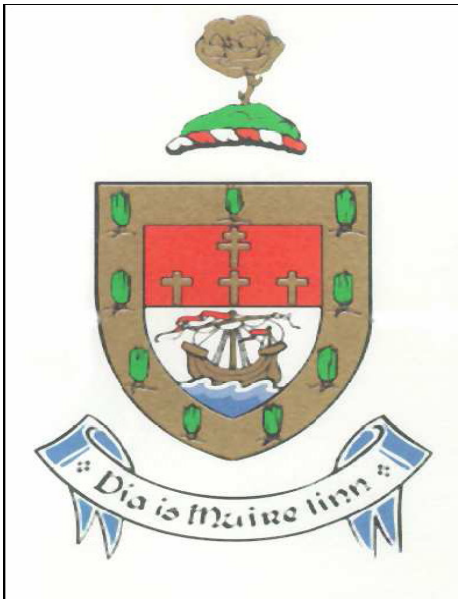
Mayo County Council
Comhairle Chontae Mhaigh Eo



Annual Environmental Report for Rathroeen Landfill
Waste Licence W0067-02

2010

Submitted March 2011

Annual Environmental Report
Rathroeen Landfill

• Reporting Period

This is the Annual Environmental Report (AER) for the Rathroeen Landfill & civic Amenity. It covers the period from January to December 2010.

Owner and Operator

Mayo County Council owns and operates the landfill at Rathroeen, Killala Rd, Ballina.

Site Description;

Rathroeen Landfill is located approximately 5Km north of Ballina Town. The site entrance is located on a minor road 300 meters from the Ballina – Killala regional road (R314). The entire landholding is 18.5 hectares in size. The land filled area covering 9.2 hectares.

The site drains to a stream that flows along its western then northern boundaries. This stream then flows around the northern end of a glacial hill to the east of the site before making its way to the Moy Estuary, approximately 2km east of the site.

Historically excavated material from the lake suggests that there is a grey silty/sandy till beneath the lake deposits. The geology outside the bounds of the former lake comprises of a layer of grey clayey till above limestone bedrock. The bedrock is shallow (1.5 to 3m below the ground) to the north and south of the site and is deeper (9m) to the east of the site. The surrounding area contains glacial hills. The till which forms this hill is brown and more sandy than the under lying grey clayey till.

Reporting Period

This Annual Environmental Report is for Rathroeen Landfill, Killala Rd, Ballina, Co. Mayo. It covers the period from the 1st January 2010 to the 31st of December 2010.

Details of Activity

The construction of Cell No. 2 was completed in April of 2006 and we commenced placing waste therein in May 2006. Waste was placed in Cell 2 for all of 2009. We are also operating a recycling center at the landfill site, which has become very busy, (circa 5900 users per month) during 2009.

Volume and composition of waste received during the year.

In the year ending 31/12/10, 0 tonnes of waste was accepted for landfilling at Rathroeen Landfill.

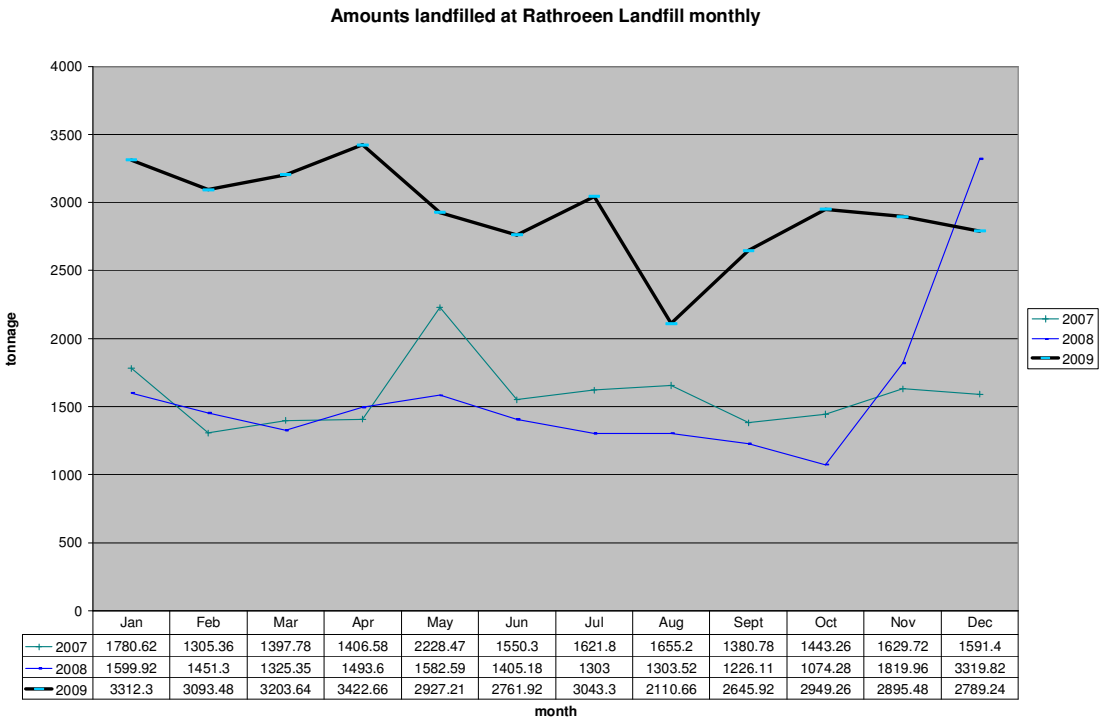
Table 1.1 Volume and composition of waste accepted at Rathroeen Landfill.
Site: Rathroeen Landfill Year: 1st January to 31st December 2010

		2006	2007	2008	2009
Waste type	**EWC Code.**	**Tonnage**	**Tonnage**	**Tonnage**	**Tonnage**
Domestic	20030101	12407.12	12111.15	12708.93	22850
Commercial	20030102	5021.84	5412.05	4618.90	8788
C&D		176.34	0	0	0
Industrial Non Hazardous	20030103	365.08	454.56	439.19	808
Public Cleansing		888.58	1013.98	1137.61	2706
Total		**18858.96**	**18991.74**	**18904.63**	**35,155**

Total Accumulated volumes of waste deposited

There are no historical records of the waste that has been deposited at Rathroeen Landfill. During the application for the waste licence an estimate was made for the volumes of waste being generated in the Mayo area contributing to the landfill. At that time it was estimated that 18,500 tons per annum was being deposited at the landfill. The weighbridge was put in place in April 2001 and since then we have been able to gain a more precise picture of quantities of waste. Table 2 below shows the monthly tonnages of waste accepted at Rathroeen Landfill since April 2001.

Table 2.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
2007	1780.62	1305.36	1397.78	1406.58	2228.47	1550.3	1621.8	1655.2	1380.78	1443.26	1629.72	1591.4
2008	1599.92	1451.3	1325.35	1493.6	1582.59	1405.18	1303	1303.52	1226.11	1074.28	1819.96	3319.82
2009	3312.3	3093.48	3203.64	3422.66	2927.21	2761.92	3043.3	2110.66	2645.92	2949.26	2895.48	2789.24

Calculated remaining capacity.
The most recent design for the landfill available from the consulting engineers shows the following void spaces available:

Cell No. 1	89,000tonnes	111,250m³
Cell No. 2	63,500tonnes	79,375m³
Cell No. 3	162,000tonnes	202,500m³
Total	314,500tonnes	393,125m³

Void Space utilised

Cell No. 1	89,000tonnes	111,250m³
Cell No. 2	85,950tonnes	79,375m³
Cell No. 3	0tonnes	0m³

Total Void Space utilized	139795 tonnes	174743.75m³
Total Void Space Remaining 31/12/09.	162,000tonnes	202,500m³

Year in which final capacity will be reached.

The remaining capacity of the landfill is 202,500 m³. In the year ended 31/12/09 we accepted 35,155 tonnes of waste. Cell 2 has been completely filled and we are waiting for the construction of Cell Number 3. There will be no more land filling carried out at Rathroeen until Cell 3 is constructed and certified to accept waste. Construction of Cell 3 is due to start during May 2011, an accurate void calculation shall be carried out upon completion of cell.

2011 Objectives and targets

Objective 1

To continue to maintain and review the Environmental Management System (EMS) for the facility on an annual basis and work towards accreditation to the European Environmental Standard ISO 14001.

Target
To maintain and review the Environmental Management System (EMS) annually and to reach a standard that is above that required by waste licence 67-1.

Designation of responsibility.
The landfill manager is responsible for the establishment and maintenance of the EMS.

Investment in project.
To be decided.

Progress to date.
Original EMS has been agreed with Agency, this is the third set of revised sections to be submitted for approval.

Objective 2

To have Cell 2 permanently capped.

Target.
To have waste in Cell 2 permanently capped by the end of 2011.

Designation of responsibility.
Landfill Manager & Capital Projects section Mayo County Council.

Investment in project.
To be decided.

Progress to date.
Tenders have been received and work is due to commence in May 2011.

Objective 3.

To have Cell 3 constructed and certified to accept waste in 2011.

Target.
To have Cell 3 constructed and certified to accept waste in 2011.

Designation of responsibility;
Landfill Manager and Senior Engineer Capital projects Mayo County Council...

Investment in project.
To be decided.

Progress to date.
Tenders have been received and work is due to commence in May 2011.

Engineering Details;

Site preparation and provision of services.

Rathroeen Landfill is located approximately 5Km north of Ballina Town. The site entrance is located on a minor road 300 meters from the Ballina – Killala regional road (R314). The entire landholding is 18.5 hectares in size. The land filled area covers 9.2 hectares.

In order to continue the deposition of waste and to mitigate against any further adverse environmental impacts at Rathroeen Landfill, it was proposed to construct three lined cells on top of the existing waste body. The new cells are designed for both leachate and gas collection. The cells will be capped to prevent migration of gas and infiltration of rainfall thereby minimising the amount of leachate generated. The final capping will allow for the collection of clean surface runoff, which will be diverted to surrounding streams.

In addition the new cells will prevent rainfall entering old waste and therefore reduce leachate generated. The gas will be collected from the old waste and flared.

Construction of Cell No. 1 was completed in July of 2003. Filling of Cell No. 1 with waste commenced on the 15th of August 2003. Construction of Cell No.2 commenced in September 2005 and placing of waste therein commenced on 1/5/06. The permanent capping of the unlined area of waste at the northern end of the waste body was completed in March 2005, the capping of Cell 1 was completed in November 2006 and the spreading of clay thereon was delayed due to bad weather but eventually completed early in 2007. Land filling of waste in Cell 2 was completed in January 2010. Construction of Cell 3 and the permanent capping of Cell 2 is due to commence in May 2011

Leachate drainage, collection and treatment.

All leachate generated in cells 1 & 2 is draining to the southwest corners of the cells. It is pumped to an under ground leachate lagoon. All leachate from Cell 3 shall also be pumped to the leachate lagoon. From this lagoon the leachate will pass through a methane stripping plant and into the main pump sump. It is then pumped via rising main to Ballina wastewater treatment plant.

A leachate interceptor drain has been constructed along the western edge of the old waste body. The invert level of the interceptor drain is just above the high water level in the reed beds to the west. The collected leachate drains to a sump from which it is pumped to the leachate lagoon.

The surface water collection system from the civic waste facility and the sorting shed also flows to the leachate lagoon and is sent for treatment in Ballina.

Landfill gas abatement, collection and flaring details.

A landfill gas flare has being installed at Rathroeen Landfill as part of the development of the site. The flare was commissioned in March of 2004.Since early December 2005 the flare has been running 24hrs daily. It has only been switched off for services and or repair. Gas is being collected from the following areas.

3 No. horizontal wells under cell no.1,
11 no vertical wells under cell no.2,
8 No. vertical wells in the north of the site which was permanently capped early in 2006,
And 9 No. vertical wells into cell no.1, cell no. 1 is to be permanently capped during the summer of 2006.
During 2010 11 vertical wells were placed into Cell 2 and abstraction from these commenced in may 2010.

Site access roads and secondary roads

Site access roads within Rathroeen Landfill are constructed with 75mm stone laid 300mm deep on a geotechnical material or compacted waste and cover material.
The main access road to the landfill from the regional road R314 has recently been upgraded. It now consists of a 7m carriageway of dense bitumen macadam, which is surfaced with asphalt.

Current landscaping and tree planting

Landscaping has been carried out along the Ballina/Killala road to the west of the landfill and along the Rosserk Road to the north of the landfill. The original planting scheme was to be carried out on the boundary line landfill but it would have taken a long time for the benefits of such planting to become apparent. It was therefore decided that the planting along the roads as stated would be more effective.

The entrance road to the landfill has also been landscaped with grass verges a line of hedging and semi-mature trees on either side. We are maintaining all the planted areas as necessary. Permanently capped areas have been grassed and the south and north facing embankments have all been planted with a mix of gorse and whitethorn.

Wheel cleaning

The permanent wheel wash system was installed in June 2003 and has been operational since. Regular cleaning and inspections of the equipment are carried out.

Weighbridge

The weighbridge in use at the landfill is a pit mounted 18m pit mounted precast concrete.

Operational Matters

Description of the operations;

The main activity at Rathroeen Landfill is the deposition of household and non-hazardous commercial and industrial refuse into an un-lined un-engineered area. The refuse is placed using a steel wheeled compactor in layers not exceeding 2m and is covered at the end of each day with hession/polypropylene.

Water coming into contact with the waste is deemed contaminated and called leachate. Leachate is collected and pumped to Ballina wastewater treatment plant.

The anaerobic breakdown of the organic fraction of the waste produces landfill gasses. The main constituents of these are methane and carbon dioxide. The gasses are flammable and toxic in high concentrations. At present Mayo County Council monitors gas levels at various points within the site. Monitoring is also carried out at several locations around the perimeter to ensure there is no migration of these potentially dangerous gasses.

There are presently 6 employees of Mayo County Council working full time at Rathroeen. The duties are as follows; the deputy landfill manager has responsibility for all monitoring and reporting to the EPA. There are two clerical staff that are responsible for the operation of the weighbridge and maintaining records of all site operations. There is an outdoor foreman and two general operatives. They are responsible for maintaining the site in an appropriate manner. Keeping roads free of litter and dust, regulation of all traffic movements within the site and keeping the tip head in a safe and tidy state. Any windblown litter is collected immediately by the outdoor staff or if not then first thing the following day.

Phasing of filling;

Placing of waste into cell no.1 commenced in August 2003. Construction of Cell No.2 started in Autumn 2005, as did the permanent capping of the unlined area of waste to the north end of the site. Filling of Cell No.2 commenced on the 1st of May 2006. The permanent capping of cell No. 1 commenced early in 2006 and was completed in July 2006. We completed the filling of Cell 2 in January 2010.

Report on development works undertaken in the reporting period

The following works were carried out during the year:
2010

- 11 vertical wells were placed into Cell 2.
- Gas collection pipework was put in place to connect these new wells to the gasflare.

- Peat was excavated from Cell 3 area and stockpiled for the use in the permanent capping of Cell 2.

Water, leachate and gas control measures;

All water from the lined cells, the civic amenity area and road drainage within the site are be diverted to the leachate lagoon to be pumped for treatment. Other collected waters such as roof water will be diverted to the surface water drain. Efforts will be made to divert as much water as possible from the lagoon. These waters will be tested regularly and agreement reached with the agency before they are diverted permanently.

Measures for the control of environmental nuisances;

Noise

Any equipment or plant that is deemed to exceed noise limits will be fitted with noise attenuation measures.

Dust and/or mud

Measures that are taken to alleviate problems with mud and dust are as follows;

1. The installation of a wheel wash.
2. Regular maintenance and cleaning of all site roads.
3. Where there are dry and windy conditions the site roads will be damped down to prevent windblown dust.

Odour

Odour emissions from the landfill site are reduced by a number of measures such as;

1. The minimisation of the size of the working face.
2. Adequate compaction of the waste once it has been placed.
3. Use of a mineral soil layer to cover the waste at different stages.
4. The use of a misting system combined with odour neutraliser
5. The extraction and flaring of landfill gas.

Litter

Windblown litter is kept to a minimum by keeping the working face as small as possible and working in a netted area. The approach to the landfill is checked on a daily basis and cleared of any litter. All vehicles entering the site are required to have the waste covered properly or they are refused entry.

Birds

Nuisances caused by birds is controlled on the site by use of birds of prey in conjunction with keeping a small working face and covering the waste daily.

Vermin

There is no vermin problem on the site at present. A specialist company are retained to monitor the vermin population.

Insects and pests

At present there is no problem with insects and flies. Insecticide sprays are kept in storage to be utilised immediately if any problem is noticed.

Site opening and operating hours;

The opening hours at Rathroeen Landfill have to comply with the following conditions of our licence;

1.7 Waste acceptance hours and hours of operation

1.7.1. Landfill

1.7.1.1. Waste shall only be accepted at the facility for disposal at the landfill between the hours of 9.00am to 6.00pm Monday to Friday inclusive and 9.00am to 1.00pm on Saturdays.

1.7.1.1.1. The landfill at the facility shall only be operated during the hours of 8.00am to 6.30pm Monday to Friday inclusive and between 8.00am to 2.00pm on Saturdays.

1.7.1.1.2. Waste shall not be accepted at the landfill on bank holidays or on Sundays.

1.7.1.1.3. Civic waste facility

1.7.1.1.4. Waste shall only be accepted at the civic waste facility between the hours of 8.00am to 6.00pm Monday to Friday inclusive and 8.00am to 5.00pm on Saturdays.

The operational hours currently being used at the landfill are as follows;

Landfill;	Waste accepted 9.00am to 5pm Monday to Friday inclusive. The landfill is closed on Saturdays.

Civic Waste Facility;	waste accepted 9am to 5pm Monday to Friday inclusive and 9.00am to 3.00pm on Saturdays.

Access control;

During 2010 only the civic amenity accepted waste at Rathroeen, all waste was transferred to Derrinumera by ejector trailer.

Equipment used on site;

When landfilling recommences a 35 tonne steel-wheeled compactor, Bomag, is to be used for compacting the waste. In addition to the compactor a tracked excavator is used at the tip head at all times. This is to keep the tipping area tidy and to keep the waste in front of the compactor for final placement.
Other equipment used at the site include a tractor with trailer for covering, a water tanker which is also attached to the tractor used for dust control and a transport box which is used for moving small items around site. Also on site is a skid steer, which is used for placing the recycling material into the baler in the sorting shed. It can also be fitted with forks for lifting palletized materials or with a road-sweeping brush to keep the recycling center tidy. Other items of machinery are hired in as required.

Cover requirements;

At the end of each working day the active tipping face is covered using a hession/polypropylene material. When the area is to be covered for a period of weeks or months then the intermediate cover will consist of subsoil's spread to a depth of approximately 100mm and a 3-400mm layer of timber shreddings. At the commencement of filling an area, as much of the intermediate cover as possible will be removed before waste is placed. Procedures for final capping are outlined in the section for restoration and aftercare.

Area occupied by waste.

The area of the Rathroeen Landfill site is 18.75 Hectares, of this area 9.4 Hectares has been land filled at some stage of the development. We are currently placing waste in Cell No. 2 which has an area of 15,000m².

Methods of deposition of waste.

The deposition of waste is currently being done in a lined cell. Waste vehicles reverse to an elevated tipping area to deposit the waste. This ensures that nobody has to walk on the waste. There is an excavator at the tip head that places the waste and it is then compacted by 32 tonne Bomag Compacter. Members of the public are not allowed to access the tipping area, they are provided with skips at the recycling center.

Civic Amenity.

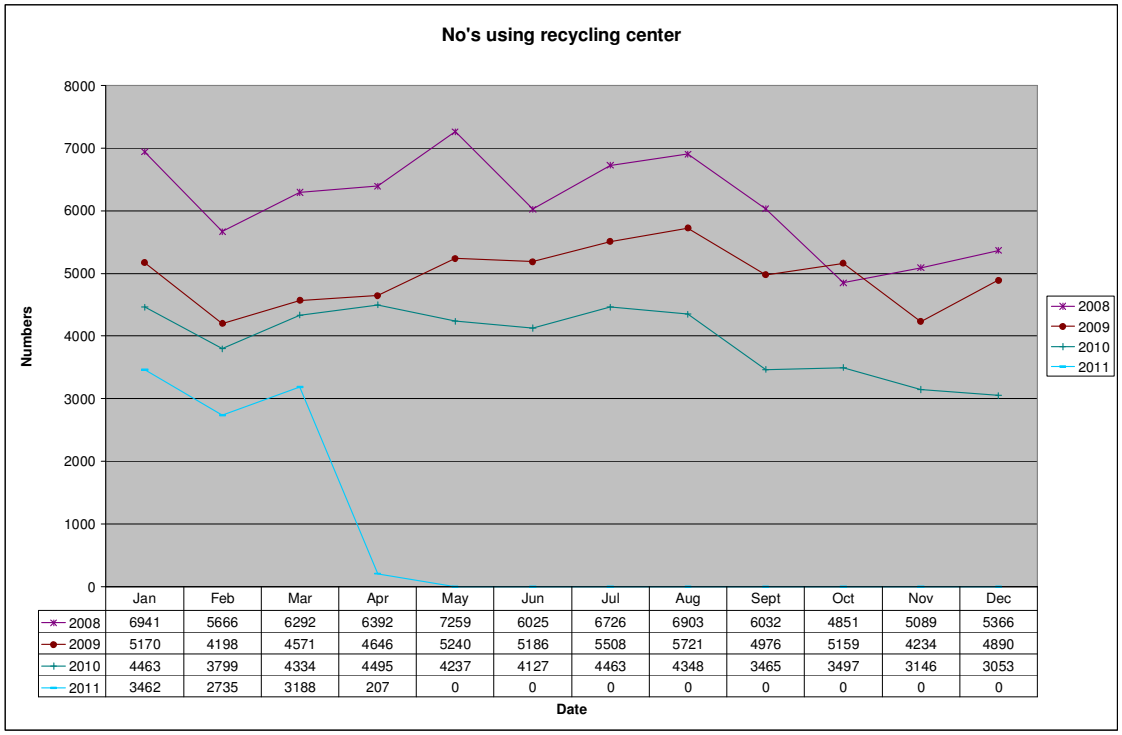
In September 2003 the recycling center at Rathroeen Landfill was opened to the public. Prior to this there had always been glass and aluminium can banks at the site. The new center increased the range of items that could be recycled.
At the end of December 2010 the following items were being accepted at the recycling center:

1. Papers and magazines.
2. Cardboard.
3. Tetra-paks.
4. Plate glass.
5. Aeroboard / polystyrene
6. Glass - Clear, Brown, Green
7. Scrap metal
8. Tin / steel cans
9. White goods - Dishwashers, Cookers, Tumble dryers, Washing machines
10. Florescent tubes and light bulbs
11. Brown goods - Televisions, Computers, Keyboards and hard drives
12. Batteries - Household and car
13. Engine oil
14. Cooking Oil
15. Textiles
16. Plastics - PET and HDPE
17. Timber
18. Fridges and freezers
19. Tyres
20. Household hazardous wastes; Aerosols, Waste Medicines, Waste vetinary medicines, Pesticides, Herbicides, Paint, Household corrosives

Outlined on Table 3 appendix A .are the quantities of recycled material removed from the site by registered contractors in 2010.The contractors we had agreed with the agency for 2010 were as follows:

Re-cyclable Waste (Charge)	**Contractor**	**Waste Collection No**	**Waste Licence No**
Window Glass Polystyrene* & Tetra paks* Type 1 Plastic Plasterboard	Barna	WCP-MO-08-0604-01	W0106-02
Steel Cans* , Aluminium cans*, Scrap metal	Erin recyclers	CW206	WP SO-08-93
Paper, Cardboard*, Hard plastics, Type 2 Plastic	WERS	WCP-MO-09-0608-02	WFP-G-09-0002-01
Waste medicines, waste paint & waste pesticides	Eco Safe Syatems	WCP-DC-09-1203-01	W0054-02
Aerosols, Cooking oil, motor oil	Enva	WCP-DC-08-1116-01	W0184-01
Textiles	Textile recycling ltd.	Exempt	WPR-014
Glass Bottles	Rehab recycling	Exempt	03//02
Tyres	Irish Rubber Solutions	WCP-MO-08-0598-01	
Waste Oil filters & Car Batteries	RILTA	CW-421	W0192-02
White Goods TV's and Computers Small electrics Electric Fence Batteries Household Batteries Flourescent tubes Fridge Freezers	KMK- Metal	CW-093	W113-2
OXFAM Bank	Oxfam	Exempt	Exempt
Mobile Phones	Jack and Jill foundation	Exempt	Exempt
Print cartridges	Jack and Jill foundation	Exempt	Exempt
* Repak subsidies apply			

For the year ended 31/12/10, 47427 people availed of the facilities at the recycling center. Graph No.1. below shows the numbers attending the center on a monthly basis through 2009.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
2008	6941	5666	6292	6392	7259	6025	6726	6903	6032	4851	5089	5366
2009	5170	4198	4571	4646	5240	5186	5508	5721	4976	5159	4234	4890
2010	4463	3799	4334	4495	4237	4127	4463	4348	3465	3497	3146	3053
2011	3462	2735	3188	207	0	0	0	0	0	0	0	0

Summary of environmental monitoring.
Monitoring and maintenance procedures;

Monitoring at the landfill site is carried out in accordance with schedule D of Waste licence 67-1.

The main elements of the monitoring programme are as follows;

1. Groundwater monitoring
2. Surface water monitoring
3. Landfill gas monitoring
4. Leachate monitoring
5. Noise and dust monitoring
6. Meteorological monitoring
7. Ecological monitoring

Landfill Gas Monitoring.

Monitoring was carried out on a monthly basis as required by our waste licence.
There were a few occasions when levels exceeded trigger levels as outlined in the licence. Mainly these were high levels of CO2 in areas outside the waste body.

A permanent gas detection system has been installed in the site buildings and it is tested and calibrated twice annually as set out in maintenance procedures.

Monthly gas monitoring sheets are included in Appendix B.

- The computerised gas model used was "Land SIM",

Details for the emissions for 2010 are as follows;

Complete Landfill LFG	408.17m³/hr
Complete Landfill CH4	163.27m³/hr
Complete Landfill CH4	972568.4kg/yr
Complete Landfill CO2	244.90m³/hr
Complete Landfill CO2	4247836kg/yr

Dust Monitoring

At Rathroeen Landfill we are required to carry out dust monitoring three times a year, twice between the months of May to September and once in the remainder of the year.

The results from each period are outlined below in Table 2.1.

Table 2.1 Total dust emissions during 2009

	Up- 24/03/10 Down- 20/04/10	**Up- 1/07/10 Down- 30/07/10**	**Up- 1/08/10 Down- 30/08/10**
	Total Dust Mg / m2 / day	**Total Dust Mg / m2 / day**	**Total Dust Mg / m2 / day**
D1	**47**	**65**	**60**
D2	**128**	**1205**	**250**
D3	**86**	**101**	**110**
D4	**59**	**451**	**285**

Groundwater Monitoring

Analysis of groundwater samples has shown that levels of ammonia have been elevated in each sampling period. Coliforms have also been found at most of the wells during this period, this indicates that there has been contamination due to sewage or industrial waste. Sampling dates for 2010 were, 25/02/10, 27/05/10, 14/06/10, 22/9/10, 1/10/10.

Prior to the granting of our waste licence there were 6 No. monitoring points, MW 1,2,3,4D, 4S and MW5. In December '02 five more wells were drilled to comply with condition 3.18.1. This condition required that one well be drilled in the bedrock down gradient of the site and two more is drilled in the overburden to the north and east of the site. These were labelled MW7D, MW6 and MW8S. While the drilling rig was in these areas, we also had two more wells drilled in the overburden to the west, MW7S and in the bedrock up gradient of the site, MW8D. During the construction phase on site monitoring wells MW1, MW4D and MW4S were destroyed. These were replaced in October 2003 with wells that have been agreed with the agency and labeled as follows MW9, MW10D and MW10S.

With the completion of cells one and two plus the construction of the leachate interceptor drain there should be significant improvement in the groundwater quality.

Details of groundwater analysis are attached in Appendix C.

Surface water Monitoring

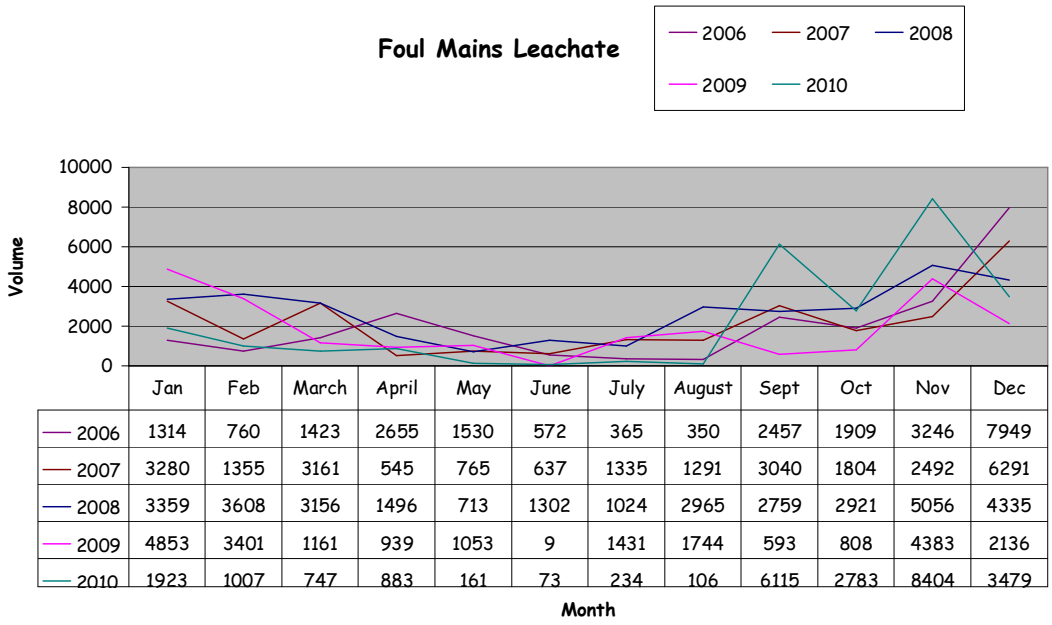
Monitoring of the five surface water points is carried out on a quarterly basis as per schedule D.5.1. On each occasion that the samples have been taken one or more of the limits set for A1 waters has been exceeded. Dates of sampling in 2010 were, 25/02/10, 23/02/10, 25/05/10, 15/09/10.

The general trend of the samples are as follows, SW1 the upstream point is of poor quality generally, the situation is a lot worse at SW2 which is at the northern end of the site. The quality shows a gradual improvement as the stream makes the 2km journey, through points SW4, 3 and 5 to the river Moy.

A summary of results for each point is included in Appendix.C.

Leachate Monitoring.

As part of compliance to our waste licence we are sampling leachate monthly from the main pump sump before the rising main leaves the site to the treatment plant. Sampling dates for 2010 were as follows; 25/02/10, 14/06/10, 15/09/10. Analysis and details on leachate monitoring and levels from the site are attached in Appendix C. Volumes pumped from the site are shown in table below.



	Jan	Feb	March	April	May	June	July	August	Sept	Oct	Nov	Dec
2006	1314	760	1423	2655	1530	572	365	350	2457	1909	3246	7949
2007	3280	1355	3161	545	765	637	1335	1291	3040	1804	2492	6291
2008	3359	3608	3156	1496	713	1302	1024	2965	2759	2921	5056	4335
2009	4853	3401	1161	939	1053	9	1431	1744	593	808	4383	2136
2010	1923	1007	747	883	161	73	234	106	6115	2783	8404	3479

Biological Assessment

Bord Na Mona Technical Services were commissioned by Mayo County Council to perform a biological kick-sample at a designated location and subsequent macroinvertebrate analysis to assign a quality rating to the watercourse. The site was subsequently sampled on the 24th August 2010. The conclusion of the analysis was a Q3 rating, which is a moderately polluted rating.

Noise Monitoring

The annual Noise survey was carried out in May 2010 the final results are attached in Appendix.D.

Meteorological Report

In August of 2002 a weather station was put in place at the landfill site. It is being used to monitor wind speed, wind direction, rainfall, temperature, humidity and atmospheric pressure. A brief summary of monitoring has been included in Appendix E. Also shown are the rainfall totals that have been collected at Rathroeen.

Wind has been the most influential weather on the daily operations at Rathroeen landfill. We use an enclosed area of netting for tipping when it is windy. Since moving into Cell No. 2 we have been using a mobile netting system in conjunction with the perimeter netting. This netting can be moved to a new area in approximately half a day. We are therefore operating in an enclosed area at all times.

Complaints Summary.

As part of the agreed management of the Rathroeen Landfill regular meeting are held with the local Cooneal and Ballisokeary Residents Association, four meetings were held in 2009, on the following dates, 23/02/10, 28/04/10, 15/12/10. Many of the concerns of the residents are expressed through these meetings and minuted.

Financial provisions made under licence.

For the year 2010 the cost per ton of waste at Rathroeen Landfill has been as follows, €145 per ton inclusive of the €30 per tonne government landfill levy.

The running costs for Rathroeen for 2010 were €1.01 million; the current estimated cost for 2011 is €0.98 million.

Management and staffing structure at Rathroeen Landfill

Rathroeen Landfill Site Management Structure				
Title	Name	Responsibilities/Duties	Qualifications/Experience	
Director of Services	Seamus Granaghan	Directorial responsibilities for the operation of the landfill.	B.E., C.Eng. F.I.E.I.	
Senior Engineer	Patsy Bourke	Overall responsibility for all aspects of development and management of the landfill.	B.E., C.Eng. M.I.E.I.	
Senior Engineer	Michael Mongan	Overall responsibility for all capital works at the landfill	B.E., C.Eng. F.I.E.I.	
Site Manager	Eddie Munnelly	Overall responsibility for the operation and the management of the landfill and ensuring compliance with the licence.	B.E., C.Eng. M.I.E.I.	
Deputy Site Manager	Michael Hegarty	Carrying out environmental monitoring at Rathroeen Landfill as specified in the waste licence. Deputising for Site Manager.	B.Sc., Dip C.Eng.	
Assistant Staff Officer, Grade 4	Ciaran Commons	Operation of the office system including weighbridge accounts, payments, invoicing, wages, subsistence, information management, public relations.	Suitably Qualified	
Clerical Officer	Patricia Loftus	Operation of the office system including weighbridge accounts, payments, invoicing, wages, subsistence, information management, public relations. Deputising for Administrative Officer.	Suitably Qualified	
A / Foreman	Gerry Bourke	Supervision of works and filling operations at the landfill. Deputising in absence of deputy landfill manager.	Suitably Qualified	
General Operative 1	John Quinn	General Maintenance as directed	Suitably Qualified	

General Operative 2	David McAndrew	General Maintenance as directed	Suitably Qualified	
General Operative 3	Martin McNulty	General Maintenance as directed	Suitably Qualified	

Public Information Programme

All records of environmental monitoring are kept at Rathroeen Landfill. To date there have been no requests to see the information. We have also placed information boxes at the recycling center and have numerous leaflets and brochures available to the public at the reception area of the landfill. In addition to this we are also running a number of school tours. These are from both primary and secondary schools generally from the local area.

Operational and safety procedures, including Emergency Response Procedures;

Refer to the guidelines for safe tipping procedures at the landfill site and Emergency Response procedure in the current EMS.

Assessment of settlement in finished areas;

A topographical survey has been carried out at the landfill each year since the grant of the licence. A number of fixed benchmarks have been installed on the area to the north of the graded and these are being monitored for settlement.

Closure and aftercare;

Final contours of the site;

The final contours of the site are as set out on drawing No. 0020405/01/609 submitted as part of the licence application in September 1999.

The restoration plan;

The finalised restoration and aftercare programme for the facility has not yet been fully decided upon, however the following issues will be dealt with;

- On cessation of filling each cell will be capped with an impermeable liner and soil layer;

- Gas extraction and leachate treatment will continue post closure;
- Monitoring of gas, surface and groundwater and leachate quality will continue post closure.

Phases for closure and restoration of completed areas;

The filling of cell no.1 was completed in April 2006; it was permanently capped winter 2006 and spring 2007. Cell.2 has been filled from May 2006 onwards; its capacity was exhausted in January 2010, capping of Cell 2 is due to commence in May 2011, in conjunction with the construction of Cell 3.

Aftercare monitoring and other control measures;

Post closure monitoring will be as follows;

Landfill gas;

Monitoring of gas levels will be continuous in the site buildings, and will continue on a monthly basis at the monitoring points around the site, unless circumstances arise that requires more frequent monitoring. This will continue until it is shown that conditions on the site are stable. At this stage it is hoped that the gas monitoring may be continued on a biannual basis with the agreement of the agency.

Surface water;

The post closure-monitoring programme of the surface water will be based on the results of the monitoring programme over the remaining operating life of the landfill. All monitoring will aim to comply with the compliance monitoring as set out in the EPA manual on Landfill Monitoring, or as required by the Agency. The monitoring programme will consist of a minimum of twice yearly sampling at points upstream and downstream of the facility. All results and interpretations of it shall be included in the annual status report on Rathroeen Landfill.

Ground water;

The post closure-monitoring programme of the Ground water will be based on the results of the monitoring programme over the remaining operating life of the landfill. All monitoring will aim to comply with the compliance monitoring as set out in the EPA manual on Landfill Monitoring, or as required by the Agency. The monitoring programme will consist of a minimum of twice-yearly sampling from points up gradient and down gradient of the facility in the overburden and in the bedrock. The water levels will also be measured at these intervals. All results and interpretation s of it shall be included in the annual status report on Rathroeen Landfill.

Leachate;

Following closure, leachate levels and flow rates will continue to be recorded at the pump sumps. Leachate composition will be sampled and analysed on a six monthly basis in conjunction with the ground and surface water sampling. It shall be analysed for the same parameters as outlined for pre-closure.

Noise;

Noise monitoring is not expected to be required following completion of the landfill activities at Rathroeen Landfill.

Odours;

The need to monitor odours may arise due to complaints. However proper management of the facility and installation of a gas extraction plant will ensure that odour problems are kept to a minimum.

Dust;

Following the completion of the final landscaping dust monitoring will not be applicable at the facility.

Meteorology;

The weather station will remain in place at the facility following completion of the operations.

Ecology;

The vicinity of the landfill shall be monitored once approximately six months after completion of final landscaping. No further monitoring of the ecology is expected thereafter.

Maintenance programme for aftercare phase;

The management programme being established for the running of the landfill facility will continue post closure, with particular emphasis being placed on leachate, landfill gas emissions, surface and groundwater systems to ensure that the potential for environmental damage is minimised or eliminated. Mayo County Council will oversee the restoration plan and if the need arises, a landscape architect will be engaged to advise on how best to return the site to proposed condition. Attention will also be given to security of the facility in order to safeguard the integrity of the management systems put in place. The management programme will continue until such time as the agency dictates.

Appendix A.

Rathroeen Recycling Center tonnages 2010.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
Glass(Clear, Green, Brown)	13.78	8.86	11.56	10.08	8.64	5.4	12.86	10.46	8.22	6.3	7.12	6.18	109.46
Aluminium Cans	1.74	0	0.62	0	0	0.62	0	0.76	0	0.74	0.76	0	5.24
Paper	10.76	24.55	14.26	24.5	16.92	19.34	19.26	25.58	9.4	25.58	20.52	8.36	219.03
Cardboard	15.82	18.34	8.48	9.94	9.7	13.62	6.68	15.14	5.52	10.78	6.98	5.18	126.18
Tetra Paks	2.4	0	0.7	0.8	1.4	0	0	0	2.08	0.44	1	0	8.82
Tin/steel Cans	4.14	5.58	2.6	2.5	1.58	2.96	0	1.28	1.32	1.26	1.64	0	24.86
Plastics (PE + HDPE)	3.84	1.82	3.62	3.82	4.58	1.86	4.68	1.96	1.88	4.96	2.4	0.8	36.22
Hard Plastic	0	0	2.22	3.32	0	0.52	0	1.68	0.68	2.46	1.92	0	12.8
Timber	4.78	5.34	5.18	8.32	5.52	1.54	9.36	4.62	0	0.74	6.17	1.52	53.09
Metal	16.6	14.8	15.18	16.4	6.6	30.84	17.72	11.18	11.3	10.24	7.34	0	158.2
Textiles	2.62	3.42	4.64	4.3	4.36	5.38	4.28	5.38	3.34	2.92	4.34	2	46.98
Waste oil	0.12	0.4	0	0	0	0.86	0	0.66	0.16	1.5	0	0	3.7
Waste Veg oil	0	0	0.58	0.84	0	0	0	0	0	0	0.3	0	1.72
Batteries -Nickel/cad	0.6	0.36	0	0.3	0	0.62	0.24	0.38	0	0.88	0.18	0	3.56
Batteries - lead acid	1.46	2.32	0	2.98	0.92	1.4	1.38	1.26	0	1.58	0.78	0	14.08
Window Glass	0	0	0	0	0	0	6.48	0	2.84	3.8	0	0	13.12
Flourescent tubes	0.12	0.06	0	0.04	0	0	0.08	0.01	0	0.16	0.08	0	0.55
White goods	5.4	6.14	22.68	12.96	0	0	0	26.8	0	0	0	10.7	84.68
TVs	23.4	0	0	0	0	0	0	0	0	0	0	0	23.4
Small Electrical Goods	0	0	7.14	7.94	36.86	22.12	12.4	12.38	18.76	9.72	13.8	4.7	145.82
Fridges/Freezers	0	0	0	0	0	0	0	0	0	13.44	0	0	13.44
Gas Cylinders	0	0	0	0	0	0	0	0	0	0	3.16	0	3.16
Green Waste	0	0	0	0	0	2.06	6.86	2.58	7.56	4.9	0	0	23.96
Polystyrene	0.64	0	0.64	0.34	0	0	0.54	0	0.2	0	0	0	2.36
Tyres	1.16	0	0	0	0	0	0	0	4.72	0	0	0	5.88
Hse Haz. Waste (Medicine)	0	0	0	0	0	0	0	0	0	0	0	0	0
Hse Haz. Waste (Paint)	0.6	0.92	1.02	1.38	0	1.08	1.32	0	1.58	1.6	0	0	9.5
Hse Haz. Waste (Aerosols)	0.44	0	0.36	0	0.04	0.16	0	0.3	0	0.4	0.16	0	1.86
Gypsum / Plasterboard	5.14	1.9	3.34	3.7	2.16	5.58	1.2	2.16	0	3.92	1.26	0	30.36
Totals	115.56	94.81	104.82	114.46	99.28	115.96	105.34	124.57	79.56	108.32	79.91	39.44	1182.03

Appendix B.

2010	GW. No.	CH4	CO2	O2	CO	H2S	Rel	Barometric
January	BALLGW08	0	0.3	19.8	0	0	-0.56	1033
February	BALLGW08	0	0.5	19.2	0	0	-0.55	983
March	BALLGW08	0	1.6	17.6	0	1	0.52	988
April	BALLGW08	0	2.5	16.4	0	4	0.8	1000
May	BALLGW08	0	0.8	19.9	0	1	0.45	1004
June	BALLGW08	0	2.4	17.8	5	5	1.09	1014
July	BALLGW08	0	2.9	16.4	2	1	-0.13	1013
August	BALLGW08	0	3.1	15.8	1	1	0.03	1006
September	BALLGW08	0	2.3	17.1	0	0	-0.97	1005
October	BALLGW08	0	3.1	12.8	1	0	-0.29	982
November	BALLGW08	0	0.5	19.8	0	0	0.24	1014
December	BALLGW08	0	0.5	19.2	0	0	-0.55	983

2010	GW. No.	CH4	CO2	O2	CO	H2S	Rel	Barometric
January	BALLGW09	0	1.4	19.2	0	0	-0.42	1034
February	BALLGW09	0	1.2	18.7	0	0	-0.48	983
March	BALLGW09	0	1.2	18.9	0	0	-0.39	986
April	BALLGW09	0	1.3	19	0	0	-0.06	998
May	BALLGW09	0	1.3	19.4	0	0	0.12	1005
June	BALLGW09	0	1.1	19.4	0	0	0.65	1014
July	BALLGW09	0	2	17.9	0	0	0.39	1014
August	BALLGW09	0	2.5	17.7	2	1	0.38	1006
September	BALLGW09	0	2.2	18.2	0	0	-0.09	1006
October	BALLGW09	0	2.7	17.6	0	0	-0.05	983
November	BALLGW09	0	1.8	18.4	0	0	0.05	1016
December	BALLGW09	0	1.2	18.7	0	0	-0.48	983

2010	GW. No.	CH4	CO2	O2	CO	H2S	Rel	Barometric
January	BALLGW12	0	1.6	12.9	0	0	0.01	1033
February	BALLGW12	0	0.4	18.5	0	0	-0.08	983
March	BALLGW12	0	2.1	14.9	0	0	0.57	988
April	BALLGW12	0	1.8	16.4	0	2	0.71	1000
May	BALLGW12	0	2.3	17.4	1	0	0.42	1004
June	BALLGW12	0	2.6	16.6	3	6	1.09	1014
July	BALLGW12	0	2.8	14.5	3	1	-0.14	1013
August	BALLGW12	0	3.8	14	1	4	-0.36	1006
September	BALLGW12	0	3	11.8	0	0	-1.7	1005
October	BALLGW12	0	3.5	10.7	0	0	-0.26	982
November	BALLGW12	0	2	11.5	1	0	-0.69	1014
December	BALLGW12	0	0.4	18.5	0	0	-0.08	983

2010	GW. No.	CH4	CO2	O2	CO	H2S	Rel	Barometric
January	BALLGW13	0	0	20.9	0	0	-0.86	1033
February	BALLGW13	0	0	20.3	0	0	0.19	983
March	BALLGW13	0	0	20.7	0	0	0.25	988
April	BALLGW13	0	0	20.8	0	0	-0.71	1000
May	BALLGW13	0	0	20.7	1	0	0.55	1004
June	BALLGW13	0	0.5	20.4	2	5	0.73	1014
July	BALLGW13	0	0	20.7	1	2	-1.05	1013
August	BALLGW13	0	0	20.5	0	2	-0.25	1006
September	BALLGW13	0	0	20.5	2	5	-1.02	1005
October	BALLGW13	0	0	20.3	0	0	-0.21	982
November	BALLGW13	0	0	20.2	0	0	2.25	1014
December	BALLGW13	0	0	20.7	0	0	0.25	988

2010	GW. No.	CH4	CO2	O2	CO	H2S	Rel	Barometric
January	BALLGW17	0	3.8	13.8	0	0	0	1033
February	BALLGW17	0	6.4	7.6	0	0	0.08	983
March	BALLGW17	0	4.6	14.6	0	0	0.51	988
April	BALLGW17	0	5.5	14.7	0	0	0.76	1000
May	BALLGW17	0	5.4	10.4	1	0	0.47	1004
June	BALLGW17	0	4.9	14.4	2	3	1.14	1014
July	BALLGW17	0	6.3	12.4	2	1	0.54	1013
August	BALLGW17	0	7.4	9.8	0	1	0.5	1006
September	BALLGW17	0	6.6	10.5	1	1	-1.12	1005
October	BALLGW17	0	7.2	10.3	0	0	-0.11	982
November	BALLGW17	0	2.5	17.2	0	0	0.92	1014
December	BALLGW17	0	4.6	14.6	0	0	0.51	988

2010	GW. No.	CH4	CO2	O2	CO	H2S	Rel	Barometric
January	BALLGW18	0	3.6	14.3	0	0	-0.07	1033
February	BALLGW18	0	2.5	17.3	0	0	0.08	983
March	BALLGW18	0	1.7	18.9	0	0	0.54	988
April	BALLGW18	0	1.8	19.3	0	2	0.85	1000
May	BALLGW18	0	1.1	20.3	0	0	0.5	1004
June	BALLGW18	0	1.6	19.6	2	3	1.13	1013
July	BALLGW18	0	1.4	19.1	1	0	0.57	1013
August	BALLGW18	0	2	19	0	0	0.56	1006
September	BALLGW18	0	2.9	17.7	1	0	-0.85	1005
October	BALLGW18	0	2.9	18.3	1	1	-0.08	982
November	BALLGW18	0	1.5	19.1	0	0	-0.7	1014
December	BALLGW18	0	2.5	17.3	0	0	0.08	983

2010	GW. No.	CH4	CO2	O2	CO	H2S	Rel	Barometric
January	BALLGW19	27.4	14.2	1.8	0	1	0.1	1032
February	BALLGW19	45.4	15.5	0	0	0	-0.06	982
March	BALLGW19	55.8	17.3	0.7	0	1	-0.02	985
April	BALLGW19	53.2	20.7	0.1	0	0	0.23	999
May	BALLGW19	26.5	17.8	3.9	4	0	0.31	1005
June	BALLGW19	32.3	18.5	3.7	0	4	0.59	1014
July	BALLGW19	0.8	0.5	19.3	0	0	0.35	1013
August	BALLGW19	26.5	17.8	3.9	4	0	0.31	1005
September	BALLGW19	34.2	18.7	2.3	0	0	-0.12	1004
October	BALLGW19	29.9	20.6	0.1	0	0	5.01	982
November	BALLGW19	12.3	16.8	0.5	0	0	-0.22	1015
December	BALLGW08	26.5	17.8	3.9	4	0	0.31	1005

Appendix C.

SW1				
Lab				
Date		15/09/2010	25/05/2010	25.02.10
Temp	degrees C			
DO	% sat	7.4	7.48	8.36
Ammonical Nitrogen	mg/l N	0.13	0.034	0.2
BOD	mg/l O2	<1	1	
COD	mg/l O2	55	30	46.3
Chloride	mg/l Cl	24.9	32.8	34.2
Conductivity		731	0.687	0.738
pH	pH units	7.4	7.6	8.59
Total Suspended Solids	mg/l	<5	5	6
Total Phosphourous	mg/l P	0.04	0.04	0.0183
Orthophosphate	mg/l P	<0.009	0.023	0.03
Cadmium	ug/l	0.2		
Calcium	mg/l	151		
Chromium	ug/l	<1		
Copper	ug/l	<0.003		
Iron	ug/l	432		
Lead	ug/l	<0.3		
Magnesium	mg/l	7.9		
Manganeese	ug/l	92.8		
Mercury	ug/l	<0.02		
Potassium	mg/l	6.1	2.6	6.31
Sulphate	mg/l SO4	13		
Sodium	mg/l	16.8	18.6	19.4
Alkalinity	mg/l CaCO3	310.4		
Total Oxidised Nitrogen	mg/l N	0.54		
Zinc	ug/l	12.1		
List 1 & 2 Organics				
Nickel	ug/l			
Total Ammonia as N	mg/l			

SW2				
Lab				
Date		15/09/2010	25/05/2010	25/02/2010
Temp	degrees C			
DO	mg/l	8	6.87	7.9
Ammonical Nitrogen	mg/l N	0.108	5.07	6.25
BOD	mg/l O2	<1	3	
COD	mg/l O2	32	46	60.3
Chloride	mg/l Cl	25.6	38.9	44.3
Conductivity		750	0.718	0.68
pH	pH units	7.4	7.4	8.82
Total Suspended Solids	mg/l	<5	5	7
Total Phosphourous	mg/l P	0.04	0.08	0.116
Orthophosphate	mg/l P	<0.009	0.057	0.03
Cadmium	ug/l	0.2		
Calcium	mg/l	151		
Chromium	ug/l	<1.0		
Copper	ug/l	<0.003		
Iron	ug/l	300		
Lead	ug/l	<0.3		
Magnesium	mg/l	95.3		
Manganeese	ug/l	8.5		
Mercury	ug/l	<0.02		
Potassium	mg/l	5.3	5.4	
Sulphate	mg/l SO4	188		
Sodium	mg/l	17.9	25.5	13.6
Alkalinity	mg/l CaCO3	305.2		
Total Oxidised Nitrogen	mg/l N	0.41		
Zinc	ug/l	8.3		
List 1 & 2 Organics				
Nickel	ug/l			
Total Ammonia as N	mg/l			
dissolved oxygen	mg/l			

SW3				
Date		15/09/2010	25/05/2010	25.02.10
Temp	degrees C			
DO	% sat	9.3	7.68	8.48
Ammonical Nitrogen	mg/l N	0.53	0.935	1.92
BOD	mg/l O2	2	6	
COD	mg/l O2	49	30	30.9
Chloride	mg/l Cl	23.5	37	31.4
Conductivity		641	0.754	0.657
pH	pH units	7.7	8	8.59
Total Suspended Solids	mg/l	<5	11	3.5
Total Phosphourous	mg/l P	0.08	0.06	0.0531
Orthophosphate	mg/l P	0.029	0.032	0.03
Cadmium	ug/l	0.2		
Calcium	mg/l	122		
Chromium	ug/l	<1.0		
Copper	ug/l	<0.003		
Iron	ug/l	402		
Lead	ug/l	<0.3		
Magnesium	mg/l	61		
Manganeese	ug/l	8.4		
Mercury	ug/l	<0.02		
Potassium	mg/l	4.9	8.7	5.87
Sulphate	mg/l SO4	<1.0		
Sodium	mg/l	17.8	25.2	23.1
Alkalinity	mg/l CaCO3	268.4		
Total Oxidised Nitrogen	mg/l N	1.24		
Zinc	ug/l	8.1		
List 1 & 2 Organics				
Nickel	ug/l			
Total Ammonia as N	mg/l			

SW4				
Date		15/19/10	25/05/2010	25.02.10
Lab				
Temp	degrees C			
DO	% sat	7.5	7.78	8.2
Ammonical Nitrogen	mg/l N	2.466	9.47	5.39
BOD	mg/l O2	4	5	
COD	mg/l O2	69	46	58.3
Chloride	mg/l Cl	28.8	51.3	40.6
Conductivity		635	0.867	0.682
pH	pH units	7.3	7.8	8.79
Total Suspended Solids	mg/l	<5	9	8
Total Phosphourous	mg/l P	0.14	0.09	0.258
Orthophosphate	mg/l P	0.06	0.057	0.03
Cadmium	ug/l	0.2		
Calcium	mg/l	113		
Chromium	ug/l	<1.0		
Copper	ug/l	<0.003		
Iron	ug/l	867		
Lead	ug/l	<0.3		
Magnesium	mg/l	9.6		
Manganeese	ug/l	129.3		
Mercury	ug/l	<0.02		
Potassium	mg/l	7.6	14.6	13.1
Sulphate	mg/l SO4	20.5		
Sodium	mg/l	21.4	36.6	35.9
Alkalinity	mg/l CaCO3	229.8		
Total Oxidised Nitrogen	mg/l N	1.81		
Zinc	ug/l	8.8		
List 1 & 2 Organics				
Nickel	ug/l			
Total Ammonia as N	mg/l			

SW5

Date		15/09/2010	25.05.10	25.02.10
Temp	degrees C			
DO	% sat	9.8	9.11	8.61
Ammonical Nitrogen	mg/l N	0.298	0.007	1.19
BOD	mg/l O2	<1	1	
COD	mg/l O2	30	21	24
Chloride	mg/l Cl	22.4	33.1	29.6
Conductivity		657	0.731	0.673
pH	pH units	7.9	8.3	8.54
Total Suspended Solids	mg/l	<5	5	3.5
Total Phosphourous	mg/l P	0.06	0.04	0.0472
Orthophosphate	mg/l P	0.016	0.03	0.03
Cadmium	ug/l	0.2		
Calcium	mg/l	129		
Chromium	ug/l	<1.0		
Copper	ug/l	129		
Iron	ug/l	294		
Lead	ug/l	<0.3		
Magnesium	mg/l	8.7		
Manganeese	ug/l	35.9		
Mercury	ug/l	<0.02		
Potassium	mg/l	4.8	6.2	5.9
Sulphate	mg/l SO4	<1.0		
Sodium	mg/l	16.9	22.4	23.3
Alkalinity	mg/l CaCO3	1214.2		
Total Oxidised Nitrogen	mg/l N	1.36		
Zinc	ug/l			
List 1 & 2 Organics				
Nickel	ug/l			
Total Ammonia as N	mg/l			

MW2				
Lab				
Date		22.09.10	14.06.10	25.02.10
	Units			
Temp.				
D.O.	mg/l	4.7	5.61	7.08
pH		7.2	7.4	8.37
Conductivity	mS/cm	0.86	0.846	0.85
Ammonical Nitrogen	mg/l N	0.749	0.098	0.335
Total Ox Nitrogen	mg/l N	0.02	0.138	0.1
Chloride	mg/l Cl	36.3	40.5	41.1
Total Carbon	mg/l			
Total Inorganic Carbon	mg/l			
Total Organic Carbon	mg/l C	4.6	6.4	5.35
Total Coliforms	No/100ml	261	2420	1000
Faecal Coliforms	No/100ml	0	0	0
Phenols	mg/l	0.15	0.01	0.015
Sodium	mg/l	23	14.4	24.7
Potassium	mg/l	3.5	3.1	3.18
Iron	ug/l	436500		
Lead	ug/l	1.9		
List 1&2 Organics				
Magnesium	mg/l	18		
Manganeese	ug/l	829		
Mercury	ug/l	0.02		
Total Alkalinity	mg/l CaCO3	375		
Sulphate	mg/l SO4	72.4		
Total Phosphorous	mg/l P		0.02	0.0254
Orthphosphate	mg/l PO4			
Residue on evaporation				
Zinc	ug/l	10.6		
Flouride	mg/l F	0.37		
Calcium	mg/l	149.5		
Cadmium	ug/l	0.1		
Copper	ug/l	0.006		
Cyanide	mg/l CN	0.01		
Total Solids	mg/l			
Boron	ug/l	0.04		
Chromium	ug/l	1.4		
Dissolved Nickel	ug/l			
Total Nickel	mg/l			
nitrate as no3	mg/l			
nitrite as no2	mg/l			

MW3				
Lab				
Date		22.9.10	14.06.10	25.02.10
	Units			
Temp.				
D.O.	mg/l	5	4.95	7.09
pH		6.9	7.1	8.27
Conductivity	uS/cm	1.104	0.906	0.866
Ammonical Nitrogen	mg/l N	137	0.97	0.215
Total Ox Nitrogen	mg/l N	0.03	0.138	0.1
Chloride	mg/l Cl	16.5	17.6	18.6
Total Carbon	mg/l			
Total Inorganic Carbon	mg/l			
Total Organic Carbon	mg/l C	5.6	5.3	4.17
Mercury	ug/l	0.02		
Faecal Coliforms	No/100ml	387	0	0
Total Coliforms	No/100ml	0	31	10
Sodium	mg/l	17.2	21.9	17.7
Potassium	mg/l	7	6	6.43
Phenols	mg/l	0.15	0.01	0.015
Total Phosphorous	mg/l P		0.03	0.0183
Boron	ug/l	0.05		
Cadmium	ug/l	0.1		
Calcium	mg/l	223.5		
Chromium	ug/l	1		
Copper	ug/l	0.018		
Iron	ug/l	3465		
Lead	ug/l	0.3		
Magnesium	mg/l	13.8		
Manganeese	ug/l	345		
Dissolved Nickel	ug/l			
Total Nickel	mg/l			
Zinc	ug/l	8.4		
List 1&2 Organics				
Total Alkalinity	mg/l CaCO3	157.2		
Sulphate	mg/l SO4	202.7		
Orthphosphate	mg/l PO4			
Residue on evaporation				
Flouride	mg/l F	0.1		
Cyanide	mg/l CN			
Total Solids	mg/l			
nitrate as no3	mg/l			
nitrite as no2	mg/l			

MW6

Lab				
Date		4.10.10	14.06.10	25.02.10
	Units			
Temp.				
D.O.	mg/l		3.47	4.03
pH		7.2	7.2	8.41
Conductivity	uS/cm	0.663	0.671	0.684
Ammonical Nitrogen	mg/l N	1.178	1.28	1.37
Total Ox Nitrogen	mg/l N	0.29	0.22	0.1
Chloride	mg/l Cl	18.5	21.3	21.7
Total Carbon	mg/l			
Total Inorganic Carbon	mg/l			
Total Organic Carbon	mg/l C		7.5	7.64
Total Coliforms	No/100ml	19863	9804	0
Faecal Coliforms	No/100ml	0	0	0
Phenols	mg/l	0.15	0.03	0.04
Sodium	mg/l	16.2	16.3	18.4
Potassium	mg/l	2.4	2	6.84
Iron	ug/l	75		
Lead	ug/l	0.3		
List 1&2 Organics				
Magnesium	mg/l	18.9		
Manganeese	ug/l	385		
Mercury	ug/l	0.03		
Total Alkalinity	mg/l CaCO3	261		
Sulphate	mg/l SO4	90.7		
Total Phosphorous	mg/l P		0.01	2.43
Orthphosphate	mg/l P			
Residue on evaporation				
Zinc	ug/l	3.2		
Flouride	mg/l F	0.23		
Calcium	mg/l	420.9		
Cadmium	ug/l	0.3		
Copper	ug/l	0.003		
Cyanide	mg/l CN	10		
Total Solids	mg/l			
Boron	ug/l	0.02		
Chromium	ug/l	1		
Dissolved Nickel	ug/l	21.7		
total Nickel	mg/l			
dissolved potassium	mg/l			
nitrate as no3	mg/l			
nitrite as no2	mg/l			

MW7D				
Lab				
Date			1.10.10	25.02.10
	Units			
Temp.				
D.O.	mg/l			3.24
pH			7.3	8.68
Conductivity	uS/cm		0.991	0.829
Ammonical Nitrogen	mg/l N		1.432	2.9
Total Ox Nitrogen	mg/l N		2.07	1.67
Chloride	mg/l Cl		57.9	48.7
Total Carbon	mg/l			
Total Inorganic Carbon	mg/l			
Total Organic Carbon	mg/l C		8.41	7.58
Total Coliforms	No/100ml		24196	31
Faecal Coliforms	No/100ml		556	31
Phenols	mg/l		0.15	0.09
Sodium	mg/l		79.5	19.6
Potassium	mg/l		45.2	42.9
Iron	ug/l		522.4	
Lead	ug/l		1.8	
List 1&2 Organics				
Magnesium	mg/l		16.6	
Manganeese	ug/l		134.4	
Mercury	ug/l		0.24	
Total Alkalinity	mg/l CaCO3		394	
Sulphate	mg/l SO4		51	
Total Phosphorous	mg/l P			0.974
Orthphosphate	mg/l P			
Residue on evaporation				
Zinc	ug/l		28.4	
Flouride	mg/l F		0.15	
Calcium	mg/l		152.2	
Cadmium	ug/l		0.1	
Copper	ug/l		0.005	
Cyanide	mg/l CN		0.001	
Total Solids	mg/l			
Boron	ug/l		0.02	
Chromium	ug/l		1.2	
Dissolved Nickel	ug/l		4.3	
total nickel	mg/l			
nitrate as no3	mg/l			
nitrite as no2	mg/l			

MW8D

Lab				
Date		22.9.10	27.05.10	25.02.10
	Units			
Temp.				
D.O.	mg/l	5.3	4.87	6.49
pH		6.9	7	8.13
Conductivity	uS/cm	1.067	1.117	1.07
Ammonical Nitrogen	mg/l N	0.415	1.43	0.534
Total Ox Nitrogen	mg/l N	0.32	0.15	0.775
Chloride	mg/l Cl	49.6	90.2	105
Total Carbon	mg/l			
Total Inorganic Carbon	mg/l			
Total Organic Carbon	mg/l C		20.7	8.81
Total Coliforms	No/100ml	24200	404	0
Faecal Coliforms	No/100ml	50	0	0
Phenols	mg/l	0.15	0.005	0.015
Sodium	mg/l	33.3	48.7	42.1
Potassium	mg/l	3.7	2.8	3.17
Iron	ug/l	31430		
Lead	ug/l	1.1		
List 1&2 Organics				
Magnesium	mg/l	10		
Manganeese	ug/l	103.1		
Mercury	ug/l	0.02		
Total Alkalinity	mg/l CaCO3	301.9		
Sulphate	mg/l SO4	153.1		
Total Phosphorous	mg/l P		0.01	0.0327
Orthphosphate	mg/l P			
Residue on evaporation				
Zinc	ug/l	29.6		
Flouride	mg/l F	0.17		
Calcium	mg/l	255.4		
Cadmium	ug/l	0.6		
Copper	ug/l	0.013		
Cyanide	mg/l CN	0.01		
Total Solids	mg/l			
Boron	ug/l	0.03		
Chromium	ug/l	1.9		
Dissolved Nickel	ug/l			
total nickel	mg/1			
chloride	mg/1	49.6		
nitrate as no3	mg/1			
nitrite as no2	mg/1			

MW8S

Lab				
Date		22.9.10	27.05.10	25.02.10
	Units			
Temp.				
D.O.	mg/l	5.8	4.15	6.23
pH		7.1	6.9	8.26
Conductivity	uS/cm	1.073	1.129	1.03
Ammonical Nitrogen	mg/l N	0.616	1.68	1.07
Total Ox Nitrogen	mg/l N	0.05	1.9	0.385
Chloride	mg/l Cl	53.7	99.5	107
Total Carbon	mg/l			
Total Inorganic Carbon	mg/l			
Total Organic Carbon	mg/l C	9	20.6	9.83
Total Coliforms	No/100ml	1400	4352	0
Faecal Coliforms	No/100ml	120	20	1
Phenols	mg/l	0.15	0.005	0.015
Sodium	mg/l	30.8	41.4	59.5
Potassium	mg/l	6.6	2.5	6.67
Iron	ug/l	3907		
Lead	ug/l	0.7		
List 1&2 Organics				
Magnesium	mg/l	11.6		
Manganeese	ug/l	103.6		
Mercury	ug/l	0.02		
Total Alkalinity	mg/l CaCO3	263		
Sulphate	mg/l SO4	192.6		
Total Phosphorous	mg/l P		0.01	0.049
Orthphosphate	mg/l P			
Residue on evaporation				
Zinc	ug/l	12.3		
Flouride	mg/l F	0.2		
Calcium	mg/l	212.7		
Cadmium	ug/l	0.2		
Copper	ug/l	0.03		
Cyanide	mg/l CN	0.01		
Total Solids	mg/l			
Boron	ug/l	0.03		
Chromium	ug/l	1.3		
Dissolved Nickel	ug/l			
Total nickel	mg/1			
nitrate as no3	mg/1			
nitrite as no2	mg/1			

MW9			
Lab			
Date		22.9.2010	27.05.10
	Units		
Temp.			
D.O.	mg/l	0.2	1.46
pH		7.5	7.6
Conductivity	uS/cm	0.77	0.762
Ammonical Nitrogen	mg/l N	0.36	0.632
Total Ox Nitrogen	mg/l N	0.03	0.138
Chloride	mg/l Cl	25.3	25.4
Total Carbon	mg/l		
Total Inorganic Carbon	mg/l		
Total Organic Carbon	mg/l C	3	2
Total Coliforms	No/100ml	2420	10
Faecal Coliforms	No/100ml	2420	10
Phenols	mg/l	0.15	0.005
Sodium	mg/l	32.7	42.6
Potassium	mg/l	5.8	6.9
Iron	ug/l	1260	
Lead	ug/l	0.3	
List 1&2 Organics			
Magnesium	mg/l	44	
Manganeese	ug/l	140	
Mercury	ug/l	0.02	
Total Alkalinity	mg/l CaCO3	357	
Sulphate	mg/l SO4	68.8	
Total Phosphorous	mg/l P		0.02
Orthphosphate	mg/l P		
Residue on evaporation			
Zinc	ug/l	22.8	
Flouride	mg/l F	1.24	
Calcium	mg/l	92.2	
Cadmium	ug/l	0.1	
Copper	ug/l	0.003	
Cyanide	mg/l CN	0.01	
Total Solids	mg/l		
Boron	ug/l	0.33	
Chromium	ug/l	1.6	
Dissolved Nickel	mg/l		
Total Nickel	ug/l		
nitrate as no3	mg/l		
nitrite as no2	mg/l		

MW10D

Lab				
Date		1.10.10	27.05.10	25.02.10
	Units			
Temp.				
D.O.	mg/l		5.9	6.93
pH		7.3	7.4	8.07
Conductivity	uS/cm	0.739	0.743	0.734
Ammonical Nitrogen	mg/l N	0.112	0.048	0.2
Total Ox Nitrogen	mg/l N	0.21	0.138	0.887
Chloride	mg/l Cl	21.7	28.1	23.1
Total Carbon	mg/l		1.2	
Total Inorganic Carbon	mg/l			
Total Organic Carbon	mg/l C	3.08		3
Total Coliforms	No/100ml	135	171	150
Faecal Coliforms	No/100ml	7	0	0
Phenols	mg/l	0.15	0.005	0.015
Sodium	mg/l	15.9	19.9	23.6
Potassium	mg/l	1.2	1.5	4.61
Iron	ug/l	2165		
Lead	ug/l	7.6		
List 1&2 Organics				
Magnesium	mg/l	16.5		
Manganeese	ug/l	156.8		
Mercury	ug/l	0.02		
Total Alkalinity	mg/l CaCO3	388		
Sulphate	mg/l SO4	23.3		
Total Phosphorous	mg/l P		0.01	0.0183
Orthphosphate	mg/l P			
Residue on evaporation				
Zinc	ug/l	8		
Flouride	mg/l F	0.43		
Calcium	mg/l	142.3		
Cadmium	ug/l	0.2		
Copper	ug/l	0.003		
Cyanide	mg/l CN	0.001		
Total Solids	mg/l			
Boron	ug/l	0.02		
Chromium	ug/l	1.4		
Nickel	ug/l	1.7		
nitrate as no3	mg/l			
nitrite as no2	mg/l			

MW10S				
Lab				
Date		1.10.10	27.05.10	25.02.10
	Units			
Temp.				
D.O.	mg/l		5.99	7.14
pH		7.2	7.3	8.09
Conductivity	uS/cm	0.731	0.763	0.719
Ammonical Nitrogen	mg/l N	0.03	0.064	0.2
Total Carbon	mg/l			0.1
Total Inorganic Carbon	mg/l			27
Total Organic Carbon	mg/l C	2.57	2.5	5.11
Faecal Coliforms	No/100ml	179	2	
Total Coliforms	No/100ml	2420	148	
Sodium	mg/l	15.7	19.8	335
Potassium	mg/l	0.9	1.4	121
Total Phenols	mg/l	0.15	0.005	0.015
Total Phosphorous	mg/l P		0.01	16.8
Chloride	mg/l Cl	23.1	21.7	3.02
Orthphosphate	mg/l P			
Total Ox Nitrogen	mg/l N	0.138	0.138	
Iron	ug/l	5576		
Lead	ug/l	3		
List 1&2 Organics				
Magnesium	mg/l	18.1		
Manganeese	ug/l	66		
Mercury	ug/l	0.02		
Total Alkalinity	mg/l CaCO3	375		0.119
Sulphate	mg/l SO4			
Residue on evaporation				
Zinc	ug/l	9.7		
Flouride	mg/l F	0.61		
Calcium	mg/l	161		
Cadmium	ug/l	0.2		
Copper	ug/l	0.003		
Cyanide	mg/l CN	0.001		
Total Solids	mg/l			
Boron	ug/l	0.02		
Chromium	ug/l	1		
Dissolved Nickel	mg/l			
Total Nickel	mg/l	2.5		
nitrate as no3	mg/l			
nitrite as no2	mg/l			

Appendix D.

5.0 Summary of Daytime Noise Measurements

Point	Daytime Limit dB(A)	Date	Time	L_{eq}	L_{10}	L_{90}	Comment
N1	**55**	17/05/10	14:28 – 14:58	43	45	40	The main sources of noise at this point were traffic movements on the R314, birds chirping in nearby vegetation and HGV's entering and leaving the site. An aircraft passed overhead. Activities at Rathroeen Landfill although audible were not a significant contributor to noise at this point.
N4	**55**	17/05/10	13:53 – 14:23	52	55	46	The main sources of noise at this point were HGV's entering and leaving the site, traffic movements on the R314, birds chirping in nearby trees, vehicles passing close by the noise meter and other human activities on site.
N6	**55**	17/05/10	15:42 – 16:12	58	59	46	The main sources of noise at this point were traffic movements on the R314, dogs barking, birds chirping in nearby trees and vehicles passing close by the noise meter. Activities at Rathroeen Landfill were not audible at this point.
N7	**55**	17/05/10	15:05 – 15:35	65	77	47	The main source of noise at this location was attributed to the constant flow of traffic on the R314 c. 5 meters from the monitoring point. No noise could be heard from Rathroeen Landfill at this point.

6.0 Summary of Night Time Noise Measurements

Point	Night time Limit dB(A)	Date	Time	L_{eq}	L_{10}	L_{90}	Comment
N1	**45**	17/05/10	22:01 – 22:31	44	47	38	Activities at Rathroeen Landfill were not audible at this monitoring point. The main source of noise was attributed to background traffic movements on the R314 and the occasional bird chirping in the nearby vegetation.
N4	**45**	17/05/10	22:35 – 23:05	45	50	43	No activities at Rathroeen Landfill were audible at this point. The main sources of noise were from traffic on the R314 and the occasional bird chirping in the nearby vegetation.
N6	**45**	17/05/10	23:42 – 00:12	52	56	31	Activities at Rathroeen Landfill were not audible at this point as the site was closed. The main sources of noise at this point were from background traffic movements on the R314 and vehicles passing close by the noise meter.
N7	**45**	17/05/10	23:11 – 23:41	60	67	34	The main source of noise at this point was from traffic on the R314 and vehicles passing close by the noise meter. There was no noise audible from the landfill.

7.0 Conclusions

There were 4 noise sensitive locations monitored as part of the Annual Noise survey at Rathroeen Landfill.

Points N6 & N7 exceeded the L_{eq} limit of 55 dB(A) during the day time survey at 58 dB(A) and 75 dB(A) respectively. This was entirely due to noise from traffic movements on the R314. Activities on going at Rathroeen landfill could not be heard at either of these locations throughout the survey. It is outlined in the EPA guidelines that:

"at sites where the LAeq is mainly influenced by extraneous noise such as road traffic , a 30 minute sample may be excessive, pertinent and critical data can often be gathered by using a series of short – term sampling intervals (especially when sources operate at a steady level) to try exclude the influence of extraneous sources".

This statement is relevant to noise levels detected at monitoring points N6 and N7. Traffic is definitely the most significant influence on noise measurements at both these points during the day and night surveys. For this reason, a number of short – term samples were assessed to determine levels excluding this interference. The results if which were determined between 45 and 47 dB(A) at N6 and 45 – 50 dB(A) at N7. The L_{90} is also more representative figure for these points at 46 dB(A) & 47 dB(A) for N6 and N7 respectively. There were no tonal or impulsive noise determined at either of the NSL's during either the day or night surveys.

Points N6 & N7 exceeded the Leq limit of 45 dB(A) during the night time survey at 52dB(A) & 60dB(A) respectively. This again was entirely due to noise from the R314 traffic. Noise was not audible at either these points from any activities at Rathroeen Landfill. The L_{90} is a more representative figure for these points at 31 dB(A) & 34 dB(A) respectively.

There were no tonal or impulsive noise determined at any of the noise sensitive locations during either the day or night surveys.

Appendix E.

ANNUAL CLIMATOLOGICAL SUMMARY

NAME: RathroeenLandfillDEC09on CITY: STATE:
ELEV: 46 m LAT: 54° 54' 01" N LONG: 9° 54' 01" W

TEMPERATURE (°C), HEAT BASE 18.3, COOL BASE 18.3

YR	MO	MEAN MAX	MEAN MIN	MEAN	DEP. FROM NORM	HEAT DEG DAYS	COOL DEG DAYS	HI	DATE	LOW	DATE	MAX >=32	MAX <=0	MIN <=0	MIN <=-18
10	1	6.0	0.1	3.0	0.0	468	0	11.2	16	-9.8	9	0	0	15	0
10	2	6.3	-0.3	2.9	0.0	422	0	9.7	4	-4.7	20	0	0	15	0
10	3	9.7	2.2	5.8	0.0	378	0	13.6	17	-3.6	9	0	0	9	0
10	4	12.8	5.1	8.8	0.0	282	0	18.0	10	-0.2	21	0	0	1	0
10	5	13.9	7.1	10.6	0.0	240	1	22.3	20	2.9	11	0	0	0	0
10	6	17.7	10.8	14.1	0.0	115	2	22.8	21	7.4	21	0	0	0	0
10	7	17.6	12.0	14.5	0.0	115	0	20.4	14	8.7	23	0	0	0	0
10	8	16.9	10.2	13.7	0.0	142	0	22.1	15	5.4	25	0	0	0	0
10	9	16.8	10.8	13.6	0.0	141	3	22.7	2	6.2	29	0	0	0	0
10	10	13.6	6.9	10.2	0.0	234	0	18.8	11	0.2	24	0	0	0	0
10	11	8.3	2.7	5.4	0.0	171	0	15.1	4	-4.2	29	0	0	3	0
10	12	4.1	-1.7	1.4	0.0	525	0	10.9	28	-13.3	24	0	6	21	0
		12.2	5.6	8.8	0.0	3234	7	22.8	JUN	-13.3	DEC	0	6	64	0

PRECIPITATION (mm)

YR	MO	TOTAL	DEP. FROM NORM	MAX OBS. DAY	DATE	DAYS OF RAIN OVER .2	OVER 2	OVER 20
10	1	50.4	0.0	5.2	15	26	12	0
10	2	34.2	0.0	7.4	16	19	7	0
10	3	35.8	0.0	11.0	30	15	5	0
10	4	32.0	0.0	7.0	3	14	5	0
10	5	15.3	0.0	6.6	31	17	1	0
10	6	16.4	0.0	5.6	30	12	3	0
10	7	81.8	0.0	12.8	21	26	13	0
10	8	33.0	0.0	6.6	16	25	4	0
10	9	119.0	0.0	33.4	22	21	12	2
10	10	51.2	0.0	7.4	1	25	10	0
10	11	62.0	0.0	12.8	7	12	10	0
10	12	34.9	0.0	10.2	26	21	8	0
		566.0	0.0	33.4	SEP	233	90	2

WIND SPEED (m/s)

YR	MO	AVG.	HI	DATE	DOM DIR
10	1	3.8	20.6	12	SSE
10	2	2.6	15.6	4	NE
10	3	4.0	25.0	30	SE
10	4	3.9	21.0	5	SSE
10	5	4.2	15.2	31	N
10	6	3.4	18.8	30	N
10	7	4.1	23.7	4	SSE
10	8	3.5	17.9	20	WSW
10	9	4.0	22.8	13	SE
10	10	3.7	20.6	4	SSE
10	11	2.7	20.1	7	NNE
10	12	2.6	20.6	17	S
		3.6	25.0	MAR	SSE