinan	
			Sampling point:	Clear	Clear	Clear	Clear	Clear	No sample, pump house gone	
			Sampled by:	DB/SB	DB/SB	DB/SB	DB/SB	DB/SB	DB/SB	
			Time Sampled:	10:20	10:30	10:45	10:55	11:39	12:55	
			Start/End - Dates of Analysis:	24-09-14/01-10-14	24-09-14/01-10-14	24-09-14/01-10-14			24-09-14/24-09-14	
			Status of results:	**Final Report**	**Final Report**	**Final Report**	**Final Report**	**Final Report**	**Final Report**	
Parameter		**Units**	**Limits**							
F **	Depth of Borehole	m		12.3	13.5	13.3	NM	14	-	
F **	Water Level	m		6.3	5	9	NM	11.7	-	
F **	Temperature	°C		11.0	12.2	11.9	12.3	10.8	-	
F **	Dissolved Oxygen (as %Sat)	% Saturation		18.7	21.3	39.1	43.5	17.0	-	
F	pH	pH		6.9	6.7	6.8	6.8	6.7	-	
F	Conductivity @25°C	µS/cm		1079	1507	791	805	682	-	
L	Ammonia	mg/l N		0.11	13	0.035	0.083	1.7	-	
L	Chloride	mg/l Cl		67	165	39	46	17	-	
L	Fluoride	mg/l F		<0.4	<0.4	0.25	<0.20	<0.20	-	
L	Sulphate	mg/l SO4		25	32	19	17	23	-	
L **	E Coli	per 100ml		-	-	-	10	-	-	
L **	Total coliforms	No/100 ml		-	-	-	740	-	-	

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

ISO 17025 IVNAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 113T

Test Report

Report of: Analysis of landfill site sample(s)
Report to: Tipperary County Council
Report date: 16/10/14

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

Date collected: 24/09/2014 Date received: 24/09/2014

			Laboratory Ref:	1423965	1423966	1423967
			Type of sample:	Leachate	Leachate	Leachate
			Location code:	WST-W0078-01-LS3	WST-W0078-01-LL2	WST-W0078-01-LS2
			Sampling point:	Brownish	Green	Dark
			Sampled by:	DB/SB	DB/SB	DB/SB
			Time Sampled:	12:30	12:40	12:15
			Start/End - Dates of Analysis:	24-09-14/30-09-14	24-09-14/30-09-14	24-09-14/30-09-14
			Status of results:	**Final Report**	**Final Report**	**Final Report**
	Parameter	**Units**	**Limits**			
F **	Depth of Borehole	m		NM	NM	NM
F **	Leachate Level	m		NM	NM	NM
F **	Temperature	°C		16.2	17.3	13.1
F	pH	pH		6.8	7.5	8.0
F	Conductivity @25°C	µS/cm		901	3040	11360
F **	Dissolved Oxygen (as %Sat)	% Saturation		nm	nm	nm
L	BOD	mg/l O2		4.9	41	60
L	Chemical Oxygen Demand	mg/l O2		38	337	1200
L	Ammonia	mg/l N		13	130	0.14

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Signed: PP _____ Date: 16/Oct/2014

Caroline Bowden, Regional Chemist

APPENDIX 4

Incident No.	Incident Nature	Category	Raised By	Status	CI-Refs	Incident Date	Date Submitted	Date Closed
INCI006985	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	02/11/2014 00:00	03/03/2015 15:12	
INCI006984	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	02/11/2014 00:00	03/03/2015 15:10	
INCI006983	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	02/11/2014 00:00	03/03/2015 15:08	
INCI006982	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	02/11/2014 00:00	03/03/2015 15:06	
INCI006981	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	02/11/2014 00:00	03/03/2015 15:04	
INCI006980	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	02/11/2014 00:00	03/03/2015 15:02	
INCI006979	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	02/11/2014 00:00	03/03/2015 15:00	
INCI006978	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	02/11/2014 00:00	03/03/2015 14:59	
INCI006977	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	02/11/2014 00:00	03/03/2015 14:57	
INCI006976	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	02/11/2014 00:00	03/03/2015 14:55	
INCI006975	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	02/11/2014 00:00	03/03/2015 14:49	
INCI006974	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	02/11/2014 00:00	03/03/2015 14:47	
INCI006973	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	02/11/2014 00:00	03/03/2015 14:45	
INCI006972	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	02/11/2014 00:00	03/03/2015 14:43	

INCI006971	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	02/11/2014 00:00	03/03/2015 14:41	
INCI006970	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	02/11/2014 00:00	03/03/2015 14:39	
INCI006969	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	02/11/2014 00:00	03/03/2015 14:36	
INCI006968	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	01/03/2015 17:00	03/03/2015 14:03	
INCI006967	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	01/03/2015 17:00	03/03/2015 14:01	
INCI006966	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	01/03/2015 17:00	03/03/2015 13:59	
INCI006965	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	24/02/2015 06:00	03/03/2015 13:32	
INCI006964	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	24/02/2015 06:00	03/03/2015 13:30	
INCI006642	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	01/02/2015 13:00	02/02/2015 10:41	
INCI006641	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	01/02/2015 13:00	02/02/2015 10:39	
INCI006640	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	02/11/2014 00:00	02/02/2015 10:35	
INCI006639	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	13/11/2014 00:00	02/02/2015 10:31	
INCI006638	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	13/11/2014 00:00	02/02/2015 10:28	
INCI006628	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	13/11/2014 00:00	30/01/2015 14:38	
INCI006627	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	13/11/2014 00:00	30/01/2015 14:36	

INCI006626	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	13/11/2014 00:00	30/01/2015 14:29	
INCI006625	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	13/11/2014 00:00	30/01/2015 14:27	
INCI006607	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	13/11/2014 00:00	27/01/2015 21:15	
INCI006606	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	13/11/2014 00:00	27/01/2015 21:12	
INCI006605	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	13/11/2014 00:00	27/01/2015 21:09	
INCI006604	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	13/11/2014 00:00	27/01/2015 21:05	
INCI006603	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	13/11/2014 00:00	27/01/2015 21:02	
INCI006602	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	13/11/2014 00:00	27/01/2015 20:59	
INCI006601	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	13/11/2014 00:00	27/01/2015 20:39	
INCI006600	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	13/11/2014 00:00	27/01/2015 20:35	
INCI006599	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	13/11/2014 00:00	27/01/2015 20:31	
INCI006598	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	13/11/2014 00:00	27/01/2015 20:28	
INCI006597	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	13/11/2014 00:00	27/01/2015 20:24	
INCI006596	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	13/11/2014 00:00	27/01/2015 20:21	
INCI006595	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	13/11/2014 00:00	27/01/2015 20:18	

INCI006594	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	13/11/2014 00:00	27/01/2015 20:15	
INCI006593	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	13/11/2014 00:00	27/01/2015 20:11	
INCI006591	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	13/11/2014 00:00	27/01/2015 16:47	
INCI006590	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	13/11/2014 00:00	27/01/2015 16:45	
INCI006589	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	13/11/2014 00:00	27/01/2015 16:43	
INCI006588	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	13/11/2014 00:00	27/01/2015 16:40	
INCI006587	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	13/11/2014 00:00	27/01/2015 16:37	
INCI006586	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	13/11/2014 00:00	27/01/2015 16:35	
INCI006585	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	13/11/2014 00:00	27/01/2015 16:33	
INCI006584	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	13/11/2014 00:00	27/01/2015 16:31	
INCI006583	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	13/11/2014 00:00	27/01/2015 16:29	
INCI006582	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	13/11/2014 00:00	27/01/2015 16:27	
INCI006581	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	13/11/2014 00:00	27/01/2015 16:25	
INCI006580	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	13/11/2014 00:00	27/01/2015 16:23	
INCI006579	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	13/11/2014 00:00	27/01/2015 16:20	

INCI006578	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	13/11/2014 00:00	27/01/2015 16:18	
INCI006577	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	13/11/2014 00:00	27/01/2015 16:05	
INCI006576	Trigger Level Reached	1	Louise Ryan	Open-CI	CI000136	13/11/2014 00:00	27/01/2015 15:55	
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APPENDIX 5

Ballaghveny 2014 Leachate

	Tonnes to Limerick Main Drainage	Tonnes to Kilkenny WWTP	Tonnes to Thurles WWTP	Tonnes to Rilta Facility Rathcoole	Total by Month
Jan-14	1919.31	150			2069.31
Feb-14	1808.84	180			1988.84
Mar-14	2215.1	165			2380.1
Apr-14		105			105
May-14			31		31
Jun-14				1392.22	1392.22
Jul-14				1103.1	1103.1
Aug-14				642.34	642.34
Sep-14				1003.3	1003.3
Oct-14				584.34	584.34
Nov-14				970.64	970.64
Dec-14				1308.38	1308.38
Total by Location	5943.25	600	31	7004.32	13578.57

APPENDIX 6

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john@odourireland.ie
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W0078-03-VOC/SURFACEEMISSIONS/2014/1 LANDFILL GAS SURFACE EMISSIONS SURVEY AT BALLAGHVENY LANDFILL, BALLYMACKEY, CO. TIPPERARY

PERFORMED BY ODOUR MONITORING IRELAND ON BEHALF OF TIPPERARY COUNTY COUNCIL

PREPARED BY:	Dr. John Casey
ATTENTION:	Ms. Olga Doyle
LICENCE NUMBER:	WL0078-3
LICENCE HOLDER:	Tipperary County Council
FACILITY NAME:	Ballaghveny Landfill Facility
DATE OF MONITORING VISIT:	30th Jul. 2014
NAME AND ADDRESS OF CLIENT ORGANISATION:	Ballaghveny Landfill, Ballymackey, Co. Tipperary
NAME AND ADDRESS OF MONITORING ORGANISATION:	Odour Monitoring Ireland, Unit 32 DeGranville Court, Dublin Road, Trim, Co. Meath
DATE OF REPORTING:	13th Aug. 2014
NAME AND THE FUNCTION OF THE PERSON APPROVING THE REPORT:	Dr. Brian Sheridan, Managing Partner, Odour Monitoring Ireland
REPORT NUMBER:	2014327
REVIEWERS:	Dr. Brian Sheridan

TABLE OF CONTENTS

DOCUMENT AMENDMENT RECORD

Client: ***Tipperary County Council***

Title: W0078-03-VOC/SurfaceEmissions/2014/1 Landfill Gas Surface emissions Survey at Ballaghveny Landfill, Ballymackey, Co. Tipperary.

Project Number: 2014327			**Document Reference:** W0078-03-VOC/SurfaceEmissions/2014/1		
2014327(1)	Document for review	JWC	BAS	JWC	13/08/2014
Revision	**Purpose/Description**	**Originated**	**Checked**	**Authorised**	**Date**

Executive Summary

Tipperary County Council commissioned Odour Monitoring Ireland to perform a landfill gas surface emissions survey of Ballaghveny landfill facility (i.e. Waste licence number W0078-03) in order to ascertain any likely sources of landfill gas surface emissions from the operating landfill. Landfill gas surface emissions are the predominant source of odour emissions from landfills in Ireland. The survey was carried out on the 30th July 2014.

During the surface emissions survey, the following tasks were performed on site:

1. Identification the key mechanisms that lead to the release of landfill gas surface emissions from the site.
2. Identify geographically on a site map, the locations of landfill gas surface emissions in order to perform remediation of the identified surface emissions areas.

The following conclusions were drawn from survey:

- Three zones of surface emissions were identified within the landfill facility that exceeded recommended trigger levels. These zones are identified geographically on a site map contained in *Appendix I* of this report.
- There were 2 surface emissions zones greater than or equal to 500 ppm around identified features. There was 1 surface emissions zone greater than or equal to 100 ppm instantaneous reading on open surfaces within the landfill footprint.
- Seven zones of surface emissions were identified within the landfill facility that exceeded recommended trigger levels on the 21st Feb. 2013. There were 7 surface emissions zones greater than or equal to 500 ppm around identified features. There was 0 surface emissions zone greater than or equal to 100 ppm instantaneous reading on open surfaces within the landfill footprint.

1. Introduction

1.1. Background to work

Odour Monitoring Ireland was commissioned by Tipperary County Council to perform a specified independent Volatile organic compound surface emissions survey at Ballaghveny landfill facility. The assessment involved a Volatile organic compound (VOC) surface emissions survey of the landfill facility in order to ascertain the VOC emission points and mark them upon a map for remediation. This report presents a summary of the findings of a VOC surface emissions survey at Ballaghveny Landfill, Ballymackey, Co. Tipperary. The report is based on scientific measurements and observations made during a site visit conducted on the 30th July 2014.

1.2. Scope of work

The main aims of the survey included:

- Surface emissions monitoring in accordance with AG6 requirements.
- Discussion meeting with landfill manager once survey was complete in order to communicate main surface emissions areas for immediate remediation, where necessary.

2. Techniques used

This section describes the techniques used throughout the study. The surface emissions surveying and reporting was performed by Dr. John Casey, Odour Monitoring Ireland. Dr. John Casey has preformed surface emissions monitoring survey's on behalf of Odour Monitoring Ireland for regulatory bodies in Ireland and Northern Ireland, local authorities in Ireland, private waste operators in Ireland and borough councils in Northern Ireland. A full documented list of previous survey's is available upon request.

2.1. "Odour hog" monitoring within the landfill

The "Odour hog" (i.e. Version 2, 4 years old with less than 3.5 second response time for the FID) VOC analyser is a portable, intrinsically safe, survey VOC dual monitor, which provides fast and accurate readings of organic and inorganic vapours. A Photo ionisation detector (PID) uses an Ultraviolet (UV) light source (*photo*) to ionise a gas sample and detect its concentration. Ionisation occurs when a molecule absorbs the high energy UV light, ejecting a negatively charged electron and forming of positively charged molecular ion. The gas becomes electrically charged. These charged particles produce a current that is easily measured at the sensor electrodes. Only a small fraction of the VOC molecules are ionised. A PID does not respond to methane. A FID is similar to a flame thermocouple detector, but measures the ions from the flame instead of the heat generated. The FID detects the methane fraction, which provides greater sensitivity in terms of methane surface emissions detection but not necessarily odour hence why the PID data is also interpreted. The FID/PID analyser was calibrated with certified reference material isobutylene and methane before commencement of the survey, see calibration certificates for gases used in Appendix II. The calibration readings were rechecked in accordance with AG6 requirements.

Using the continuous kinematic "Odour hog" with integrated GPS (i.e Magellan Professional with sub centimetre accuracy post processed), the capping of the landfill was surveyed for potential surface emissions areas. Those areas identified were geo-referenced and highlighted for remediation. This technique is useful for comparison in surface emissions area within the same landfill facility on different survey's. The surface emissions maps generated for the particular facility can be used to assess the effectiveness of implemented mitigation techniques and to qualitatively assess the nature of surface emissions from the facility. All surface emissions surveying was carried out in accordance with "Surface VOC Emissions Monitoring on Landfill Facilities (AG6).

Efforts should be made to attain surface emissions <100 ppm from open surfaces and <500 ppm around features such as vertical wells, leachate collection sumps, leachate slope risers and other projections out of the waste body (Casey et al., 2008). These are minimum standards, which should lead to greater landfill collection efficiencies thus reducing the impact on the general environment.

2.2. Meteorological conditions

Table 2.1 illustrates the predominant wind direction during the monitoring exercise. The meteorological conditions were characterised for the day of monitoring and were as follows:

Table 2.1. Meteorological conditions during Ballaghveny landfill facility TVOC survey.

30th Jul. 2014	
Average wind speed 3 m s^{-1}	Wind direction SW
Temperature 25^0C	1025 mbar
Dry weather	Capping moisture content low

During the TVOC and gas field survey, wind deviated from an southerly direction. Capping moisture content was very low.

2.3 Current landfill gas collection infrastructure on the facility

There are a total of 26 vertical wells, 3 horizontal lines and 4 pumped / 4 gravity condensate knock out pots on the facility. Horizontal and Vertical landfill gas abstraction is employed in the facility. There is one operational installed landfill gas enclosed flare. The flare was in operation on the date of the survey. The facility is permanently capped see Figure 6.1.

3. Results

3.1. Volatile organic compound surface emissions locations identified within Ballaghveny landfill facility

Figure 6.2 and Table 3.1 illustrates the results obtained for the capping surface emissions survey. A total of 3 individual surface emissions zones were identified. Each surface emissions zone is discussed separately in this manner in order to allow for the development of remediation strategies to mitigate the individual surface emissions areas.

Table 3.1. Capping VOC surface emissions locations results with source identities correlating with *Figure 6.2 (see Appendix I)*.

Location ID	Easting (m)	Northing (m)	Max VOC conc. (ppm)	Identification and Mitigation	Recommended trigger levels
B1	197049	182326	129	Discrete Location: Permanent Cap, Surface Area. Landfill gas leakage from area in the vicinity of the flank. Investigate and remediate the cause of the surface emissions.	<100ppm
B2	197034	182302	724	Discrete Feature: Permanent Cap, Gas Well LFG22. Landfill gas leakage from area in the vicinity of the vertical well. Investigate and remediate the cause of the surface emissions.	<500ppm
B3	197069	182261	1,085	Discrete Feature: Permanent Cap, Gas Well LFG20. Landfill gas leakage from area in the vicinity of the vertical well. Investigate and remediate the cause of the surface emissions.	<500ppm

Three sources of landfill gas surface emissions were identified (*see Figures 6.2 and Table 3.1*) within the landfill.

There were 2 surface emissions zones greater than or equal to 500 ppm around identified features. There was 1 surface emissions zone greater than or equal to 100 ppm instantaneous reading on open surfaces within the landfill footprint.

3.2. Close out meeting with landfill manager

Following completion of the surface emissions survey, the surface emissions team and the landfill management discussed all aspects and general conclusions of the survey. The landfill management was informed of the potential areas of surface emissions.

4. Conclusions

The following conclusions were drawn from the survey of Ballaghveny landfill facility:

- The surface emissions contour map generated from the kinematic Volatile organic compound (VOC) survey illustrated surface areas of landfill gas surface emissions.
- There were 2 surface emissions zones greater than or equal to 500 ppm around identified features. There was 1 surface emissions zone greater than or equal to 100 ppm instantaneous reading on open surfaces within the landfill footprint.

5. References

- Casey, J.W., Sheridan, B.A., Henry, M., Reynolds, K., (2008). Effective tools for managing odours from landfill facilities. International Conference on Environmental Odour Monitoring and Control, Rome, Italy, July 6-8, 2008.

6. *Appendix I*- Volatile organic compound surface emissions contour map & Cell capping outline & LFG infrastructure map

Figure 6.1. Cell capping outline & LFG infrastructure on the facility.

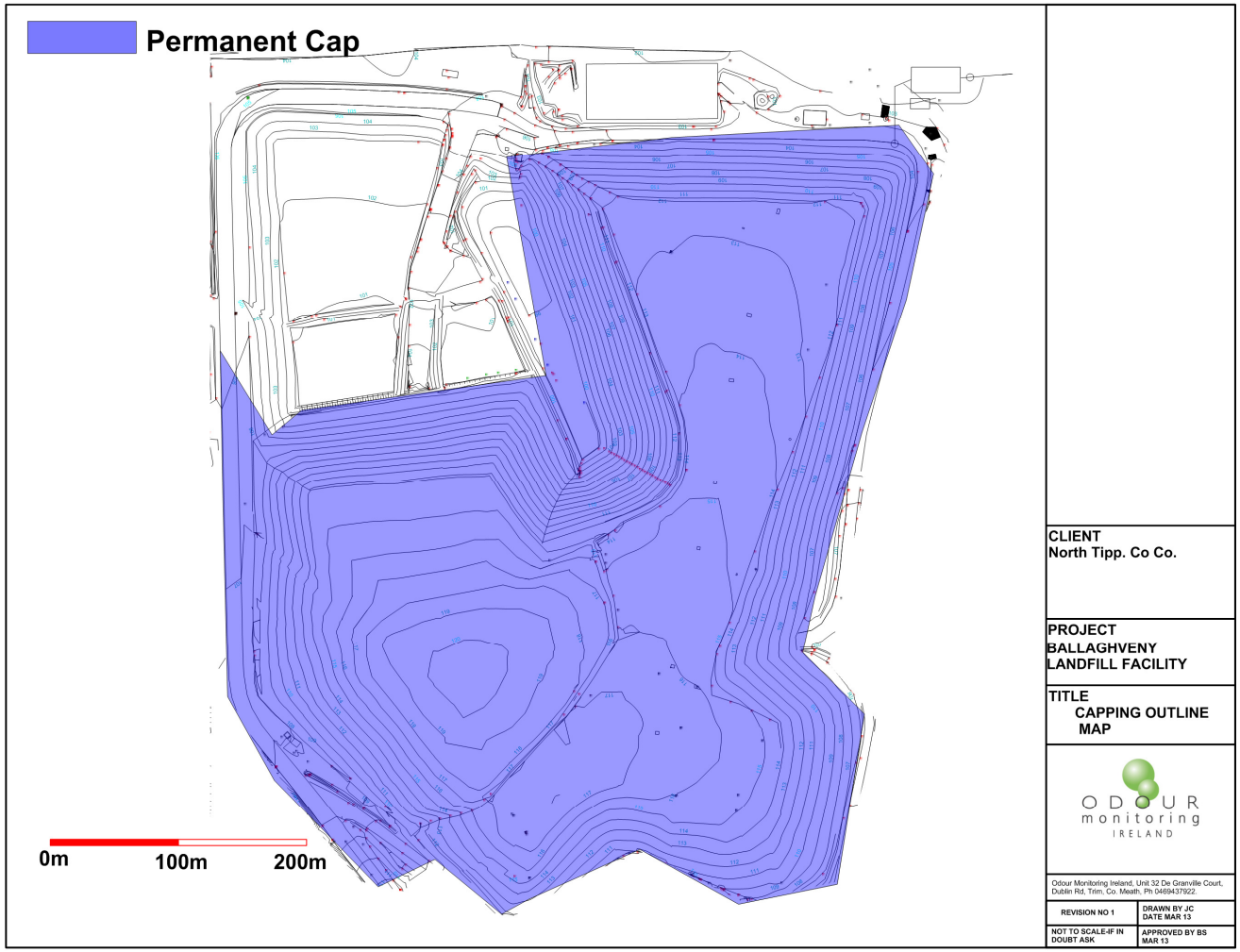
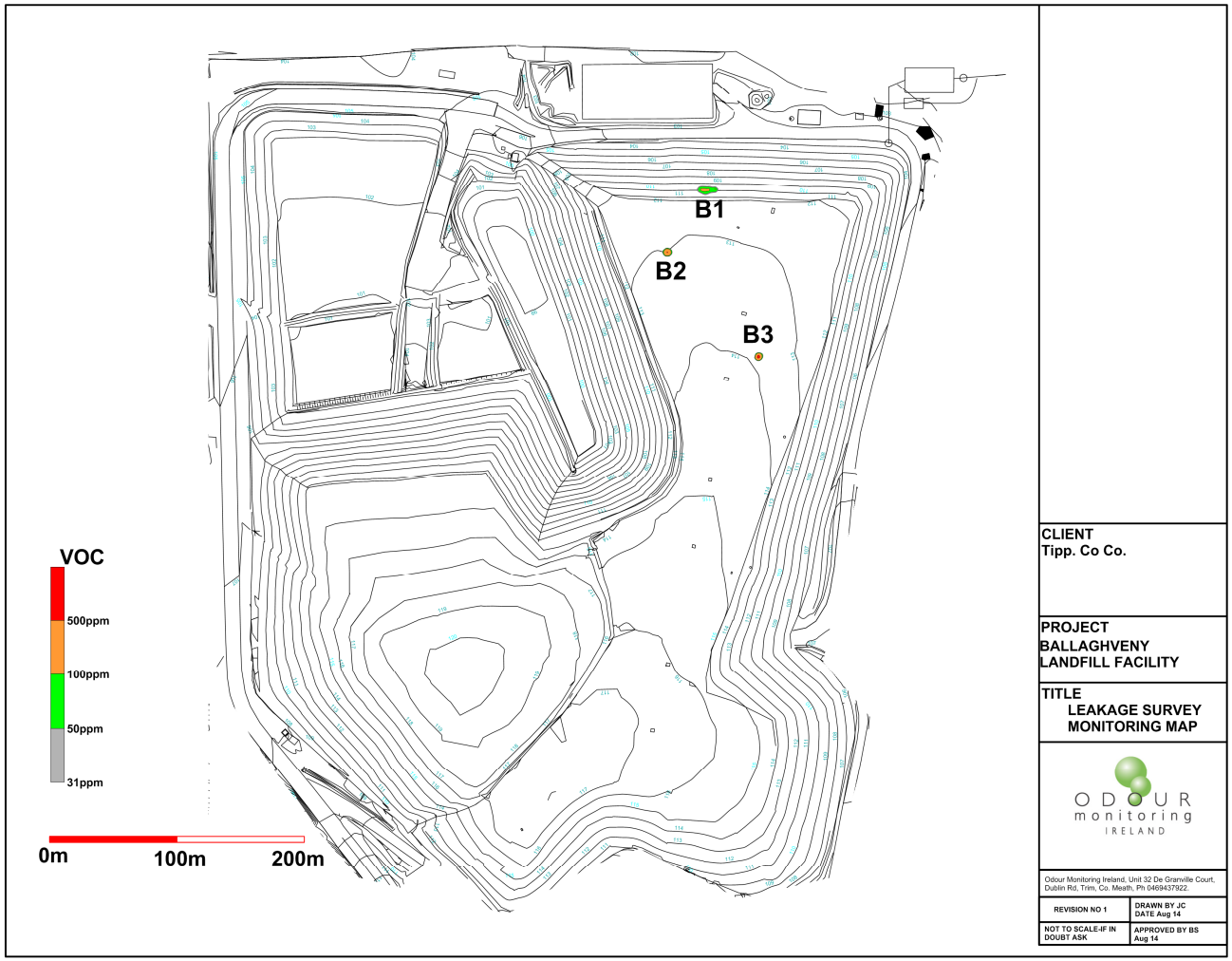

Permanent Cap
0m
100m
200m
CLIENT
North Tipp. Co Co.
PROJECT
BALLAGHVENY
LANDFILL FACILITY
TITLE
CAPPING OUTLINE
MAP
ODOUR
monitoring
IRELAND
Odour Monitoring Ireland, Unit 32 De Granville Court, Dublin Rd, Trim, Co. Meath. Ph 0469437922
REVISION NO 1
DRAWN BY JC
DATE MAR 13
NOT TO SCALE-IF IN DOUBT ASK
APPROVED BY BS
MAR 13

Figure 6.2. Landfill gas surface emissions monitoring within the operating landfill facility (colour scale area indicating TVOC gas colour scale).


B1
B2
B3
VOC
500ppm
100ppm
50ppm
31ppm
0m
100m
200m
CLIENT
Tipp. Co Co.
PROJECT
BALLAGHVENY
LANDFILL FACILITY
TITLE
LEAKAGE SURVEY
MONITORING MAP
ODOUR
monitoring
IRELAND
Odour Monitoring Ireland, Unit 32 De Granville Court, Dublin Rd, Trim, Co. Meath, Ph 046943722.
REVISION NO 1
DRAWN BY JC
DATE Aug 14
NOT TO SCALE-IF IN DOUBT ASK
APPROVED BY BS
Aug 14

7. Appendix II-Calibration certificates and procedures.

7.1 Span & Calibration procedure

Necessary Calibration gases: Zero gas (0ppm), 100ppm and 500ppm methane (Calibration certificates below).

Calibration is carried out in accordance with manufacturers guidelines.

Location: Zero span instrument onsite.

Frequency: Before, midway through, and after the surface emissions survey, typically therefore at 3-4 hour intervals. If the survey only last 2 to 3 hours the instrument is checked before and after the event.

Instrument settling: The FID is switched on and left to settle for a period of 30 minutes minimum.

Span Procedure: The zero and span gases shall be introduced under the same flow and pressure conditions using the sample probe at the end of the sample line. The adjustment procedure shall be as follows:

a) Feed the zero gas (0ppm) into the FID and set the zero;

b) Feed the span gas (100ppm) and adjust the instrument accordingly;

c) Feed the zero gas into the FID once more and check that the reading returns to zero; if not repeat steps a) to c).

d) repeat procedure A to C to verify

Equipment is maintained and operated as specified by the manufacturer.

Scientific & Technical
[redacted] Gases Ltd [redacted]

Certificate of Composition 29485-6-2

Order No E-MAIL Cylinder No Customer ODOUR MONITORING I

Cylinder Valve C10 Our Ref 29485 Cylinder Size 112DA Nett Wt

(Kg) 0.12 Gross Wt (Kg) 1.2

Component	Requested Value	Certified Value
METHANE	500PPM	500PPM
AIR (ZERO GRADE)	BALANCE	BALANCE

Pressure 1000PSI Volume 112LTR Valid Until *February 2015*

Please note all units are in *MOL%* and accuracy is +/-2%. Relative mixtures traceable to standards calibrated at the National Physics Labratory, Teddington, Middlesex, England

Certified by S. Banks UN NO 1956 Date 10/02/2013

Scientific & Technical
[redacted] Gases Ltd [redacted]

Certificate of Composition 29485-1-2

Order No E-MAIL Cylinder No Customer ODOUR MONITORING I Cylinder Valve C10 Our Ref 29485 Cylinder Size 112DA Nett Wt (Kg) 0.12 Gross Wt (Kg) 1.2

Component	Requested Value	Certified Value
AIR ZERO GRADE	ZERO GRADE	

Pressure 1000PSI Volume 1000PSI Valid Until *February 2015*

Please note all units are in *MOL%* and accuracy is +/-2%. Relative mixtures traceable to standards calibrated at the National Physics Labratory, Teddington, Middlesex, England

Certified by S. Banks UN NO 1002 Date 10/02/2013

Scientific & Technical
[redacted] Gases Ltd [redacted]

Certificate of Composition 29485-5-8

Order No E-MAIL Cylinder No Customer ODOUR MONITORING I

Cylinder Valve C10 Our Ref 29485 Cylinder Size 112DA Nett Wt

(Kg) 0.12 Gross Wt (Kg) 1.2

Component	Requested Value	Certified Value
METHANE	100PPM	100PPM
AIR (ZERO GRADE)	BALANCE	BALANCE

Pressure 1000PSI Volume 112LTR Valid Until *February 2015*

Please note all units are in *MOL%* and accuracy is +/-2%. Relative mixtures traceable to standards calibrated at the National Physics Labratory, Teddington, Middlesex, England

Certified by S. Banks UN NO 1956 Date 10/02/2013

APPENDIX 7

Comhairle Contae Thiobraid Árann
Tipperary County Council

Tipperary County Council

Water Balance Calculation for Ballaghveny Landfill 2014 for Ballaghveny Landfill

Prepared for:
Tipperary County Council
Ballaghveny Landfill

Revision: 0 ***Date: 07/05/15***

Prepared by:
Fehily Timoney & Co.
Core House,
Pouladuff Road,
Cork.

FEHILY TIMONEY & COMPANY

CONSULTANTS IN ENGINEERING & ENVIRONMENTAL SCIENCES
Cork : Tel 021-4964133 Fax 021-4964464

DESIGNED: TR **CHECKED:** AR
DATE: 07/05/15 **REVISION:** 0
JOB NUMBER: LW15-854-01
CALC NUMBER: C-05
FILE \\Ftc05\rcp\2015\LW15\854\01\Calc Set 05 Ballaghveny water balance\LW15-854-01_Calc set 05 Water Balance Ballaghveny_Rev 0.xlsx
SHEET Calc cover

PROJECT: Tipperary County Council
DESCRIPTION: Water Balance Calculation for Ballaghveny Landfill 2014

Rev	Date	Purpose and Description	Prepared	Checked
A	7/5/15	Preparation of annual water balance calculation -draft to client	TR	AR
0	7/5/15	Preparation of annual water balance calculation - Final issue to client	TR	AR

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DESIGNED:	TR	**CHECKED:**	AR
DATE:	7.5.15	**REVISION:**	0
JOB NUMBER:	LW15-854-01		
CALC NUMBER:	C-05		
FILE	\\Ftc05\rcp\2015\LW15\854\01\Calc Set 05 Ballaghveny water balance\LW15-854-01_Calc set 05 Water Balance Ballaghveny_Rev 0.xlsx		
		SHEET	#REF!

PROJECT: **Tipperary County Council**
DESCRIPTION: **Water Balance Calculation for Ballaghveny Landfill 2014**

Ref. | Output

i references

1 Previous Waterbalance for Ballaghveny Landfill (created 2011)
\\Ftc05\rcp\2015\LW15\854\01\Calc Set 05 Ballaghveny water balance\Incoming info\Appendix 7 Water Balance.pdf
2 Incoming weather data from TCC and leachate volumes tankered
\\Ftc05\rcp\2015\LW15\854\01\Calc Set 05 Ballaghveny water balance\Incoming info\Ballaghveny rain_leachate.msg
\\Ftc05\rcp\2015\LW15\854\01\Calc Set 05 Ballaghveny water balance\Incoming info\BirrGurteenData 1998 to 2014.xls
3 Waste Data for 2014
\\Ftc05\rcp\2015\LW15\854\01\Calc Set 05 Ballaghveny water balance\Incoming info\Ballaghveny landfill lifetime waste input.xlsx
4 Capping details and cell areas
4a \\Ftc05\rcp\2015\LW15\854\01\Calc Set 05 Ballaghveny water balance\Incoming info\Cell area info
4b and lagoon info_Ballaghveny info.msg
\\Ftc05\rcp\2015\LW15\854\01\Calc Set 05 Ballaghveny water balance\Incoming info\Ballaghveny rain_leachate.msg

ii List of FTC Drawings

iii List of Appendices
Appendix A - Water Balance

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DESIGNED:	TR	**CHECKED:**	AR
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CALC NUMBER:	C-05		
FILE	\\Ftc05\rcp\2015\LW15\854\01\Calc Set 05 Ballaghveny water balance\LW15-854-01_Calc set 05 Water Balance Ballaghveny_Rev 0.xlsx		
SHEET	#REF!		

PROJECT: Tipperary County Council
DESCRIPTION: Water Balance Calculation for Ballaghveny Landfill 2014

Ref. | Output

1.0 Introduction

The purpose of this calculation is to prepare the annual water balance calculation for Ballaghveny Landfill for inclusion in the 2014 AER.

FTC will:
- Review background information, including historical water balance calculations, siteworks and 2014 leachate records
- Prepare the water balance calculation and report

2.0 Calculation

2.1 Review of 2014 leachate removal & weather records

Using information provided by TCC, the following are the monthly leachate removal volumes for Ballaghveny for 2014. (2)

Month	Leachate Tankered from site (t)	Rainfall (mm)	Evaporation (mm)		Eff. Rainfall (mm)
Jan	2,069	119.3	13.5		105.84
Feb	1,989	129.9	17.0		112.86
Mar	1,924	78.8	7.9		70.92
Apr	561	36.4	3.6		32.76
May	31	89.5	8.8		80.66
Jun	1,369	33.7	3.4		30.33
Jul	1,126	61.9	3.6		58.28
Aug	642	117.8	7.3		110.49
Sep	1,003	18.3	3.0		15.28
Oct	584	85.0	7.5		77.46
Nov	971	134.8	13.5		121.32
Dec	1,308	98.2	9.8		88.38
Total	**13,579**	1003.6	99.0		**904.58**

It is assumed that 1 tonne of leachate is equivalent to 1 m^3 (i.e. the density of leachate is 1 t/m^3).

For the purposes of this calculation, a 10% evaporation factor has been assumed.

The total figures compare to those from the 2011-2013 AERs as follows: (1)

	2011	**2012**	**2013**	**2014**
Total Leachate:	9,650	9,563	9,563	6,977
Total tankered	15,670	6,804	7,112	13,579

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JOB NUMBER:	LW15-854-01		
CALC NUMBER:	C-05		
FILE	\\Ftc05\rcp\2015\LW15\854\01\Calc Set 05 Ballaghveny water balance\LW15-854-01_Calc set 05 Water Balance Ballaghveny_Rev 0.xlsx		
		SHEET	#REF!

PROJECT: Tipperary County Council
DESCRIPTION: Water Balance Calculation for Ballaghveny Landfill 2014

Ref. | Output

2.2 Water Balance Equation

The calculation is carried out using MS Excel following the method from the EPA Landfill Manual on Landfill Site Design, as shown:

Lo = [ER(A) + LW + IRCA + ER(I)] - a(W);

where:
- Lo = leachate produced(m^3)
- ER = effective rainfall, [(ER) is defined as Total Rainfall (R) minus Actual Evapotranspiration (AE) i.e. ER=R-AE]
- A = area of cell (m^3)
- LW = liquid waste (m^3)
- IRCA = infiltration through restored and capped areas (m^3)
- I = surface area of lagoons (m^2)
- a = absorptive capacity of waste (m^3/t)
- W = weight of waste deposited (t/a)

2.3 Definition of catchment areas

4 The areas contributing to the surface water calculation are defined as follows:

Zone	Area (m^2)	Infiltration (%)		Description	
Cell 1 & 2	15,500	10		Cell 1 & 2	1 m clay cap
Cell 3, 4 &	17,200	10		Cell 3, 4 & 5	final cap
Cell 6 & 7	10,608	10		Cell 6 & 7	final cap
Cell 08	9,541	10		Cell 08	final cap
Cell 09	12,801	10		Cell 09	final cap
Cell 10a	4,421	10		Cell 10a	final cap
Cell 10b	3,752	10		Cell 10b	
Cell 11	6,555	10		Cell 11	empty cells, clean surface water
Wedge	3,257	10		Wedge	diverted to sw system
Leachate Lagoon	706	100		Leachate Lagoon	

2.4 Waste inputs 2014

3 The total waste input for 2014 was 0 t
The facility has been closed to waste acceptance since 2011.

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2.5 Discussion of Results

The leachate generation estimated from the water balance is shown below compared to the leachate removed from site as per TCC's records.

Month	Leachate Tankered	Estimated Leachate
Jan	2,069.31	816.33
Feb	1,988.84	870.48
Mar	1,923.78	547.00
Apr	561.32	252.67
May	31.00	622.12
Jun	1,369.45	233.93
Jul	1,125.87	449.51
Aug	642.34	852.20
Sep	1,003.30	117.85
Oct	584.34	597.44
Nov	970.64	935.73
Dec	1,308.38	681.67
Total	**13,578.57**	**6,976.94**

The estimated leachate generation for 2014 was 6,977 m³ which compared to a recorded volume removed from site of 13,579 m³.

The discrepancy between the volume of leachate estimated using the water balance calculations and tankering records is likely accounted for by possible groundwater ingress and rainwater infiltration at the flanks of the unfilled cells. TCC is currently conducting a separate hydrogeological survey to detemine and quantify this issue. The difference and increase in the estimated leachate generation between 2013 and 2014 is due to a difference in infiltration factors used in the calculation. In 2013 and in previous years an infiltration rate of 20% was used. This calcuation assumed a 10% infiltration rate, which is the upper level (2-10%) of Agency guidance.

Appendix A - Water Balance

Comhairle Contae Thiobraid Árann
Tipperary County Council

FEHILY TIMONEY & COMPANY

Appendix A

Water Balance Calculation for Ballaghveny Landfill Facility

Waste Landfilled (t)
590,899

Month	Rainfall	Evaporation	Effective Rainfall	Waste Input (closed)	Active Area* (none)	Fully capped with 1 m soil (Cells 1 and 2)	Fully Capped Area (Cell 3-10a)	Lagoon area	Active Infiltration	Capped Infiltration	Liquid Waste	Lagoon Contribution	Absorptive Capacity	Active Leachate		Total Leachate Production	Cumulative Leachate Production
	(mm)	(mm)	(mm)	(tonnes)	(m^2)	(m^2)	(m^2)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)		(m^3)	(m^3)
Jan-14	119.3	13.46	105.84	0	0	15,500	54,571	705.8	-	741.6	0	74.7	0.0	0		816.3	816.3
Feb-14	129.9	17.04	112.86	0	0	15,500	54,571	705.8	-	790.8	0	79.7	0.0	0		870.5	1,686.8
Mar-14	78.8	7.88	70.92	0	0	15,500	54,571	705.8	-	496.9	0	50.1	0.0	0		547.0	2,233.8
Apr-14	36.4	3.64	32.76	0	0	15,500	54,571	705.8	-	229.6	0	23.1	0.0	0		252.7	2,486.5
May-14	89.5	8.84	80.66	0	0	15,500	54,571	705.8	-	565.2	0	56.9	0.0	0		622.1	3,108.6
Jun-14	33.7	3.37	30.33	0	0	15,500	54,571	705.8	-	212.5	0	21.4	0.0	0		233.9	3,342.5
Jul-14	61.9	3.62	58.28	0	0	15,500	54,571	705.8	-	408.4	0	41.1	0.0	0		449.5	3,792.0
Aug-14	117.8	7.31	110.49	0	0	15,500	54,571	705.8	-	774.2	0	78.0	0.0	0		852.2	4,644.2
Sep-14	18.3	3.02	15.28	0	0	15,500	54,571	705.8	-	107.1	0	10.8	0.0	0		117.9	4,762.1
Oct-14	85	7.54	77.46	0	0	15,500	54,571	705.8	-	542.8	0	54.7	0.0	0		597.4	5,359.5
Nov-14	134.8	13.48	121.32	0	0	15,500	54,571	705.8	-	850.1	0	85.6	0.0	0		935.7	6,295.3
Dec-14	98.2	9.82	88.38	0	0	15,500	54,571	705.8	-	619.3	0	62.4	0.0	0		681.7	6,976.9
Total	**1,004**	**99**	**905**	**-**						**6,338**	**0**	**638**	**0**	**0**		**6,977**	

Notes:

Weather data from TCC

The calculation was carried out using MS Excel following the method from the EPA Landfill Manual on Landfill Site Design, as shown:

Lo = [ER(A) + LW + IRCA + ER(I)] - a(W);

where:	Lo =	leachate produced(m3)
	ER =	effective rainfall, [(ER) is defined as Total Rainfall (R) minus Actual Evapotranspiration (AE) i.e. ER=R-AE]
	A =	area of cell (m2)
	LW =	liquid waste (m3)
	IRCA =	infiltration through restored and capped areas (m3)
	I =	surface area of lagoons (m2)
	a =	absorptive capacity of waste (m3/t)
	W =	weight of waste deposited (t/a)

* Infiltration Rates (%) Look to Design Criteria for exact figures (Ranges from 5% to 100%)

APPENDIX 8

Curtin Pest Control
Ballysimon Road, Limerick

Olga Doyle
Facility Manager
Ballaghveney Landfill Site.
8th September 2014

Olga,

The following is a progress report on the Pest Management Plan at Ballaghveney Landfill facility for the previous twelve months.

The service agreement provides for:

- Eight rodent control service visits per year at regular intervals the facility and three adjoining properties.
- Any emergency calls to be responded to on the day at no extra charge.
- Each service visit to be documented in a service report folder, which will also contain a computer generated plan of all bait points and material safety data sheets for each product used.
- A signed copy of each service report and an annual report on the performance of the pest management plan.

The products used to control rodent activity are "Sakarat" a warfarin based anticoagulant rodenticide used in external tamper resistant bait stations and "Klerat" a brodificoum based anticoagulant in tamper resistant bait stations used only in the main office.

Annual update:
Since the closure and sealing of the landfill in 2012, there has been a general decline in the levels of rodent activity experienced in previous years.
Fly activity has generally declined except when the weather is particularly warm. the sealing of the landfill and strategic treatment sprays have also significantly helped control high levels of this activity.
There was a slight increase in mouse activity in the compound area and two of the adjoining properties towards the end of 2013 and this was dealt with by increasing the amount of bait and carrying out follow up servicing until control was maintained.
We have again this year installed new replacement external tamper resistant bait stations. Two at the covered landfill area and one at the lagoon area where there had bait stations had been accidently damaged.
Low levels of rat activity were also evident on occasion at the lagoon area and on the adjoining properties but were effectively controlled by increasing and refreshing rodent bait.

Rodent activity continues to be controlled by the regular servicing and the service reports show that where activity occurs, it is dealt with before an infestation develops and is quickly controlled.
The pest management plan at this facility is working well and the effective cooperation between site staff and pest control technicians ensure this.

Qualifications:
Curtin Pest Control is a founder member of the Irish Pest Control Association and each technician holds an IPCA diploma.
We hold a Diploma in Environmental Pest Management from UCC..
We also offer a presentation to staff on practical pest management precautions.
If you have any further queries please contact me at 061 419901 or 087 6484119 or email curtinpestcontrol@gmail.com

John Roche
Managing Director,
Sean Curtin Pest Control Ltd.