Cavan County Council

CORRANURE LANDFILL

Leachate Management Plan

October 2007

RPS

MGE0068CR0001

Corranure Landfill
Waste Licence No. W0077-02

DOCUMENT CONTROL SHEET

Client	Cavan County Council					
Project Title	Corranure Landfill Waste Licence Compliance					
Document Title	Leachate Management Plan					
Document No.	MGE0068RP0009					
This Document Comprises	DCS	TOC	Text	List of Tables	List of Figures	No. of Appendices
	1	1	10	1	-	-

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F01	Final	M.W.	S.G./D.C.	W.M.	Galway	03/10/07

Consulting Engineers

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1 INTRODUCTION

Cavan County Council operate Corranure Landfill Waste Licence W0077-02. The facility is licenced to accept household waste, commercial waste, green waste, construction and demolition waste, street cleaning residues and hazardous household waste. This Leachate Management Plan has been prepared in order to comply with Conditions 3.13, 3.19.3, 5.11, 6.6 and 11.5 of Waste Licence W0077-02.

The landfill has been in operation at its current location since 1988. Initially, the site was operated on a "dilute-and-disperse" basis. In 2001, a major redevelopment of the site in compliance with the conditions of the Waste Licence was completed comprising the construction of a new 19,050 m^2 composite lined cell (known as Cell 1), leachate collection system and a new site entrance area consisting of an administration building, weighbridge, wheelwash and civic amenity facility. The original landfill was also capped as part of this contract.

Cell 1 ceased accepting waste in October 2005 and was permanently capped during 2006. Construction of Cell 2 commenced in 2004 and waste was accepted in this cell from October 2005 to April 2007. The installation of a permanent capping system on Cell 2 was completed in September 2007. Phase 3 which consisted of two cells 3 and 4 was constructed adjacent to Cell 2. Waste is currently being accepted in Cell 3. It is estimated that there is 4.5 years of filling remaining in Cell 3 and 4.

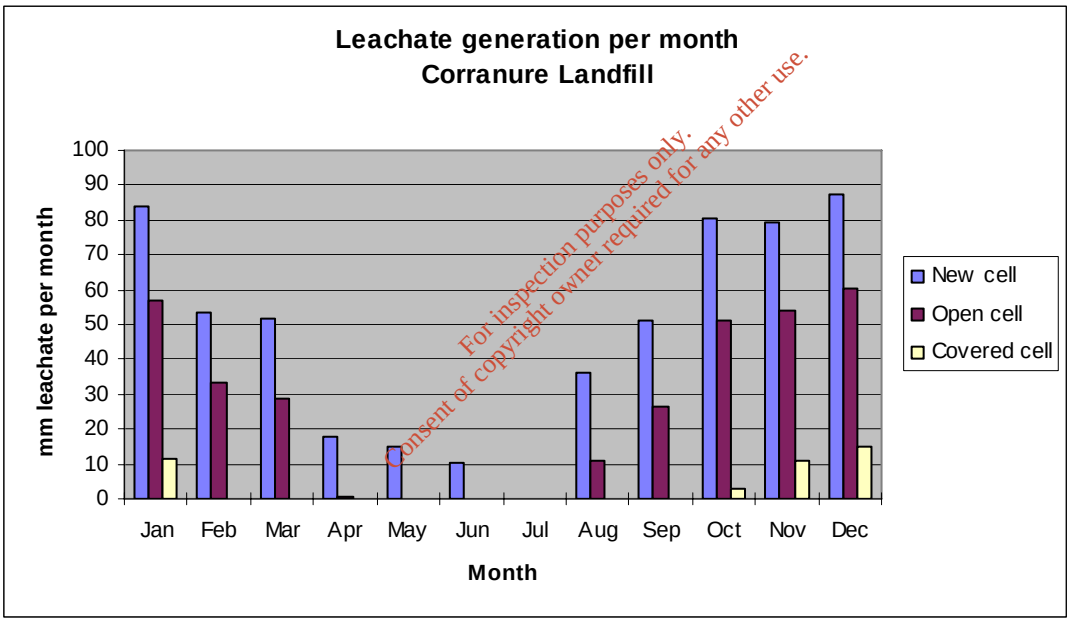
Leachate produced in a landfill is a liquid which has percolated through the waste, picking up suspended and soluble materials that originate from or are products of the degradation of waste. Factors which affect the rate of generation of leachate include precipitation, surface water runoff, evapotranspiration, moisture released and absorbed in waste, moisture using during decomposition and vapour contained in gas. Of these, precipitation, surface water runoff and evapotranspiration are the major constituents.

2 LEACHATE GENERATION

Leachate generation data from Corranure Landfill which was submitted with the Waste Licence Review Application for Corranure Landfill (March 2003) is shown below.

Based on an annual precipitation of 928 mm/year, an annual evapotranspiration of 562.6 mm/year and the assumption regarding surface water run-off that there is no surface water run-off for a new cell, 30% surface water run-off for an open cell and 80% surface water run-off for a covered cell, the amount of leachate generated (in mm/m^2 per month) for a new (unfilled) cell, an open (active) cell and a covered (capped) cell are given in **Figure 2.1** below.

Figure 2.1: Leachate per month for Different Stages, Mean Years



Based on the area of each of cells the estimated annual leachate generation for different stages over the lifetime of the landfill are shown **Table 2.1** below.

Table 2.1: Leachate Generation (Collection) in Different Development Stages of the Landfill

Landfill Stage	Area m^2	Phase 1 m^3/year	Phase 2 m^3/year	Phase 3 m^3/year	Phase 4 m^3/year	Phase 5 m^3/year	Phase 6 m^3/year	Phase 7 m^3/year	Phase 8 m^3/year
Old Remediated landfill	32,600	1,325	1,325	1,325	1,325	1,325	1,325	1,325	1,325
Cell 1	19,050	6,139	774	774	774	774	774	774	774
Cell 2	14,484	8,212	4,667	589	589	589	589	589	589
Phase 3 Cell 3	20,398	0	11,566	6,573	6,573	6,573	829	829	829
Phase 3 Cell 4	20,398	0	0	0	11,566	6,573	6,573	6,573	829
Total Phase 3	*40,796*	*0*	*11,566*	*6,573*	*18,739*	*13,146*	*7,402*	*7,402*	*1,658*
Total	**74,330**	**15,676**	**18,332**	**9,260**	**20,826**	**15,833**	**10,089**	**10,089**	**4,345**

The leachate estimates given in **Table 2.1** above are based on the assumption that each cell is developed in 3 stages as follows:

- First stage - is when the bottom of the cell is covered with waste (< 2m)
- Second stage - is when the cell is covered with more than 2 m of waste and no final cover is established
- Third stage - is when the cell is capped with final cover

The 8 phases given in **Table 2.1** above therefore represent the following stage of operation.

- **Phase 1:** Cell 2 is in stage 1, cell 1 is in stage 2 and remediated old landfill is in stage 3.
- **Phase 2:** Cell 3 is in stage 1, cell 2 is in stage 2 and cell 1 and remediated old landfill is in stage 3.
- **Phase 3:** Cell 3 is in stage 2, cell 2, cell 1 and remediated old landfill is in stage 3.

- **Phase 4:** Cell 4 is in stage 1, cell 3 is in stage 2, cell 2, cell 1 and remediated old landfill is in stage 3.

- **Phase 5:** Cell 4 is in stage 2, cell 3 is in stage 2, cell 2, cell 1 and remediated old landfill is in stage 3.

- **Phase 6:** Cell 4 is in stage 2, cell 3, cell 2, cell 1 and remediated old landfill is in stage 3.

- **Phase 7:** Cell 4 is in stage 2, cell 3, cell 2, cell 1 and remediated old landfill is in stage 3.

- **Phase 8:** All cells are in stage 3.

A summary of leachate generation and load from Corranure Landfill is shown below in **Table 2.2.**

Table 2.2: Leachate Generation and Load from Corranure Landfill

	Unit	2005	2006	2007	2008	2009	2010	2011
Leachate generation	m^3/year	15,676	18,332	9,260	**20,826**	15,833	10,089	10,089
Leachate generation, max (120% of average)	m^3/day	52	60	30	**68**	52	33	33
BOD	kg/year	71,806	98,674	73,299	**105,433**	110,427	58,880	45,979
BOD, max (120% of average)	kg/day	236	324	241	**347**	363	194	151
PE, max (120% of average)		3,935	5,407	4,016	**5,777**	6,051	3,226	2,519

As noted above leachate generation and BOD are based on precipitation in an average year (928 mm/year). Maximum loads are assumed to be 20% higher.

3 LEACHATE CONTROL SYSTEM

The objectives of the leachate control system are as follows:

- To reduce the potential for seepage out of the landfill through the sides or the base by exploiting weaknesses in the liner or by flow though its matrix,
- To maintain low leachate head to prevent leachate rising to such an extent that it can spill over and cause uncontrolled pollution to surface water, and
- To minimise the interaction between the lachate and the liner to prevent groundwater contamination.

Figure 3.1 provides details on the leachate management system at Corranure Landfill.

9 no. leachate abstraction wells are operational in the old remediated landfill and Cell 1 and an interceptor drain also removes leachate from the remediated old landfill. Cell 1 was remediated in late 2005/early 2006. Cell 2 is currently being remediated (due for completion in October 2007) and Cell 3 is the active cell.

In Cells 1, 2 and 3 and future Cell 4 leachate is collected in a network of slotted pipes laid in the base of each cell and draining to a leachate collection chamber constructed at the lowest point of each cell.

A glass-lined steel leachate tank was installed at the facility in 2006 with a capacity of 1,531 m^3 and replaces the leachate lagoon as the primary leachate storage unit at the facility. The original lagoon, with a capacity of approximately 270 m^3 is now used as an emergency overflow to the tank. Therefore, the total available capacity for leachate storage at Corranure Landfill is 1,801 m^3 which exceeds the required storage capacity for 7 days of average leachate generation.

A 100mm MDPE leachate main runs from the landfill into Cavan town. This newly installed rising main runs from the leachate storage tank at the facility to the current discharge point at the entrance to the Rocklands Estate. The replacement of the main has increased leachate pumping capacity at the landfill and will enable the facility to deal with the expected increase in leachate generation rates following the commencement of landfilling in Cells 3 and 4.

N

Proposed Cell 4

Cell 3
Current Filling Area

Cell 2
Currently being Remediated

Remediated Cell 1

Remediated Old Landfill

63mm Ø OD from Cell 3

63mm Ø OD from Cell 2

63mm Ø OD from Cell 1

Wheelwash

Overflow Lagoon

Leachate Storage Tank

Discharge Pumping Station

Waste Inspection / quarantine area

Leachate Rising Main

Landfill Entrance

Inlet Pumping Station

LVG - 17

LVG - 03

LVG - 07

LVG - 15

LVG - 16

LVG - 04

LVG - 11

LVG - 13

P5W6

To Corrin WWTP

To Cavan

Lagoon

Asphalt

ESB

MH
cl:114.13

110.52

111.34

63mm Ø OD from Condensate Pot

63mm Ø OD from Interceptor Tnnels

63mm Ø OD from Boreholes

63mm Ø OD from Sump (P7)

63mm Ø OD from Cell 1

63mm Ø OD from P4 (Waste Inspection/ Quarantine Area)

63mm Ø OD From P5W6

LEGEND
Leachate Abstraction Boreholes LVG

0.00km 0.05km 0.1km 0.15km 0.2km 0.25km
Scale Bar

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Better Waste Management

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No.	Date		Amendment / Issue	App.
F01	26.06.07		Final Issue	W.M.

Corranure Landfill
Licence Compliance

Title:
Leachate Management System
Figure 3.1

Drawn by:	E.F.	Job No:	M2E0008
Checked by:	S.McG.	File No:	M2E0008DG0016
Approved by:	W.M.	Dg. No:	DG0016-01
Scale: 1:1250 @ A1		Rev:	F01
Date:	Sept.'07		

In addition the leachate pumping system at the facility itself has been improved to allow the facility to better deal with future increases in leachate generation rates:

- All leachate generated on site is pumped into a leachate inlet pumping chamber adjacent to the existing lagoon. Leachate is pumped from this chamber into the leachate storage tank. A duty-standby pump system has been installed so as to ensure that sufficient pumping capacity will always be available to manage the leachate.

- A new leachate discharge pumping chamber and rising main were constructed to pump leachate from the collection tank into the Cavan town sewer system. This arrangement facilitates easier management of the system and improves ease of monitoring of the pumping system by landfill staff.

-The existing pumping station P6/V6 has been reconfigured to pump leachate collected in the interceptor drain only. This leachate has been pumped back to the leachate collection chamber. This reduces capacity pressures on this pump and allows for better control of leachate volumes around the original landfill.

Surface water generated in the waste inspection/quarantine area and run off from the wheelwash is treated as leachate and is discharged to the leachate management system.

An odour suppression system of dosing with Sewage Conditioner Product Septiox (Ferric Nitrate) is carried out at the discharge pumping station.

4 LEACHATE TREATMENT

The leachate being generated at Corranure Landfill is being sent to Cavan WWTP for treatment via the rising main.

Significant upgrading works have been recently undertaken at the Cavan Wastewater Treatment Plant with a view to improving performance and achieving necessary effluent standards. The works are currently being commissioned and include improvements to the aeration stage which consists of 4 no. 545m^3 tanks. Before these works were undertaken only two of the four aeration tanks were in service. All four tanks have been recommissioned as part of the upgrade works.

In the assessment of the upgrade works to the WWTP account was taken of the leachate loading from Corranure Landfill and a comprehensive flow and load survey was undertaken at the WWTP.

The upgrade works at the WWTP provides the off site treatment capacity for leachate pumped from the landfill to the sewer system. The existing PE at the WWTP is 9,850 while the plant has a design capacity of 21,000 PE.

The new leachate rising main from the landfill has also been commissioned which will allow a continuous discharge of leachate into the WWTP and prevent high loadings at irregular intervals which previously occurred when tankering of leachate was being employed during the construction phase of the rising main.

The characteristics/quantity of leachate including for Cells 3 and 4 at peak leachate generation stage as outlined in the EIS which was submitted with the Waste Licence Review Application for Corranure Landfill (March 2003) will be as follows:

Q = 0.8 l/s = 68m^3/day

BOD = 347 kg/d

COD = 434 kg/d

PE of leachate loading: 302 PE volume

5,783 PE BOD

The WWTP is required to comply with the Urban Wastewater Treatment Regulations and the relevant water quality standards in the Cavan River.

There is potential to use Cootehill WWTP as an alternative facility for the treatment of leachate removed from Corranure Landfill. Alternatively tankering of leachate can be accommodated in the event of the current pumping system via the rising main being in-operational. This is outlined in the Emergency Leachate Procedure contained in the Operations Plan.

5 MONITORING

A Leachate Monitoring Programme is in place at Corranure Landfill in compliance with Schedule D of the Waste Licence. **Table 5.1** provides a summary of these monitoring requirements. **Figure 5.1** shows the leachate monitoring locations. For leachate quality a sample is taken from the leachate storage tank.

The leachate level has to be monitored continuously within the waste to monitor compliance with condition 5.11.1 of the Waste Licence which states: “that leachate levels in the waste shall not exceed a level of 1m over the top of the liner at the base of the landfill”. The leachate level is measured manually in the old remediated landfill via leachate abstraction boreholes. In Cells 1, 2 and 3 the leachate levels are measured in leachate collection chambers and leachate collection sump which are connected up to the telemetry system.

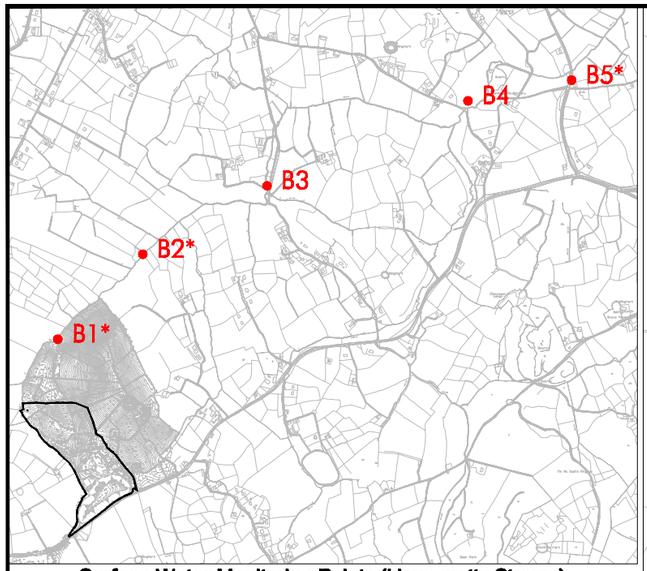
The level of leachate in the leachate storage tank has to be monitored continuously to ensure that a minimum freeboard of 0.75m shall be maintained at all times as per condition 5.11.2 of the Waste Licence. A level sensor connected to the telemetry system is located on the leachate storage tank and leachate lagoon.

In 2007 a flow meter was installed on the outlet from the leachate storage tank which measures the quantity of leachate being removed to Cavan WWTP via the rising main.

Table 5.1: Leachate Monitoring Programme

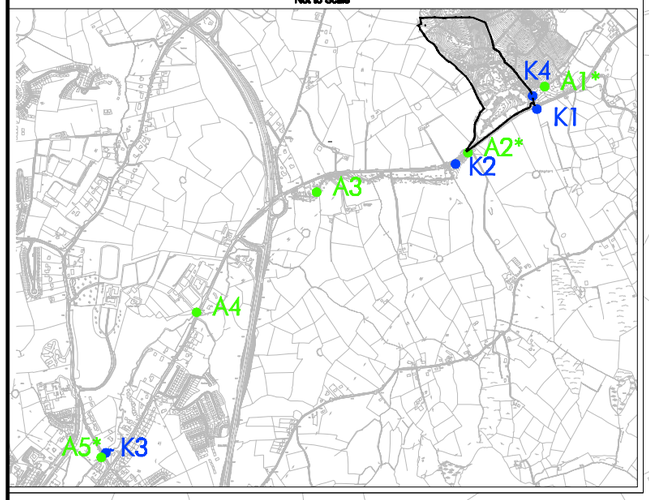
Parameter	Monitoring Frequency*
Visual Inspection/Odour	Quarterly
Leachate level	Continuous
Ammoniacal Nitrogen	Annually
BOD	Annually
COD	Annually
Chloride	Annually
Electrical Conductivity	Annually
pH	Annually
Metals/non metals	Annually
Cyanide (total)	Annually
Flouride	Annually
List I/II organics	Once off
Mercury	Annually
Sulphate	Annually
Total P/orthophosphate	Annually
Total Oxidised Nitrogen	Annually

*Where there is evident gross contamination by leachate, additional samples will be required.



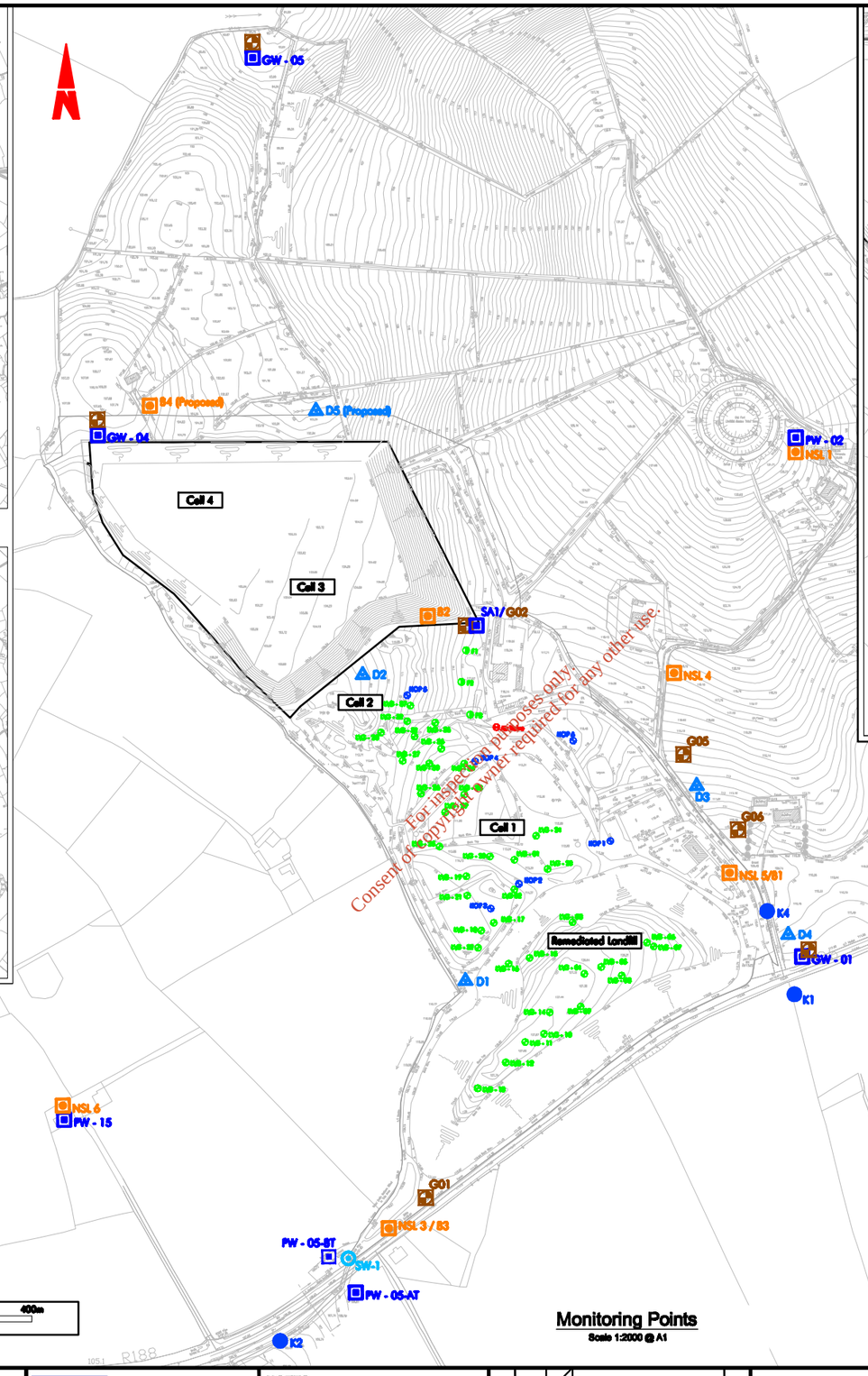
Surface Water Monitoring Points (Lismagratty Stream)

Not to Scale



Surface Water Monitoring Points (Corranure Stream)

Not to Scale



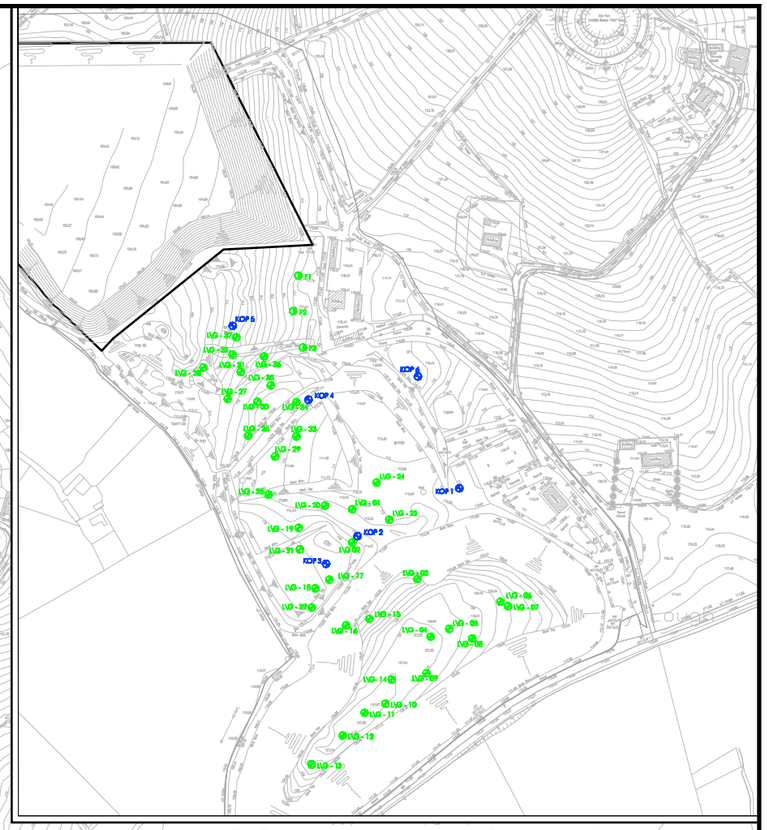
Legend:

- Surface Water Monitoring Point
- Perimeter Gas Well
- Sewer Sample Monitoring Point
- Surface Water Emission Point
- Cell Outline
- Ground Water Well / Private Well
- Dust Monitoring Point
- Noise Monitoring Point
- Landfill Gas/ Leachate Extraction Well
- Horizontal Gas Extraction Well
- Condensate Knock Out Pot

Scale Bar: 0.0m 100m 200m 300m 400m

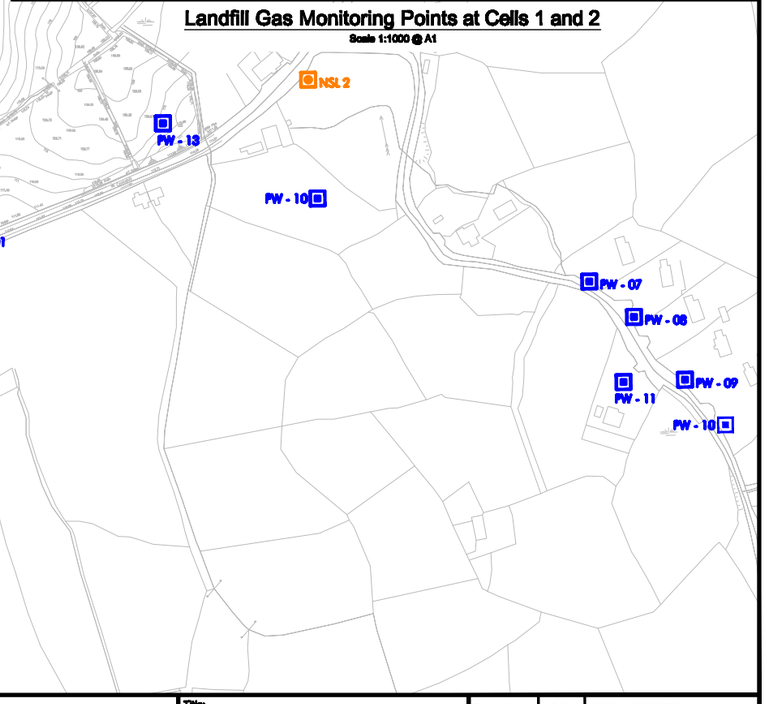
Monitoring Points

Scale 1:2000 @ A1



Landfill Gas Monitoring Points at Cells 1 and 2

Scale 1:1000 @ A1



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No.	Date		Amendment / Issue	App.
F03	22.08.07	Issue/ Doc	Final Issue	W.M.
F02	1.08.07	Issue/ Doc	Final Issue	S.G.
F01	04.04.07	Issue/ Doc	Final Issue	W.M.

Corranure Landfill
Licence Compliance

Title:
Corranure Landfill
Locations of
Monitoring Points
Figure 5.1

Drawn by:	C.N.	Job No:	MGE0068
Checked by:	S.G.	File No:	MGE0068DG0007
Approved by:	W.M.	Drg. No:	DG0007-01
Scale:	As Shown	Rev:	F03
Date:	April '07		

6 MAINTENANCE

Regular inspection of the leachate abstraction system is required including a weekly checking of boreholes and a visual inspection for damage or blockage. Regular maintenance of pumps and checking of control systems is also required. The Operations and Maintenance Manuals for the leachate pumping system should be consulted for further details.

AMENDMENT UNDER SECTION 76(4) OF THE WASTE MANAGEMENT ACTS, 1996 to 2003

This licence was amended on 28/10/2005 under Section 76(4) of the Waste Management Acts, 1996 to 2003. The details of the amendment must be read in conjunction with the licence. The amendment document is titled 77-2S76(4)AmendmentA.doc.

This licence was amended under Section 42B(1)(c) of the Waste Management Acts, 1996 to 2005. The details of Amendment B must be read in conjunction with this licence. The amendment is entitled W0077-02S42B(1)AmendmentB.

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WASTE LICENCE

LANDFILL FOR NON-HAZARDOUS WASTE

Waste Licence
Register Number: 77-2
Licensee: Cavan County Council

Location of Facility: Corranure Landfill, Lismagratty and Corranure Townlands, Cootehill Road, Cavan, County Cavan.

INTRODUCTION

This introduction is not part of the licence and does not purport to be a legal interpretation of the licence.

This licence is for the continued operation and expansion of a non-hazardous waste landfill, a civic amenity facility and a recycling building located at Corranure Landfill, Lismagratty & Corranure Townlands, Cootehill Road, Cavan, County Cavan. The facility boundary has been extended to allow for two new lined cells to be installed (Phase 3). The waste intake is limited to 90,000 tonnes per annum comprising of household waste, commercial waste, construction & demolition waste green waste, street cleaning residues and hazardous household waste.

The licence provides for the operation of a civic waste facility which will allow for acceptance of waste types such as glass, paper, aluminium and steel cans, textiles, cardboard and household hazardous waste such as fluorescent tubes, waste oils, oil filters, waste batteries. Dry recyclables such as plastic and cardboard will be baled on-site prior to transfer off-site for recovery.

The licensee must manage and operate the facility to ensure that the activities do not cause environmental pollution. The licensee is required to carry out regular environmental monitoring and submit all monitoring results, and a wide range of reports on the operation and management of the facility to the Agency.

The licence sets out in detail the conditions under which Cavan County Council will operate and manage this facility.

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DECISION & REASONS FOR THE DECISION

Reasons for the Decision

On the basis of the information before it, the Environmental Protection Agency (the Agency) is satisfied, for the reasons set out in the following Schedule of Activities Licensed, that the requirements of Section 40(4) of the Waste Management Acts, 1996 to 2003 have been complied with in respect of the application for a waste licence for the activities listed hereunder in Part I.

In reaching this decision the Agency has considered the application and supporting documentation received from the applicant, all submissions and objections received and the reports of its inspectors.

INTERPRETATION

All terms in this licence should be interpreted in accordance with the definitions in the Waste Management Acts 1996 to 2003, (the Acts), unless otherwise defined in this section.

Adequate lighting	20 lux measured at ground level.
Aerosol	A suspension of solid or liquid particles in a gaseous medium.
Agreement	Agreement in writing.
Annually	At approximately twelve monthly intervals.
Application	The application by the licensee for this waste licence.
Appropriate facility	A waste management facility, duly authorised under relevant law and technically suitable.
Attachment	Any reference to attachments in this licence refers to attachments submitted as part of the waste licence review application.
BAT	Best Available Techniques.
Biodegradable waste	Any waste that is capable of undergoing anaerobic or aerobic decomposition, such as food, garden waste, sewage sludge, paper and paperboard.
CEN	Comité Européen De Normalisation – European Committee for Standardisation.
Condition	A condition of this licence.
Construction and Demolition Waste	All wastes which arise from construction, renovation and demolition activities.
Commercial Waste	As defined in Section 5(1) of the Act.
Containment boom	A boom which can contain spillages and prevent them from entering drains or watercourses.
Cover material	Bricks, crushed concrete, tarmac, earth, soil, sub-soil, stone, rock or other similar natural materials; or other cover material the use of which has been agreed by the Agency.

Daily Cover	Is the term used to describe material spread (about 150mm if soil cover is used) over deposited waste at the end of each day. Synthetic materials may also be used. Its objective is to minimise odour, the amount of litter generated and to control flies and access to the waste by birds and vermin. Where soils are used for daily cover, it is recommended that they be removed at the start of the day and subsequently reused as much as possible.
Daytime	0800 hrs to 2200 hrs.
Documentation	Any report, record, result, data, drawing, proposal, interpretation or other document in written or electronic form which is required by this licence.
Drawing	Any reference to a drawing or drawing number means a drawing or drawing number contained in this review application, unless otherwise specified in this licence.
Emergency	Those occurrences defined in Condition 10.4.
Emission Limits	Those limits, including concentration limits and deposition levels established in *Schedule C: Emission Limits*, of this licence.
European Waste Catalogue (EWC)	A harmonised, non-exhaustive list of wastes drawn up by the European Commission and published as Commission Decision 94/3/EC and any subsequent amendment published in the Official Journal of the European Community.
Fortnightly	A minimum of 24 times per year, at approximately two week intervals.
Green waste	Waste wood (excluding timber), plant matter such as grass cuttings, and other vegetation.
Heavy Metals	This term is to be interpreted as set out in "Parameters of Water Quality, Interpretation and Standards" published by the Agency in 2001. ISBN 1-84095-015-3.
Hours of Operation	The hours during which the facility is authorised to be operational. The hours of operation of a facility are usually longer than the hours of waste acceptance to facilitate preparatory and completion works.
Hours of Waste Acceptance	The hours during which the facility is authorised to accept waste. Different activities within the facility, such as the landfill and the civic waste facility, may have different hours of waste acceptance.
Incident	The following shall constitute an incident for the purposes of this licence: a) an emergency; b) any emission which does not comply with the requirements of this licence; c) any exceedance of the daily duty capacity of the waste handling equipment; d) any trigger level specified in this licence which is attained or exceeded; and e) any indication that environmental pollution has, or may have, taken place.
Inert waste	Waste as defined in S.I. No. 395 of 2004 Waste Management (Licensing) Regulations, 2004.
Initial Development	Means such works, actions or constructions as may be specified, which for the purposes of environmental protection and safe construction and operation of

Works	the facility, have to be carried out in the initial stages of site development, and in any case prior to the commencement of construction of the landfill cells.
Intermediate Cover	Refers to placement of material (minimum 300mm if soil is used) for a period of time prior to restoration or prior to further disposal of waste.
Landfill	Refers to the area of the facility where the waste is disposed of by placement on the ground or on other waste.
Landfill Gas	Gases generated from the landfilled waste.
LEL (Lower Explosive Limit)	The lowest percentage concentration by volume of a mixture of flammable gas with air which will propagate a flame at 25^{o}C and atmospheric pressure.
Licence	A waste licence issued in accordance with the Acts.
Licensee	Cavan County Council.
List I/II Substances	Substances classified pursuant to EC Directives 76/464/EEC and 80/68/EEC.
Liquid Waste	Any waste in liquid form and containing less than 2% dry matter. Any waste tankered to the facility.
Maintain	Keep in a fit state, including such regular inspection, servicing and repair as may be necessary to adequately perform its function.
Mobile Plant	Self-propelled machinery used for the emplacement of wastes or for the construction of specified engineering works.
Monthly	A minimum of 12 times per year, at approximately monthly intervals.
Municipal waste	As defined in Section 5(1) of the Act.
Night-time	2200 hrs to 0800 hrs.
Noise Sensitive Location	Any dwelling house, hotel or hostel, health building, educational establishment, place of worship or entertainment, or any other facility or area of high amenity which for its proper enjoyment requires the absence of noise at nuisance levels.
Recyclable Materials	Those waste types, such as cardboard, batteries, gas cylinders, etc which may be recycled.
Quarterly	At approximately three monthly intervals.
Sample(s)	Unless the context of this licence indicates to the contrary, samples shall include measurements by electronic instruments.
Sludge	The accumulation of solids resulting from chemical coagulation, flocculation and/or sedimentation after water or wastewater treatment with › 2% dry matter.
SOP	Standard Operating Procedure.
Specified Emissions	Those emissions listed in *Schedule C: Emission Limits*, of this licence.
Specified Engineering Works	Those engineering works listed in *Schedule B: Specified Engineering Works*, of this licence.
TOC	Total Organic Carbon.

Treated Sludge	Sludge which has undergone biological, chemical or heat treatment, long-term storage or any other appropriate process so as significantly to reduce its fermentability and the health hazards resulting from its use.
Treatment	Treatment means the physical, thermal, chemical or biological processes, including sorting, that change the characteristics of the waste in order to reduce its volume or hazardous nature, facilitate its handling or enhance recovery.
Trigger Level	A parameter value specified in the licence, the achievement or exceedance of which requires certain actions to be taken by the licensee.
Wastewater	Contaminated water including water that has been used, for washing, and/or flushing (including foul water).
White Goods	Refrigerators, cookers, ovens and other similar appliances.
EPA Working Day	Refers to the following hours: 0900 hrs to 1730 hrs Monday to Friday inclusive.
Working Face	The area of the site in which waste other than cover material or material for the purposes of the construction of specified engineering works is being deposited.

Part I: Schedule of Activities Licensed

On the basis of the information before it, the Agency, pursuant to its powers under Section 46(2) of the Waste Management Acts, 1996 to 2003 hereby grants this Waste Licence to Cavan County Council to carry on the waste activities, that are the subject of Waste Licence Application Register Number 77-2 listed below at Corranure Landfill, Lismagratty & Corranure Townlands, Cootehill Road, Cavan, County Cavan subject to conditions, with the reasons therefor and the associated schedules attached thereto set out in the licence.

Licensed Waste Disposal Activities, in accordance with the Third Schedule of the Waste Management Acts, 1996 to 2003

Class 1	**Deposit on, in or under land (including landfill).**
Class 4	**Surface impoundment, including placement of liquid or sludge discards into pits, ponds or lagoons.**
Class 5	**Specially engineered landfill, including placement into lined discrete cells which are capped and isolated from one another and the environment.**
Class 7	**Physico-chemical treatment not referred to elsewhere in this Schedule (including evaporation, drying and calcination) which results in final compounds or mixtures which are disposed of by means of any activity referred to in paragraphs 1 to 10 of this Schedule.**
Class 11	**Blending or mixture prior to submission to any activity referred to in a preceding paragraph of this Schedule.**
Class 12	**Repackaging prior to submission to any activity referred to in a preceding paragraph of this Schedule.**
Class 13	**Storage prior to submission to any activity referred to in a preceding paragraph of this Schedule, other than temporary storage, pending collection, on the premises where the waste concerned is produced.**

Licensed Waste Recovery Activities, in accordance with the Fourth Schedule of the Waste Management Acts, 1996 to 2003

Class 2	**Recycling or reclamation of organic substances which are not used as solvents (including composting and other biological transformation processes).**
Class 3	**Recycling or reclamation of metals and metal compounds.**
Class 4	**Recycling or reclamation of other inorganic materials.**
Class 9	**Use of any waste principally as a fuel or other means to generate energy.**
Class 11	**Use of waste obtained from any activity referred to in a preceding paragraph of this Schedule.**
Class 12	**Exchange of waste for submission to any activity referred to in a preceding paragraph of this Schedule.**
Class 13	**Storage of waste intended for submission to any activity referred to in a preceding paragraph of this Schedule, other than temporary storage, pending collection, on the premises where such waste is produced.**

Part II: Schedule of Activities Refused

On the basis of the information before it, the Agency, pursuant to its powers under Section 46(2) of the Waste Management Acts, 1996 to 2003, hereby refuses the following classes of activity that are the subject of Waste Licence Application Register No. 77-2.

Refused waste recovery activities, in accordance with the Fourth Schedule of the Waste Management Acts, 1996 to 2003

Class 1	**Solvent reclamation or regeneration:**
	Reason: The activity described by the licensee, recovery of solvents from household waste at the civic waste facility, does not constitute a Class 1 Activity: instead the activities are included under Class 13 of the Fourth Schedule for which the licensee has also applied for.
Class 10	**The treatment of any waste on land with a consequential benefit for an agricultural activity or ecological system:**
	Reason: The activity described by the licensee, use of recovered materials in the restoration of the facility, does not constitute a Class 10 Activity: instead the activities are included under Classes 4 and 11 of the Fourth Schedule for which the licensee have also applied for.

PART III CONDITIONS

CONDITION 1 SCOPE OF THE LICENCE

1.1 Waste activities at the facility shall be restricted to those outlined in the licence review application and listed and described in Part I: Activities Licensed and authorised by this licence subject to the conditions of this licence.

1.2 For the purposes of this licence, the facility is the area of land outlined in red on Drawing No. Fig. 2 Rev. D03 *Corranure Landfill Site Plan* of the application. Any reference in this licence to "facility" shall mean the area thus outlined in red.

1.3 This licence is for the purposes of waste licensing under the Waste Management Acts 1996 to 2003 only and nothing in this licence shall be construed as negating the licensee's statutory obligations or requirements under any other enactments or regulations.

1.4 Activities at this facility shall be limited as set out in *Schedule A*: *Waste Acceptance*, of this licence.

1.5 Waste Acceptance Hours and Hours of Operation

1.5.1 Landfill

1.5.1.1 Waste may be accepted at the facility for disposal at the landfill only between the hours of 8:30 to 16:30 Monday to Friday inclusive and 8:00 to 12:30 on Saturdays.

1.5.1.2 The landfill at the facility may be operated only during the hours of 8:00 to 17:30 Monday to Friday inclusive and 8:00 to 13:00 on Saturdays.

1.5.1.3 Waste shall not be accepted at the facility on Sundays and Bank Holidays, other than with the written agreement of the Agency.

1.5.2 Civic Waste Facility

1.5.2.1 Waste shall be accepted at the Civic Waste Facility only between the hours of 8:00 to 16:30 Monday to Friday inclusive and 8:00 to 12:30 on Saturdays, unless otherwise agreed by the Agency.

1.5.2.2 The civic waste facility at the facility may be operated only during the hours of 8:00 to 17:30 Monday to Friday inclusive and 8:00 to 13:00 on Saturdays, unless otherwise agreed by the Agency.

1.6 Every plan, programme or proposal submitted to the Agency for its agreement pursuant to any condition of this licence shall include a proposed timescale for its implementation. The Agency may modify or alter any such plan, programme or proposal in so far as it considers such modification or alteration to be necessary and shall notify the licensee in writing of any such modification or alteration. Every such plan, programme or proposal shall be carried out within the timescale fixed by the Agency but shall not be undertaken without the agreement of the Agency. Every such plan, programme or proposal agreed by the Agency shall be covered by the conditions of this licence.

1.7 This licence is being granted in substitution for the waste licence granted to the licensee on 12th of June 2001 and bearing Waste Licence Register No: 77-1. The previous waste licence (Register No: 77-1) is superseded by this licence.

REASON: To clarify the scope of this licence.

CONDITION 2 MANAGEMENT OF THE FACILITY

2.1 Facility Management

2.1.1 The licensee shall employ a suitably qualified and experienced facility manager who shall be designated as the person in charge. The facility manager or a nominated, suitably qualified and experienced, deputy shall be present on the facility at all times during its operation.

2.1.2 The Civic Waste Facility shall be supervised by an appropriately qualified and competent person at all times while waste may be accepted.

2.1.3 Both the facility manager and deputy, and any replacement manager or deputy, shall successfully complete both the FAS Waste Management Training Programme (or equivalent agreed by the Agency) and associated on site assessment appraisal within twelve months of appointment.

2.1.4 The licensee shall ensure that personnel performing specifically assigned tasks shall be qualified on the basis of appropriate education, training and experience, as required and shall be aware of the requirements of this licence.

2.2 Management Structure

Any proposed replacement in the management structure shall be notified in advance in writing to the Agency. Written details of the management structure shall include the following information:-

a) The names of all persons who are to provide the management and supervision of the waste activities authorised by the licence, in particular the name of the facility manager and any nominated deputies;

b) Details of the responsibilities for each individual named under a) above; and

c) Details of the relevant education, training and experience held by each of the persons nominated under a) above.

2.3 Environmental Management System (EMS)

2.3.1 The licensee shall operate and maintain an EMS. Within six months from the date of grant of this licence, the licensee shall submit to the Agency for its agreement a proposal for the updating (where appropriate) of the documented Environmental Management System (EMS) for the facility. The EMS shall thereafter be updated on an annual basis with amendments being notified to the Agency, as part of the AER.

2.3.2 The EMS shall include as a minimum the following elements.

2.3.2.1 Schedule of Environmental Objectives and Targets

The objectives should be specific and the targets measurable. The schedule shall address a five-year period as a minimum. The schedule shall include a time-scale for achieving the objectives and targets and shall comply with any other written guidance issued by the Agency.

2.3.2.2 Environmental Management Plan (EMP)

The EMP shall include, as a minimum, the following: -

a) The items specified to be contained in an Environmental Management Plan in the Landfill Operational Practices Manual published by the Agency;

b) Methods by which the objectives and targets will be achieved and the identification of those responsible for achieving those objectives and targets; and

c) Any other items required by written guidance issued by the Agency.

2.3.2.3 Corrective Action Procedures

The Corrective Action Procedures shall detail the corrective actions to be taken should any of the procedures detailed in the EMS not be followed.

2.3.2.4 Awareness and Training Programme

The Awareness and Training Programme shall identify training needs, for personnel who work in or have responsibility for the licensed facility.

2.4 Communications Programme

The licensee shall establish and maintain a Communications Programme to ensure that members of the public can obtain information at the facility, at all reasonable times, concerning the environmental performance of the facility.

REASON: To make provision for the proper management of the activity on a planned basis having regard to the desirability of ongoing assessment, recording and reporting of matters affecting the environment.

CONDITION 3 FACILITY INFRASTRUCTURE

3.1 The licensee shall establish all infrastructure referred to in this licence as required by the conditions of this licence.

3.2 Phased Construction Plan

Three months prior to the commencement of any site development, the licensee shall submit to the Agency for its agreement a construction schedule, sequence and timescale (Construction Plan) incorporating the requirements of this licence. This Plan shall have regard to the following development phases: (i) Initial Development Works, (ii) Main infrastructure development works (pre acceptance of waste for disposal), and (iii) Future/planned works (in parallel with waste disposal, e.g. future cell development/phasing). The Construction Plan for cell development shall have regard to the sequencing necessary to provide medium and long term screening of the completed cells.

3.3 Specified Engineering Works

3.3.1 The licensee shall submit proposals for all Specified Engineering Works, as defined in *Schedule B: Specified Engineering Works*, of this licence, to the Agency for its agreement at least two months prior to the intended date of commencement of any such works. No such works shall be carried out without the prior agreement of the Agency.

3.3.2 All specified engineering works shall be supervised by a competent person(s) and that person, or persons, shall be present at all times during which relevant works are being undertaken.

3.3.3 Following the completion of all specified engineering works, the licensee shall complete a construction quality assurance validation. The validation report shall be made available to the Agency on request. The report shall as appropriate include the following information:-

a) A description of the works;

b) As-built drawings of the works;

c) Records and results of all tests carried out (including failures);

d) Drawings and sections showing the location of all samples and tests carried out;

e) Daily record sheets/diary;

f) Name(s) of contractor(s)/individual(s) responsible for undertaking the specified engineering works;

g) Name(s) of individual(s) responsible for supervision of works and for quality assurance validation of works;

h) Records of any problems and the remedial works carried out to resolve those problems; and

i) Any other information requested in writing by the Agency.

3.4 Facility Notice Board

3.4.1 The licensee shall provide and maintain a Facility Notice Board on the facility so that it is legible to persons outside the main entrance to the facility. The minimum dimensions of the board shall be 1200 mm by 750 mm.

3.4.2 The board shall clearly show:-

a) The name and telephone number of the facility;

b) The normal hours of opening;

c) The name of the licence holder;

d) An emergency out of hours contact telephone number;

e) The licence reference number; and

f) Where environmental information relating to the facility can be obtained.

3.5 Facility Security

3.5.1 Security and stockproof fencing and gates shall be installed and maintained along the facility boundary. The base of the fencing shall be set in the ground. Subject to the implementation of the restoration and aftercare plan and to the agreement of the Agency, the requirement for such site security may be removed.

3.5.2 The licensee shall remedy any defect in the gates and/or fencing as follows:-

a) A temporary repair shall be made by the end of the working day; and

b) A repair to the standard of the original gates and/or fencing shall be undertaken within three working days.

3.6 Facility Roads and Site Surfaces

3.6.1 Effective site roads shall be provided and maintained to ensure the safe movement of vehicles within the facility.

3.6.2 The facility entrance area, the access road to the Civic Waste Facility and the Civic Waste Facility itself shall be paved to ensure an impervious surface is maintained, unless otherwise agreed by the Agency.

3.7 Facility Office

3.7.1 The licensee shall provide and maintain an office at the facility. The office shall be constructed and maintained in a manner suitable for the processing and storing of documentation.

3.7.2 The licensee shall provide and maintain a working telephone and a method for electronic transfer of information at the facility.

3.8 Waste Inspection and Quarantine Areas

3.8.1 A Waste Inspection Area and a separate Waste Quarantine Area shall be provided and maintained at the facility.

3.8.2 These areas shall be constructed and maintained in a manner suitable, and be of a size appropriate, for the inspection of waste and subsequent quarantine if required. The waste inspection area and the waste quarantine area shall be clearly identified and segregated from each other.

3.8.3 Drainage from these areas shall be directed to the leachate storage lagoon.

3.9 Weighbridge and Wheel Cleaner

3.9.1 The licensee shall provide and maintain a weighbridge and a wheel cleaner at the facility.

3.9.2 The wheel cleaner shall be used by all vehicles leaving the facility as required to ensure that no process water or waste is carried off-site. All water from the wheel cleaning area shall be directed to the leachate storage lagoon.

3.10 Tank and Drum Storage Areas

3.10.1 All tank and drum storage areas shall be rendered impervious to the materials stored therein.

3.10.2 All tank and drum storage areas shall, as a minimum, be bunded, either locally or remotely, to a volume not less than the greater of the following:-

(a) 110% of the capacity of the largest tank or drum within the bunded area; or

(b) 25% of the total volume of substance which could be stored within the bunded area.

3.10.3 All drainage from bunded areas shall be diverted for collection and safe disposal.

3.10.4 All inlets, outlets, vent pipes, valves and gauges must be within the bunded area.

3.10.5 The integrity and water tightness of all the bunds and their resistance to penetration by water or other materials stored therein shall be confirmed by the licensee and shall be reported to the Agency following its installation and prior to its use as a storage area. This confirmation shall be repeated at least once every three years thereafter and reported to the Agency on each occasion.

3.11 Landfill Lining

3.11.1 Unless otherwise agreed by the Agency, the landfill liner at the proposed extension (Phase 3) shall comprise:-

a) A composite liner consisting of a 1m layer of compacted soil with a hydraulic conductivity of less than or equal to $1x10^{-9}$m/s, (or equivalent to be agreed by the Agency) overlain by a 2mm thick high density polyethylene (HDPE) layer;

b) A geotextile protection layer placed over the HDPE layer;

c) A 500mm thick drainage layer placed over the geotextile layer with a minimum hydraulic conductivity of 1 x 10^{-3} m/s, of pre-washed, uncrushed, granular, rounded stone (16 - 32mm grain size) incorporating leachate collection drains; and

d) The side walls shall be designed and constructed to achieve an equivalent protection.

3.11.2 The liner detailed design and its construction and the construction quality assurance testing shall be in accordance with the guidelines provided in the Agency's *Landfill Manual, Landfill Site Design*.

3.11.3 Unless otherwise agreed by the Agency, formation levels of Phase 3 shall be arranged such that sufficient thickness (at least 3m) of in-situ clay remains between base of facility and bedrock. Formation levels of Phases 1 and 2 shall be as shown on Drawing No. DG0031-01 Rev. F01 *Formation Levels of Phase 1 and Phase 2* of the Article 16 reply received on 30/8/04.

3.12 Buffer Zone

A Buffer Zone, in which no waste shall be landfilled, shall be provided and maintained within the facility. The Buffer Zone shall be located as shown on Drawing No. DG0030-01 Rev. F01 *Buffer Zone Existing & Proposed* of the Article 16 reply received on 30/8/04.

3.13 Leachate Management Infrastructure

3.13.1 Leachate management infrastructure shall be provided and maintained at the facility as described in Section 2.3.6 *Leachate Collection, Storage and Treatment* of the EIS submitted with the application and specified on Drawing No. DG-08 Rev. D03 *Corranure Landfill Leachate Management System.*

3.13.2 Within twelve months of the date of grant of this licence the licensee shall provide and maintain the proposed extended leachate storage lagoon at the facility to facilitate the storage of leachate abstracted/collected from the waste. The lagoon lining shall be a composite liner equivalent to the landfill liner and constructed using the same methods.

3.13.3 A proposal detailing how leachate collection and storage will be managed at the facility during the construction of the proposed extended leachate storage lagoon shall be submitted to the Agency for agreement prior to construction of the proposed extended leachate storage lagoon.

3.13.4 Within six months of the date of grant of this licence, the licensee shall submit to the Agency an assessment of the capacity of the existing rising main and of Cavan Waste Water Treatment Plant to treat the additional leachate generated at the facility when the facility is extended.

3.13.5 All structures for the storage and/or treatment of leachate shall be fully enclosed except for inlet and outlet piping.

3.14 Landfill Gas Management

3.14.1 Landfill gas management infrastructure at the remediated landfill shall be maintained at the facility as described in the Gas Management Plan and specified on Drawing No. DG0033-01 Rev. F01 *Gas Management System* of the Article 14 reply received on 30/08/04, unless otherwise agreed by the Agency.

3.14.2 Within six months of the date of grant of this licence, the licensee shall submit an updated plan for the landfill gas management detailing works carried out or proposed for the remediated landfill and the existing Phase 1 as well as works proposed for

Phases 2 and 3. The plan shall include an assessment of the efficiency of the landfill gas collection system and the need for additional landfill gas abstraction wells.

3.14.3 An appropriately sized landfill gas flare(s) shall be provided and maintained at the facility. The flare(s) shall be of an enclosed type design.

3.14.4 Flare unit efficiency (residence time, burn temperature) shall be tested annually and reported as part of the AER.

3.14.5 Within twelve months of the date of grant of this licence, the licensee shall submit an updated assessment of whether the utilisation of landfill gas as an energy resource is feasible. If feasible such a system shall be installed within a timeframe agreed with the Agency.

3.14.6 All buildings constructed on the facility shall have regard to the guidance given in the Department of Environment 1994 publication "Protection of New Buildings and Occupants from Landfill Gas" and any subsequent revisions.

3.15 Surface Water Management

3.15.1 Effective surface water management infrastructure shall be provided and maintained at the facility during construction, operation, restoration and aftercare of the facility. As a minimum, the infrastructure shall be capable of the following:-

a) The prevention of contaminated water and leachate discharges into surface water drains and courses; and

b) The collection/diversion of run off arising from capped and restored areas.

3.15.2 Surface water run-off perimeter drains shall be installed and maintained at the facility as shown on Drawing No. DG0030-02 Rev. F01 *Existing and Proposed Surface Water Drainage Layout* of the Article 14 reply received on 30/08/04, unless otherwise agreed by the Agency.

3.15.3 The surface water run-off from the facility discharged at the southern boundary shall be diverted to a silt trap and an oil interceptor prior to discharge from the facility. Surface water run-off from Phases 2 and 3 shall be diverted to a silt trap prior to discharge form the facility at the northern boundary.

3.15.3.1 The interceptor shall be a Class I interceptor and the silt trap and interceptor shall be in accordance with I.S. EN 585-2:2003 (separator systems for light liquids). A manual shut-off valve shall be installed at the interceptor.

3.15.4 The licensee shall submit a revised drawing to the Agency within twelve months of the date of grant of this licence, indicating all drainage arrangement at the site as detailed in this licence.

3.16 Groundwater Management

3.16.1 Effective groundwater management infrastructure shall be provided and maintained at the facility during construction, operation, restoration and aftercare of the facility. As a minimum, the infrastructure shall be capable of the following:-

a) the protection of the groundwater resources from pollution by the waste activities; and

b) The protection of surface waters and infrastructure, such as the liner, from any adverse effects caused by the groundwater.

3.16.2 Groundwater monitoring wells shall be constructed having regard to the guidance given in the Agency's *Landfill Manual, Landfill Monitoring, 2nd Edition.*

3.16.3 Prior to commencement of lining works at Phase 3, the licensee shall submit a detailed groundwater management programme in the case of a high water table at the lining works phase to include a proposal on monitoring of extracted groundwater.

3.17 Civic Waste Facility

3.17.1 The licensee shall maintain the Civic Waste Facility referred to in Attachment D.1.p. *Civic Amenity Facilities.*

3.17.2 The licensee shall provide and maintain appropriate receptacles at the Civic Waste Facility for the storage of various waste types.

3.18 Telemetry

Within six months of the date of grant of this licence, a telemetry system shall be installed and maintained at the facility for recording of leachate levels in the lined cells and the existing/proposed lagoon. All facility operations linked to the telemetry system shall also have a manual control which will be reverted to in the event of break in power supply or during maintenance.

3.19 Monitoring Infrastructure

3.19.1 Landfill Gas

a) Within six months of the date of grant of this licence, the licensee shall submit a proposal for the monitoring of landfill gas within the waste body at Phases 1, 2 and 3 to include at least one landfill gas monitoring borehole per cell prior to the gas collection system being in place at these phases.

b) Within six months from date of grant of this licence, the licensee shall submit a proposal for the installation of additional perimeter landfill gas monitoring boreholes surrounding the facility based on a detailed exposure and risk assessment of gas migration at the facility with potential pathways and receptors identified in accordance with the Agency's *Landfill Manual, Landfill Monitoring, 2nd Edition.*

c) The licensee shall maintain an effective permanent gas monitoring system in the site office and any other enclosed structures at the facility.

3.19.2 Groundwater

a) All wellheads shall be adequately sealed to prevent surface contamination within six months from the date of grant of this licence.

3.19.3 Leachate

a) Within six months from the date of grant of this licence, the licensee shall submit a proposal for monitoring of leachate levels at Phases 1 and 2 as well as the proposed Phase 3 including the locations of these monitoring points.

3.19.4 Replacement of Infrastructure

a) Monitoring infrastructure which is damaged or proves to be unsuitable for its purpose shall be replaced within three months of it being damaged or recognised as being unsuitable.

REASON: To provide appropriate infrastructure for the protection of the environment.

CONDITION 4 RESTORATION AND AFTERCARE

4.1 The licensee shall restore the facility on a phased basis. The Restoration and Aftercare Plans for the facility shall include the information contained in Section 2.3.8 *Closure and Aftercare* of the EIS submitted as part of application and shall also include the currently remediated landfill area.

4.2 Within six months of the date of grant of this licence, the licensee shall submit results of an investigation assessment of the impacts on the Corranure and Lismagratty streams from the remediated landfill to include a full sediment and biological assessment. The protocol for the assessment shall be agreed by the Agency prior to the assessement being carried out. The assessment shall include a proposal for further remediation including surface water and groundwater control and abatment as is necessary to prevent pollution of the streams.

4.3 The final height of the facility shall not exceed 129.5mOD (Malin Head).

4.4 Final Capping

4.4.1 Unless otherwise agreed by the Agency, the permanent cap for a cell shall be constructed within twenty-four months of completion of filling in that cell.

4.4.2 Unless otherwise agreed by the Agency, the final capping at Phases 1, 2 and 3 shall consist of the following:-.

a) Top soil (150 -300mm);

b) Subsoils, such that total thickness of top soil and subsoils is at least 1m;

c) Drainage layer of 0.5m thickness having a minimum hydraulic conductivity of $1x10^{-4}$ m/s;

d) Compacted mineral layer of a minimum 0.6m thickness with a permeability of less than $1x10^{-9}$ m/s or a geosynthetic material (e.g. GCL) or similar that provides equivalent protection; and

e) Gas collection layer of natural material (minimum 0.3m) or a geosynthetic layer.

4.5 No material or object that is incompatible with the proposed restoration of the facility shall be present within one metre of the final soil surface levels.

4.6 Where tree planting is to be carried out above waste-filled areas, a synthetic barrier shall be used to augment the clay cap. Combined topsoil and subsoil depths shall be a minimum of 1m.

4.7 The restoration of each of the landfill extension cells (Phases 1, 2 and 3), when filled, shall be undertaken within twelve months of the completion of installation of the permanent cap.

4.8 Soil Storage

4.8.1. All soils shall be stored to preserve the soil structure for future use.

REASON: To provide for the restoration of the facility.

CONDITION 5 FACILITY OPERATION AND WASTE MANAGEMENT

5.1 Wastes shall not be deposited in any cell or part of the landfill without the prior agreement of the Agency.

5.2 Waste Acceptance and Characterisation Procedures

5.2.1 Waste shall only be accepted at the facility, from Local Authority waste collection or transport vehicles or holders of waste permits, unless exempted or excluded, issued under the Waste Management (Collection Permit) Regulations 2001. Copies of these waste collection permits must be maintained at the facility.

5.2.2 Whole used tyres (other than bicycle tyres and tyres with an outside diameter greater than 1400mm) shall not be disposed of at the facility. Shredded tyres shall not be disposed of at the facility from 16 July 2006.

5.2.3 No hazardous wastes or liquid wastes shall be disposed of at the facility.

5.2.4 The licensee shall ensure that inert waste accepted at the facility for disposal is subject to treatment where technically feasible.

5.2.5 Within three months of the date of grant of this licence, the licensee shall submit to the Agency for its agreement updated written procedures (where appropriate) for the acceptance and handling of all wastes. These procedures shall include details of the pre-treatment of all waste to be carried out prior to acceptance at the facility and shall also include methods for the characterisation of waste in order to distinguish between inert, non-hazardous and hazardous wastes. The random inspection of incoming waste loads should also be addressed in the procedures. The procedures shall have regard to the EU Decision (2003/33/EC) on establishing the criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 and Annex II of Directive (1999/31/EC) on the landfill of waste.

5.3 All wastes shall be checked at the working face. Any wastes not suitable for acceptance shall be removed for recovery or disposal at an appropriate alternative facility. Such waste shall be stored in the Waste Quarantine Area only. No waste shall be stored in the Waste Quarantine Area for more than three months.

5.4 Working Face

5.4.1 Unless the prior agreement of the Agency is given, the following shall apply at the landfill:-

a) Only one working face shall exist at the landfill at any one time for the deposit of waste other than cover or restoration materials; and

b) The working face of the landfill shall be no more than 2.5 metres in height after compaction, no more than 25 metres wide and have a slope no greater than 1 in 3.

5.4.2 All waste deposited at the working face shall be compacted, using a steel wheeled compactor, and covered as soon as is practicable and at any rate prior to the end of the working day.

5.4.3 The working face, or faces, shall each day at the end of the day, be covered with suitable material.

5.5 Daily and Intermediate Cover

5.5.1 Any cover material at any location within the facility which is eroded, washed off or otherwise removed shall be replaced by the end of the working day.

5.5.2 Within three months of the date of grant of this licence, appropriate cover material shall be placed across the whole landfill so that no waste, other than the following is exposed:-

a) Waste suitable for specified engineering works; and

b) Waste on the working face during the operational hours of the facility.

5.6 Landscaping

5.6.1 Landscaping of the facility shall be carried out as described in *Landscape and Visual Assessment, A*ppendix C, Volume III and specified on Fig. 7 *Landscape Layout* of the EIS submitted with the application, unless otherwise agreed by the Agency.

5.6.2 Within three months of the date of grant of this license, the licensee shall submit a proposal for the installation of a screening berm as part of the proposed cell development works to reduce the visual impact of the proposed extension (Phase 3) as well as Phases 1 and 2.

5.6.3 The existing hedgerow at the southern boundary along R188 Regional Road of the facility shall be retained by the licensee as indicated in Section 3.11.3 *Existing Vegetation* of the EIS submitted with the application.

5.7 Operational Controls

5.7.1 Phase 3 at the landfill shall be filled in accordance with the phase sequence outlined in Attachment D.2a *Construction Schedule and Sequence* and shown on Drawing No. DG-07 Rev. D03 *Corranure Landfill Phase 3 Layout & Sections*.

5.7.2 All large hollow objects and other large articles deposited at the facility shall be crushed, broken up, flattened or otherwise treated.

5.7.3 Wastes once deposited and covered shall not be excavated, disturbed or otherwise picked over with the exception of works associated with the construction and installation of the leachate and landfill gas collection system unless with the prior agreement from the Agency.

5.7.4 Completed areas of the landfill shall be profiled so that no depressions exist in which water may accumulate. Any depressions arising after profiling shall be rectified by the emplacement of suitable capping or restoration materials.

5.7.5 Scavenging shall not be permitted at the facility.

5.7.6 Gates shall be locked shut when the facility is unsupervised.

5.7.7 The licensee shall provide and use adequate lighting during the operation of the facility in hours of darkness.

5.7.8 Fuels shall be stored only at appropriately bunded locations on the facility.

5.7.9 All tanks and drums shall be labelled to clearly indicate their contents.

5.8 Waste Handling

5.8.1 Inert Waste

Inert waste accepted at the facility for recovery shall comply with the standards established in *Schedule F: Criteria for the Acceptance of Inert Waste,* of this licence.

5.9 Off-site Disposal and Recovery

5.9.1 Waste sent off-site for recovery or disposal shall be conveyed only by a waste contractor agreed by the Agency.

5.9.2 All waste transferred from the facility shall be transferred only to an appropriate facility agreed by the Agency.

5.9.3 All wastes removed off-site for recovery or disposal shall be transported from the facility to the consignee in a manner which will not adversely affect the environment.

5.10 Civic Waste Facility

5.10.1 The Civic Waste Facility shall be used only by private vehicles. The facility shall not be used as a transfer station for disposal of waste by commercial waste disposal contractors or local authority waste collection vehicles.

5.10.2 All waste deposited in the Civic Waste Facility shall be either:-

a) Into a skip;

b) Into the hopper of the compactor for disposal;

c) Into a receptacle for recovery; and

d) In the case where inspection is required, into a designated inspection area.

5.10.3 The licensee shall assign and clearly label each container at the Civic Waste Facility to indicate their contents.

5.10.4 At the end of the working day the floor of the Civic Waste Facility shall be cleared of waste.

5.11 Leachate Management

5.11.1 Leachate levels in the waste shall not exceed a level of 1.0m over the top of the liner at the base of the landfill.

5.11.2 The frequency of leachate removal/discharge from the leachate lagoon shall be such that a minimum freeboard of 0.75m shall be maintained in the leachate lagoon at all times.

5.11.3 Unless treated on the facility, leachate stored in the leachate storage lagoon shall be disposed of by tankering off-site to an Agency approved facility in fully enclosed road tankers.

5.11.4 Recirculation of leachate or other contaminated water shall not be undertaken without the prior agreement of the Agency and, in any case, shall be undertaken only within cells which have been lined to the satisfaction of the Agency.

5.12 Maintenance

5.12.1 All treatment/abatement and emission control equipment shall be calibrated and maintained, in accordance with the instructions issued by the manufacturer/supplier or installer. Written records of the calibrations and maintenance shall be made and kept by the licensee.

5.12.2 All lagoon structures on the facility shall be inspected and certified fit for purpose every three years by an independent and appropriately qualified chartered engineer.

5.12.3 The wheel-wash shall be inspected on a daily basis and drained as required. Silt, stones and other accumulated material shall be removed as required from the wheel-wash and disposed of at the working face or to a skip.

REASON: To provide for appropriate operation of the facility to ensure protection of the environment.

CONDITION 6 EMISSIONS

6.1. No specified emission from the facility shall exceed the emission limit values set out in *Schedule C: Emission Limits*, of this licence. There shall be no other emissions of environmental significance.

6.2. The licensee shall ensure that the activities shall be carried out in a manner such that emissions do not result in significant impairment of, or significant interference with the environment beyond the facility boundary.

6.3. Landfill Gas

6.3.1. In relation to landfill derived gases the following shall constitute a trigger level:

a) Methane greater than 1% v/v; or,
b) Carbon Dioxide greater than 1.5% v/v,

measured in any monitoring borehole, service duct, manhole or other point as may be specified, located external to the body of waste.

6.3.2 The concentration limits for emissions to atmosphere specified in this licence shall be achieved without the introduction of dilution air and shall be based on gas volumes under standard conditions of :-

a) In the case of landfill gas flare:

Temperature 273 K, pressure 101.3 kPa, dry gas at 3% oxygen; and

b) In the case of landfill gas combustion plant:

Temperature 273 K, pressure 101.3 kPa, dry gas; 5% oxygen.

6.3.3. Emission limits for emissions from landfill gas flare/combustion plant to atmosphere in this licence shall be interpreted in the following way.

6.3.3.1. Continuous monitoring

a) No 24 hour mean value shall exceed the emission limit value;

b) 97% of all 30 minute mean values taken continuously over an annual period shall not exceed 1.2 times the emission limit value; and

c) No 30 minute mean value shall exceed twice the emission limit value.

6.3.3.2. Non-Continuous Monitoring

a) For any parameter where, due to sampling/analytical limitations, a 30 minute sample is inappropriate, a suitable sampling period should be employed and the value obtained therein shall not exceed the emission limit value;

b) For all other parameters, no 30 minute mean value shall exceed the emission limit value; and

c) For flow, no hourly or daily mean value shall exceed the emission limit value.

6.4. Groundwater

6.4.1 There shall be no direct emissions to groundwater from the lined landfill cells.

6.4.2 Within three months of the date of grant of this licence, the licensee shall submit to the Agency for its agreement, groundwater monitoring trigger levels in accordance with the requirements of Directive 1999/31/EC.

6.4.3 The trigger levels as specified in Condition 6.4.2 for groundwater shall be measured at monitoring boreholes GW-01, RC01 and GW-03.

6.5. Emissions to Surface Water

6.5.1. No leachate from the lined landfill cells, wastewater or contaminated surface water run-off shall be discharged to surface water drains and courses.

6.5.2. No substance shall be discharged in a manner, or at a concentration which, following initial dilution causes tainting of fish or shellfish.

6.5.3. Groundwater extracted during construction of Phase 3 shall be discharged to the surface water drainage network subject to Condition 3.16.3.

6.6. Disposal of Leachate

6.6.1. In emergency situations all leachate or contaminated water tankered from the facility shall be transported to Cavan Waste Water Treatment Plant, or alternative facility agreed in advance by the Agency, and disposed of there.

6.7. Emissions to Sewer

6.7.1. Unless otherwise agreed in advance by the Agency and the Sanitary Authority, the following shall apply for the discharge of leachate from the Leachate Lagoon to Cavan Wastewater Treatment Plant. There shall be no other discharge or emission to sewer of environmental significance.

6.7.2. No substance shall be present in emissions to sewer in such concentrations as would constitute a danger to sewer maintenance personnel working in the sewerage system, or as would be damaging to the fabric of the sewer, or as would interfere with the biological functioning of a downstream wastewater treatment works.

6.7.3. The licensee shall permit authorised persons of the Agency and the Sanitary Authority to inspect, examine and test, at all reasonable times, any works and apparatus installed, in connection with the discharge or emission, and to take samples of the discharge or emission.

6.7.4. No discharge or emission to sewer shall take place which might give rise to any reaction within the sewer or to the liberation of by-products which may be of environmental significance.

6.7.5. The licensee shall ensure that the discharge shall not contain dissolved methane, petroleum spirits or organic solvents (including chlorinated organic solvents), at concentrations which would give rise to flammable or explosive vapours in the sewer.

6.7.6. Non-trade effluent wastewater (e.g. firewater, accidental spillage) which occurs on-site shall not be discharged to the sewer without the prior authorisation of the Sanitary Authority.

6.7.7. The licensee shall provide and maintain an inspection chamber in a suitable position in connection with each pipe through which a discharge or emission is being made. Each such inspection chamber or manhole shall be constructed and maintained by the licensee so as to permit the taking of samples of the discharge.

6.7.8. Emission limit values for emissions to sewer/waters in this licence shall be interpreted in the following way:-

a) Continuous monitoring.

No flow value shall exceed the specified limit.

b) Non-Continuous monitoring.

Eight out of ten consecutive results, calculated as daily mean concentration or mass emission values on the basis of flow proportional composite sampling shall not exceed 1.2 times the emission limit value.

c) No grab sample shall exceed 1.2 times the emission limit value.

REASON: To control emissions from the facility and provide for the protection of the environment and to provide for the requirements of the Sanitary Authority in accordance with Section 52 of the Waste Management Acts 1996 to 2003.

CONDITION 7 NUISANCE CONTROL

7.1 The licensee shall ensure that vermin, birds, flies, mud, dust, litter and odours do not give rise to nuisance at the facility or in the immediate area of the facility. Any method used by the licensee to control any such nuisance shall not cause environmental pollution.

7.2 The road network in the vicinity of the facility shall be kept free from any debris caused by vehicles entering or leaving the facility. Any such debris or deposited materials shall be removed without delay.

7.3 Litter Control

7.3.1 The measures and infrastructure as described in Section 4.1.6 *Litter Control* of the EIS submitted with the application shall be applied to control litter at the facility.

7.3.2 Litter fencing shall be installed and maintained around the perimeter of the active tipping area to the specifications described in the Agency's *Landfill Manual, Landfill Operational Practices* prior to the disposal of any waste in any cell.

7.3.3 All litter control infrastructure shall be inspected on a daily basis. The licensee shall remedy any defect in the litter netting as follows:-

a) A temporary repair shall be made by the end of the working day; and

b) A repair to the standard of the original netting shall be undertaken within three working days.

7.3.4 All loose litter or other waste, placed on or in the vicinity of the facility, other than in accordance with the requirements of this licences, shall be removed, subject to the agreement of the landowners, immediately and in any event by 10.00am of the next working day after such waste is discovered.

7.3.5 The licensee shall ensure that all vehicles delivering waste to and removing waste and materials from the facility are appropriately covered.

7.4 Dust Control

In dry weather, site roads and any other areas used by vehicles shall be sprayed with water as and when required to minimise airborne dust nuisance.

7.5 Prior to exiting the facility, all waste vehicles shall use the wheelwash.

7.6 Bird Control

Birds shall be prevented from gathering on and feeding at the facility by the use of birds of prey and/or other bird scaring techniques. The birds of prey and/or other techniques shall be in place and shall be employed every day, from before dawn to after dark, until the waste activities cease and all the waste is capped to the written satisfaction of the Agency.

REASON: To provide for the control of nuisances.

CONDITION 8 RESOURCE USE AND ENERGY EFFICIENCY

8.1 The licensee shall carry out an audit of the energy efficiency of the site within one year of the date of grant of this licence. The licensee shall consult with the Agency on the nature and extent of the

audit and shall develop an audit programme to the satisfaction of the Agency. The audit programme shall be submitted to the Agency in writing at least one month before the audit is to be carried out. A copy of the audit report shall be available on-site for inspection by authorised persons of the Agency and a summary of the audit findings shall be submitted as part of the Annual Environmental Report. The energy efficiency audit shall be repeated at intervals as required by the Agency.

8.2 The audit shall identify all opportunities for energy use reduction and efficiency and the recommendations of the audit will be incorporated into the Schedule of Environmental Objectives and Targets under Condition 2 above.

8.3 The licensee shall identify opportunities for reduction in the quantity of water used on site including recycling and reuse initiatives, wherever possible. Reductions in water usage shall be incorporated into Schedule of Environmental Objectives and Targets.

8.4 The licensee shall undertake an assessment of the efficiency of use of raw materials in all processes, having particular regard to the reduction in waste generated. The assessment should take account of best international practice for this type of activity. Where improvements are identified, these shall be incorporated into the Schedule of Environmental Objectives and Targets.

Reason: To provide for the efficient use of resources and energy in all site operations.

CONDITION 9 MONITORING

9.1 The licensee shall carry out such monitoring and at such locations and frequencies as set out in *Schedule D: Monitoring*, of this licence and as specified in this licence. Unless otherwise specified by this licence, all environmental monitoring shall commence no later than two months after the date of grant of this licence.

9.2 The licensee shall amend the frequency, locations, methods and scope of monitoring as required by this licence only upon the written instruction of the Agency and shall provide such information concerning such amendments as may be requested in writing by the Agency. Such alterations shall be carried out within any timescale nominated by the Agency.

9.3 Monitoring and analysis equipment shall be operated and maintained in accordance with the manufacturers' instructions (if any) so that all monitoring results accurately reflect any emission, discharge or environmental parameter.

9.4 The licensee shall provide safe and permanent access to all on-site sampling and monitoring points and to off-site points as required by the Agency.

9.5 The licensee shall maintain and clearly label and name all sampling and monitoring locations.

9.6 Within twelve months of the date of grant of this licence, the licensee shall submit to the Agency for its agreement an updated appropriately scaled drawing(s) showing all the monitoring locations that are stipulated in this licence including any noise sensitive locations and private wells to be monitored. The drawing shall include the eight-digit national grid reference of each monitoring point. Thereafter any amendments to this drawing should be notified as part of the AER.

9.7 All landfill gas monitoring equipment, other than permanent monitoring systems within buildings, shall be certified as being intrinsically safe.

9.8 The following information shall be maintained on site for inspection by Agency Officers: the names, qualifications and a summary of the relevant experience of all persons that will carry out all sampling and monitoring as required by this licence and who carry out the interpretation of the results of such sampling and monitoring.

9.9 Groundwater Monitoring

Within three months of the date of grant of this licence, the licensee shall submit a proposal for agreement by the Agency outlining monitoring of groundwater in selected down-gradient wells within 500m of the facility.

9.10 Dust Monitoring

Prior to waste acceptance at the proposed Phase 3, the licensee shall submit an updated dust monitoring programme.

9.11 Noise Monitoring

Prior to waste acceptance at the proposed Phase 3, the licensee shall submit an updated noise monitoring programme.

9.12 Meteorological Monitoring

The licensee shall maintain a meteorological station at the facility capable of monitoring the parameters listed in *Schedule D.6: Meteorological Monitoring*, of this licence.

9.13 Topographical Survey

A topographical survey shall be carried out annually (during landfilling operations and installation of the final capping). The survey shall include a measurement of the remaining available void space. The survey shall be in accordance with any written instructions issued by the Agency and shall be reported annually as part of the AER.

9.14 Biological Assessment

A biological assessment of Corranure Stream and Lismagratty Stream at the locations specified on Fig. 3.6 *Surface water & Sediment Monitoring Points* of the Article 14 reply received 30/8/04 shall be undertaken within six months of the date of grant of this licence in accordance with Condition 4.2 and annually thereafter. This assessment shall use appropriate biological methods such as the EPA Q-rating system for the assessment of rivers and streams.

9.15 Archaeological Assessment

Prior to the development of any undisturbed area, the advice of The Heritage Section of the Department of the Environment, Heritage and Local Government (formerly Dúchas) shall be sought. On completion of such development a report of the results of any archaeological monitoring shall be submitted to The Development Applications Section and to the Agency.

9.16 Stability Assessment

The licensee shall carry out a stability assessment of the side slopes of the facility annually and report the results as part of the AER.

9.17 Nuisance Monitoring

9.17.1 The licensee shall, at a minimum of one week intervals, inspect the facility and its immediate surrounds for nuisances caused by litter, vermin, birds, flies, mud, dust and odours.

9.17.2 Daily odour inspections shall be carried out at the designated area for storage of green waste accepted at the civic waste facility, unless otherwise agreed by the Agency.

REASON: To ensure compliance with the conditions of this licence by provision of a satisfactory system of monitoring of emissions.

CONDITION 10 CONTINGENCY ARRANGEMENTS

10.1 In the event of an incident the licensee shall immediately:-

a) Identify the date, time and place of the incident;

b) Carry out an immediate investigation to identify the nature, source and cause of the incident and any emission arising therefrom;

c) Isolate the source of any such emission;

d) Evaluate the environmental pollution, if any, caused by the incident;

e) Identify and execute measures to minimise the emissions/malfunction and the effects thereof; and

f) Provide a proposal to the Agency for its agreement within one month of the incident occurring to:-

i) identify and put in place measures to avoid reoccurrence of the incident;

ii) identify and put in place any other appropriate remedial action.

10.2 The licensee shall maintain an Emergency Response Procedure (ERP). Within six months of the date of grant of this licence, the licensee shall submit to the Agency for its agreement, a proposal for updating (where appropriate) of the documented ERP for the facility.

10.3 The licensee shall have in storage an adequate supply of containment booms and/or suitable absorbent material to contain and absorb any spillage at the facility. Once used the absorbent material shall be disposed of at an appropriate facility.

10.4 Emergencies

10.4.1 All significant spillages occurring at the facility shall be treated as an emergency and immediately cleaned up and dealt with so as to alleviate their effects.

10.4.2 No waste shall be burnt within the boundaries of the facility. A fire at the facility shall be treated as an emergency and immediate action shall be taken to extinguish it and notify the appropriate authorities.

10.4.3 In the event that monitoring of local wells indicates that the facility is having a significant adverse effect on the quantity and/or quality of the water supply this shall be treated as an emergency and the licensee shall provide an alternative supply of water to those affected.

10.4.4 In the event that monitoring of the side slopes of the facility indicate that there may be a risk of slope failure this will be treated as an emergency.

REASON: To ensure compliance with the conditions of this licence by provision of a satisfactory system of monitoring of emissions.

CONDITION 11 RECORDS

11.1 The licensee shall keep the following documents at the facility office:-

a) The current waste licence and specified attachments and drawings relating to the facility;

b) The current EMS for the facility;

c) The previous year's AER for the facility;

d) Records of all sampling, analyses, measurements, examinations, calibrations and maintenance carried out in accordance with the requirements of this licence and all other such monitoring which relates to the environmental performance of the facility;

e) An up-to-date site drawing/plan showing the locations of key process and environmental infrastructure, including monitoring locations and emission points;

f) Relevant correspondence with the Agency; and

g) All written procedures produced by the licensee which relate to the licensed activities.

11.2 The licensee shall maintain a record for each load of waste arriving at the facility, excluding those arriving at the Civic Waste facility. The licensee shall record the following:-

a) The date;

b) The name of the carrier (including if appropriate, the waste collection permit details);

c) The vehicle registration number;

d) The name of the producer(s)/collector(s) of the waste as appropriate;

e) The name of the waste facility (if appropriate) from which the load originated including the waste licence or waste permit register number;

f) A description of the waste including the associated EWC codes;

g) The quantity of the waste, recorded in tonnes;

h) The name of the person checking the load; and

i) Where loads or wastes are removed or rejected, details of the date of occurrence, the types of waste and the facility to which they were removed including the waste licence and waste permit register number of these facilities as appropriate.

11.3 The following records shall be maintained by the licensee:-

a) The types and quantities of waste recovered and disposed of at the facility each year. These records shall include the relevant EWC Codes;

b) All training undertaken by facility staff;

c) Results from all integrity tests of bunds and other structures and any maintenance or remedial work arising from them;

d) Details of all nuisance inspections and any actions taken as a result of these inspections; and

e) The names and qualifications of all persons who carry out all sampling and monitoring as required by this licence and who carry out the interpretation of the results of such sampling and monitoring.

11.4 The licensee shall maintain a record of all complaints relating to the operation of the facility. Each such record shall give details of the following:-

a) Date and time of the complaint;

b) The name of the complainant;

c) Details of the nature of the complaint;

d) Actions taken on foot of the complaint and the results of such actions; and

e) The response made to each complainant.

11.5 A record shall be kept of each consignment of leachate removed from the facility. The record shall include the following:-

a) The name of the carrier;

b) The date and time of removal of leachate from the facility;

c) The volume of leachate, in cubic metres, removed from the facility on each occasion;

d) The name and address of the Waste Water Treatment Plant to which the leachate was transported; and

e) Any incidents or spillages of leachate during its removal or transportation.

11.6 A record shall be kept for each load of waste departing from the Civic Waste facility. The following shall be recorded:-

a) The name of the carrier;

b) The vehicle registration number;

c) The destination of the waste (facility name and waste licence/permit number as appropriate);

d) A description of the waste (if recovered or rejected waste, the specific nature of the waste);

e) The quantity of waste, recorded in tonnes;

f) The name of the person checking the load; and

g) The time and date of departure.

11.7 A record shall be kept at the facility of the programme for the control and eradication of vermin and fly infestations at the facility. These records shall include as a minimum the following:-

a) The date and time during which spraying of insecticide is carried out;

b) Contractor details;

c) Contractor logs and site inspection reports;

d) Details of the rodenticide(s) and insecticide(s) used;

e) Operator training details;

f) Details of any infestations;

g) Mode, frequency, location and quantity of application; and

h) Measures to contain sprays within the facility boundary.

REASON: To provide for the keeping of proper records of the operation of the facility.

CONDITION 12 REPORTS AND NOTIFICATIONS

12.1 Unless otherwise agreed by the Agency, all reports and notifications submitted to the Agency shall:-

a) Be sent to the EPA's Office of Environmental Enforcement, John Moore Road, Castlebar, County Mayo;

b) Comprise one original and two copies unless additional copies are required;

c) Be formatted in accordance with any written instruction or guidance issued by the Agency;

d) Include whatever information as is specified in writing by the Agency;

e) Be identified by a unique code, indicate any modification or amendment, and be correctly dated to reflect any such modification or amendment;

f) Be submitted in accordance to the relevant reporting frequencies specified by this licence, such as in *Schedule E: Recording and Reporting to the Agency*, of this licence;

g) Be accompanied by a written interpretation setting out their significance in the case of all monitoring data; and

h) Be transferred electronically to the Agency's computer system if required by the Agency.

12.2 In the event of an incident occurring on the facility, the licensee shall:-

a) Notify the Agency as soon as practicable and in any case not later than 1000 hrs the following working day after the occurrence of any incident;

b) Submit a written record of the incident, including all aspects described in Condition 10.1(a-e), to the Agency as soon as practicable and in any case within five working days after the occurrence of any incident;

c) In the event of any incident which relates to discharges to surface water, notify the Northern Regional Fisheries Board as soon as practicable and in any case not later than 1000 hrs on the following working day after such an incident; and

d) Should any further actions be taken as a result of an incident occurring, the licensee shall forward a written report of those actions to the Agency as soon as practicable and no later than ten days after the initiation of those actions.

12.3 Waste Recovery Reports

The licensee shall as part of the AER report on the facility's contribution to the achievement of the recovery targets stated in national and European Union waste policies and shall include the following:-

a) Proposals for the contribution of the facility to the achievement of targets for the reduction of biodegradable waste to landfill, going to landfills as specified in the Landfill Directive;

b) The separation of recyclable materials from the waste;

c) The recovery of Construction and Demolition Waste;

d) The recovery of metal waste and white goods;

e) The recovery of commercial waste, including cardboard;

f) Inert waste to be used for cover/restoration material at the facility; and

g) Proposals regarding the utilisation of energy from the gas utilisation plant.

12.4 Annual Environmental Report

12.4.1 The licensee shall submit to the Agency for its agreement by 31st March of each year thereafter, an Annual Environmental Report (AER) for the previous year.

12.4.2 The AER shall include as a minimum the information specified in *Schedule G: Content of Annual Environmental Report*, of this licence and shall be prepared in accordance with any relevant written guidance issued by the Agency.

REASON: To provide for proper reports to and notifications to the Agency.

CONDITION 13 CHARGES AND FINANCIAL PROVISIONS

13.1 Agency Charges

13.1.1 The licensee shall pay to the Agency an annual contribution of €17,782 or such sum as the Agency from time to time determines, having regard to variations in the extent of reporting, auditing, inspection, sampling and analysis or other functions carried out by the Agency, towards the cost of monitoring the activity, as the Agency considers necessary for the performance of its functions under the Waste Management Acts, 1996 to 2003. The first payment shall be a pro-rata amount for the period from the date of this licence to the 31st day of December, and shall be paid to the Agency within one month from the date of the licence. In subsequent years the licensee shall pay to the Agency such revised annual contribution as the Agency shall from time to time consider necessary to enable performance by the Agency of its relevant functions under the Waste Management Acts, 1996 to 2003, and all such payments shall be made within one month of the date upon which demanded by the Agency.

13.1.2 In the event that the frequency or extent of monitoring or other functions carried out by the Agency needs to be increased the licensee shall contribute such sums as determined by the Agency to defraying its costs in regard to items not covered by the said annual contribution.

13.2 Financial Provision for Closure, Restoration and Aftercare

13.2.1 The licensee shall from a date to be set by the Agency establish and maintain a fund, or provide a written guarantee, that is adequate to assure the Agency that the licensee is at all times financially capable of implementing the Restoration and Aftercare Plan required by Condition 4. The type of fund established and means of its release/recovery shall be agreed by the Agency prior to its establishment.

13.2.2 Any fund established shall be maintained in an amount always sufficient to underwrite the current Restoration and Aftercare Plan.

13.2.3 The licensee shall revise the cost of restoration and aftercare annually and any details of the necessary adjustments to the fund or guarantee must, within two weeks of the revision, be forwarded to the Agency for its agreement. Any adjustment agreed by the Agency shall be effected within four weeks of said written agreement.

13.2.4 Unless otherwise agreed any revision to the fund shall be computed using the following formula:-

$$Cost = (ECOST \times WPI) + CiCC$$

Where:-

Cost	=	Revised restoration and aftercare cost
ECOST	=	Existing restoration and aftercare cost
WPI	=	Appropriate Wholesale Price Index [Capital Goods, Building & Construction (i.e. Materials & Wages) Index], as published by the Central Statistics Office, for the year since last closure calculation/revision.
CiCC	=	Change in compliance costs as a result of change in site conditions, changes in law, regulations, regulatory authority charges, or other significant changes.

13.3 Cost of landfill of waste

In accordance with the provisions of Section 53A of the Waste Management Acts 1996 to 2003, the licensee shall ensure the costs in the setting up, operation of, provision of financial security and closure and after-care for a period of at least 30 years shall be covered by the price to be charged for the disposal of waste at the facility. The statement required under Section 53A(5) of said Acts is to be included as part of the AER.

REASON: To provide for adequate financing for monitoring and financial provisions for measures to protect the environment.

SCHEDULE A : Waste Acceptance

A.1 Waste Acceptance

The following waste related processes are authorised:

Crushing, baling, repackaging processes
Landfilling of inert waste
Use of compost & inert waste in landfill operation
Storage of waste
Use of waste as a fuel
Recovery of dry recyclables

No addition to these processes are permitted unless agreed in advance by the Agency.

Table A.1 Waste Categories and Quantities

Waste Type	Maximum (Tonnes Per Annum)[Note 1]
Household waste	**50,000**
Commercial waste	**32,000**
Construction and demolition waste[Note 3]	**5,000**
Green waste	**2,000**
Street cleaning residues	**900**
Hazardous Household waste[Note 2]	**100**
TOTAL	**90,000**

Note 1: The quantities of the individual waste types may be adjusted, only with the agreement of the Agency, subject to the total annual waste quantity remaining the same.

Note 2: Hazardous waste types as listed in Table 6.1.2 *Hazardous Waste Types and Quantities* of the Article 14 reply received 30/8/04, or as may otherwise be agreed in writing.

Note 3: This limit does not apply to construction and demolition wastes imported to the site for use in the construction of the facility.

SCHEDULE B : Specified Engineering Works

Specified Engineering Works
Development of the facility including preparatory works and lining.
Final capping.
Installation of Landfill Gas Management Infrastructure.
Installation of Leachate Management Infrastructure.
Installation of Groundwater Control Infrastructure.
Installation of Surface Water Management Infrastructure.
Any other works notified in writing by the Agency.

SCHEDULE C : Emission Limits

C.1 Noise Emissions:

(Measured at any noise sensitive locations).

Daytime Db(A) L_{Aeq}(15 minutes)	Night-time dB(A) L_{Aeq}(15 minutes)
55[Note 1]	45[Note 1]

Note 1: There shall be no clearly audible tonal component or impulsive component in the noise emission from the activity at any noise sensitive location.

C.2 Dust Deposition Limits:

(Measured at the monitoring points indicated in *Table D.1.1*).

Level (mg/m^2 /day)[Note 1]
350

Note 1: 30 day composite sample with the results expressed as mg/m^2 /day.

C.3 Surface Water Discharge Limits:

Measured at the surface water discharge points SW-1 and SW-2 indicated in Table D.1.1

Level (Suspended Solids mg/l)
35

C.4 Emission Limits Values for Landfill Gas Plant

Emission Point Reference numbers: to be agreed by Agency in advance.
Minimum discharge height: 5m (unless results from modelling suggests otherwise)

Parameter	Flare (enclosed) Emission Limit Value [Note 1]	Utilisation Plant Emission Limit Value [Note 1]
Nitrogen oxides (NO_x)	150 mg/m^3	500 mg/m^3
CO	50 mg/m^3	650 mg/m^3
Particulates	Not applicable	130 mg/m^3
Total organic carbon (TOC)	10 mg/m^3	Not applicable

Note 1: Dry gas referenced to 5% oxygen by volume for utilisation plants and 3% oxygen by volume for flares.

SCHEDULE D : Monitoring

D.1 Monitoring Locations

Monitoring locations shall be those as set out in Table D.1.1 and Drawing No. DG0009 Rev. F01 *Corranure Landfill Locations of Monitoring Points* of the Article 14 reply received 30/8/04, unless otherwise indicated or agreed by the Agency.

Table D.1.1 Monitoring Locations

Landfill Gas within Waste and Boundary Locations	Landfill Gas Flare/Utili-sation Plant	Dust Deposition Odour	Noise	Surface Water	Ground Water	Leachate
Stations		**Stations**	**Stations**	**Stations**	**Stations**	**Stations**
Within Waste[Note 1] G-01 G-02 G-03 G-04	Note 3	Note 4 D1 D2 D3 D4 D5	Note 5 B1 B2 B3 B4	**Chemical Monitoring** Note 7 SW-1 SW-2 [Note 8] K1 K2 K3 K4 A2	GW-01[Note 10] RC01[Note 10] RC02 GW-03[Note 10] SA1	Lagoon & Collection Chambers
Boundary locations Note 2 G01 GW-01 G02 G03 G04 G06 GW-03 RC02			NSL 1 NSL2 NSL 3 NSL4 NSL 5 NSL 6 NSL 7[Note 6]	**Biological Assessment & Sediment Monitoring** Note 9 B1* B2* B3 B4 B5* A1* A2* A3 A4 A5*	Private Wells[Note 11]	**Within Waste**[Note 12] L/G-01 L/G-02 L/G-03 L/G-04

Note 1: Location of landfill gas monitoring wells within the waste body to be agreed by the Agency in accordance with Condition 3.19.1.

Note 2: Additional perimeter wells to monitor for potential off-site migration of landfill gas to be provided in accordance with Condition 3.19.1.

Note 3: Location to be agreed by the Agency.

Note 4: Additional dust monitoring point(s) to be installed in relation to the operation of Phase 3 in accordance with Condition 9.10.

Note 5: Additional noise monitoring point(s) to be installed in relation to the operation of Phase 3 in accordance with Condition 9.11.

Note 6: The licensee shall carry out noise monitoring at any other noise sensitive location as may be specified by the Agency.

Note 7: The surface water monitoring points to be used for chemical monitoring as shown on Fig. 3.6 Surface Water & Sediment Monitoring Points of the Article 14 reply received on 30/8/04. The parameters and frequencies to be monitored are outlined in Table D.5.1.

Note 8: The location of the surface water discharge point to Lismagratty stream to be agreed by the Agency.

Note 9: The location of the biological assessment and sediment monitoring points as shown on Fig. 3.6 Surface Water & Sediment Monitoring Points of the Article 14 reply received on 30/8/04. Sediment monitoring only to be carried out at monitoring points marked with an asterisk. The sediment shall be sampled for the following parameters: hydrocarbons, PCBs, phenol and heavy metals.

Note 10: Groundwater monitoring wells for which trigger levels shall be set as specified in Condition 6.4.

Note 11: Private wells to be monitored in accordance with Condition 9.9.

Note 12: Location of additional leachate monitoring points to be installed in the waste body at Phases 1, 2 and 3 at the facility to be agreed with the Agency in accordance with Condition 3.19.3.

D.2 Landfill Gas

Table D.2.1 Landfill Gas Monitoring Parameters, Frequency and Technique

Parameter	Monitoring Frequency		Analysis Method[Note 1]/Technique[Note 2]
	Gas Boreholes/ Vents/Wells	Site Office	
Methane (CH_4) % v/v	Monthly	Weekly	Infrared analyser/flame ionisation detector
Carbon dioxide (CO_2) % v/v	Monthly	Weekly	Infrared analyser/ flame ionisation detector
Oxygen(O_2) % v/v	Monthly	Weekly	Electrochemical cell
Atmospheric Pressure	Monthly	Weekly	Standard
Temperature	Monthly	Weekly	Standard

Note 1: All monitoring equipment used should be intrinsically safe.
Note 2: Or other methods agreed in advance by the Agency.

D.3 Dust

Table D.3.1 Dust Monitoring Frequency and Technique

Parameter ($mg/m^2/day$)	Monitoring Frequency	Analysis Method/Technique
Dust	Three times a year. Note 2	Standard Method Note 1

Note 1: Standard method VDI2119 (Measurement of Dustfall, Determination of Dustfall using Bergerhoff Instrument (Standard Method) German Engineering Institute). Any modifications to eliminate interference due to algae growth in the gauge should be reported to the Agency.
Note 2: Twice during the period May to September.

D.4 Noise

Table D.4.1 Noise Monitoring Frequency and Technique.

Parameter	Monitoring Frequency	Analysis Method/Technique
$L(A)_{EQ}$ [30 minutes]	Annual	Standard Note 1
$L(A)_{10}$ [30 minutes]	Annual	Standard Note 1
$L(A)_{90}$ [30 minutes]	Annual	Standard Note 1
Frequency Analysis (1/3 Octave band analysis)	Annual	Standard Note 1

Note 1: "International Standards Organisation. ISO 1996. Acoustics - description and Measurement of Environmental noise. Parts 1, 2 and 3."

D.5 Surface Water, Groundwater and Leachate

Table D.5.1 Water and Leachate - Parameters / Frequency

PARAMETER[Note 1]	SURFACE WATER Monitoring Frequency	GROUNDWATER Monitoring Frequency	LEACHATE [Note 7] Monitoring Frequency
Visual Inspection/Odour [Note 2]	Weekly	Quarterly	Quarterly
Groundwater Level	Not Applicable	Monthly	Not Applicable
Leachate Level	Not Applicable	Not Applicable	Continuous
Ammoniacal Nitrogen	Quarterly [Note 8]	Monthly	Annually
BOD	Quarterly [Note 8]	Not Applicable	Annually
COD	Quarterly	Not Applicable	Annually
Chloride	Quarterly	Quarterly	Annually
Dissolved Oxygen	Quarterly	Quarterly	Not Applicable
Electrical Conductivity	Quarterly [Note 8]	Monthly	Annually
pH	Quarterly [Note 8]	Monthly	Annually
Total Suspended Solids	Quarterly [Note 8]	Not Applicable	Not Applicable
Metals / non metals [Note 3]	Annually	Annually	Annually
Cyanide (Total)	Not Applicable	Annually	Annually
Fluoride	Not Applicable	Annually	Annually
List I/II organic substances [Note 4]	Once off [Note 5]	Annually [Note 5]	Once off [Note 5]
Mercury	Annually	Annually	Annually
Sulphate	Annually	Annually	Annually
Total Alkalinity	Annually	Annually	Not applicable
Total P/orthophosphate	Annually [Note 8]	Annually	Annually
Total Oxidised Nitrogen	Annually	Not Applicable	Annually
Total Organic Carbon	Not Applicable	Monthly	Not Applicable
Residue on evaporation	Not Applicable	Annually	Not Applicable
Faecal Coliforms [Note 10]	Not Applicable	Annually	Not Applicable
Total Coliforms [Note 10]	Not Applicable	Annually	Not Applicable
Biological Assessment	Annually [Note 6]	Not Applicable	Not Applicable
Sediment Assessment	Once off [Note 9]	Not Applicable	Not Applicable

Note 1: All the analysis shall be carried out by a competent laboratory using standard and internationally accepted procedures.
Note 2: Where there is evident gross contamination of leachate, additional samples should be analysed.
Note 3: Metals and elements to be analysed by AA/ICP should include as a minimum: boron, cadmium, calcium, chromium (total), copper, iron, lead, magnesium, manganese, nickel, potassium, sodium and zinc.
Note 4: Samples screened for the presence of organic compounds using Gas Chromatography / Mass Spectrometry (GC/MS) or other appropriate techniques and using the list I/II Substances from EU Directive 76/464/EEC and 80/68/EEC as a guideline. Recommended analytical techniques include: volatiles (US Environmental Protection Agency method 524 or equivalent), semi-volatiles (USEPA method 525 or equivalent, and pesticides (USEPA method 608 or equivalent).
Note 5: 2 surface water locations, 3 groundwater locations and 2 leachate locations to be agreed by the Agency for these parameters.
Note 6: Appropriate biological methods (such as EPA Q-Rating System) to be used for the assessment of rivers and streams.
Note 7: Visual Inspection and Leachate Levels to be monitored at all leachate monitoring points specified in Table D.1.1. Leachate composition to be monitored at the leachate lagoon and two locations within the waste body.
Note 8: Monitoring at discharge points SW-1 and SW-2 shall be carried out monthly for these parameters.
Note 9: Appropriate methods to be used for the assessment of stream sediments and in accordance with the Agency's *Landfill Manual, Landfill Monitoring, 2nd Edition.*

Note 10: In the case where groundwater is extracted for drinking water, if there is evidence of bacterial contamination, the analysis at up gradient and downgradient monitoring points shall include enumeration of total bacteria at 22°C and 37°C and faecal Streptococci.

D.6 Meteorological Monitoring

Table D.6.1 Meteorological Monitoring:
Data to be obtained from a location on the facility**.** However Evaporation, Evapotranspiration and Humidity may be obtained from the Clones weather Station.

Parameter	Monitoring Frequency	Analysis Method/Technique
Precipitation Volume	Daily	Standard
Temperature (min/max.)	Daily	Standard
Wind Force and Direction	Daily	Standard
Evaporation	Daily	Standard
Evapotranspiration[Note 1]	Daily	Standard
Humidity	Daily	Standard
Atmospheric Pressure[Note 1]	Daily	Standard

Note 1: Monitoring frequency for these parameters may be decreased with the agreement of the Agency.

D.7 Landfill Gas Combustion Plant/Enclosed Flare

Location: Utilisation plant and enclosed flare

Table D.7.1 Landfill Gas Utilisation Plant/Enclosed Flare Parameters and Monitoring Frequency

Parameter	Flare (enclosed) Monitoring Frequency	Utilisation Plant Monitoring Frequency	Analysis Method[Note 1]/ Technique[Note 2]
Inlet			
Methane (CH_4) % v/v	Continuous	Weekly	Infrared analyser/flame ionisation detector/thermal conductivity
Carbon dioxide (CO_2) % v/v	Continuous	Weekly	Infrared analyser/thermal conductivity
Oxygen (O_2) % v/v	Continuous	Weekly	Electrochemical/thermal conductivity
Total Sulphur	Annually	Annually	Ion chromatography
Process Parameters			
Combustion Temperature	Continuous	Quarterly	Temperature Probe/datalogger
Outlet			
Carbon monoxide (CO**)**	Continuous	Continuous	Flue gas analyser/datalogger
Nitrogen Oxides (Nox**)**	Annually	Annually	Flue gas analyser
Sulphur dioxide	Annually	Annually	Flue gas analyser

(SO_2) Particulates TOC	Not applicable Annually	Annually Not applicable	Isokinetic/Gravimetric Flame ionisation

Note 1: All monitoring equipment used should be intrinsically safe.
Note 2: Or other methods agreed in advance by the Agency.

SCHEDULE E : Recording and Reporting to the Agency

Report	Reporting Frequency Note 1	Report Submission Date
Environmental Management System Updates	Annually	Submit as part of AER.
Annual Environment Report (AER)	Annually	By 31st March of each year.
Record of incidents	As they occur	Within five days of the incident.
Specified Engineering Works reports	As they arise	Prior to the works commencing.
Monitoring of landfill gas	Quarterly	Ten days after end of the quarter being reported on.
Monitoring of Surface Water Quality	Quarterly	Ten days after end of the quarter being reported on.
Monitoring of Groundwater Quality	Quarterly	Ten days after end of the quarter being reported on.
Monitoring of Leachate	Quarterly	Ten days after end of the quarter being reported on.
Meteorological Monitoring	Annually	Submit as part of AER.
Dust Monitoring	Three times a year	Submit as part of AER.
Noise Monitoring	Annually	Submit as part of AER.
Biological Monitoring	Annually	Within six months from the date of grant of this licence in accordance with Condition 4.2 and every year thereafter as part of the AER.
Sediment Assessment	-	Within six months from the date of grant of this licence in accordance with Condition 4.2.
Any other monitoring	As they occur	Within ten days of obtaining results.

Note 1: Unless altered at the request of the Agency.

SCHEDULE F : Criteria for the Acceptance of Inert Waste

F.1 Acceptable Waste for Recovery

Only the wastes listed below are acceptable for recovery at the facility, unless otherwise agreed by the Agency. These wastes should be in such a condition as to not represent a risk of causing environmental pollution.

WASTE	
Topsoil	Solid Road Planings, Solid Tarmacadam, Solid Asphalt
Subsoil	Brickwork
Stone, Rock and Slate	Natural Sand
Clay, Pottery and China	Concrete

SCHEDULE G : Content of the Annual Environmental Report

Annual Environmental Report Content
Reporting Period.
Waste activities carried out at the facility.
Quantity and Composition of waste received, disposed of and recovered during the reporting period and each previous year.
Calculated remaining capacity of the facility and year in which final capacity is expected to be reached.
Methods of deposition of waste.
Summary report on emissions.
Summary of results and interpretation of environmental monitoring.
Biological Monitoring summary report.
Meteorological summary report.
Resource and energy consumption summary.
Proposed development of the facility and timescale of such development.
Volume of leachate produced and volume of leachate transported / discharged off-site.
Report on development works undertaken during the reporting period, and a timescale for those proposed during the coming year.
Report on restoration of completed cells/ phases.
Topographical Survey.
Slope stability monitoring report.
Estimated annual and cumulative quantities of landfill gas emitted from the facility.
Estimated annual and cumulative quantity of indirect emissions to groundwater.
Annual water balance calculation and interpretation.
Environmental Management System updates.
Report on the progress towards achievement of the Environmental Objectives and Targets contained in previous year's report.
Schedule of Environmental Objectives and Targets for the forthcoming year.
Full title and a written summary of any procedures developed by the licensee in the year which relates to the facility operation.
Tank, pipeline and bund testing and inspection report.
Reported incidents and Complaints summaries.
Review of Nuisance Controls.
Reports on financial provision made under this licence, management and staffing structure of the facility, and a programme for public information.
Statement of charges and costs of landfill (Condition 12.3 and Section 53(A)5 of the Waste Management Acts 1996 to 2003.
Report on training of staff.
Any other items specified by the Agency.

Sealed by the seal of the Agency on this the 10th day of May, 2005

PRESENT when the seal of the Agency was affixed hereto:

Padraic Larkin, Director

MONTHLY CLIMATOLOGICAL SUMMARY for JUL. 2008

NAME: Cavan Landfill CITY: STATE:
ELEV: LAT: LONG:

TEMPERATURE (°C), RAIN (in), WIND SPEED (mph)

DAY	MEAN TEMP	HIGH	TIME	LOW	TIME	HEAT DEG ' DAYS	COOL DEG DAYS	RAIN	AVG WIND SPEED	HIGH	TIME	DOM DIR
1	15.1	20.9	18:30	11.9	24:00	1.8	0.0	0.35	12.7	34.0	6:30	SW
2	13.7	19.8	13:30	9.9	24:00	3.4	0.0	0.22	7.5	25.0	7:00	SW
3	11.4	14.2	11:00	9.3	4:30	6.5	0.0	0.67	1.8	13.0	12:30	SW
4	14.2	21.3	16:00	6.2	5:30	4.5	0.0	0.02	4.8	20.0	16:00	WSW
5	14.1	20.4	18:30	11.2	2:00	2.4	0.0	0.56	8.7	24.0	6:30	ESE
6	13.5	17.3	13:00	11.7	6:00	3.8	0.0	0.49	7.7	22.0	18:30	NE
7	13.2	17.0	15:30	10.2	24:00	4.7	0.0	0.10	7.1	21.0	12:30	N
8	12.6	18.9	17:00	9.1	2:00	4.3	0.0	0.02	7.8	23.0	10:30	WNW
9	13.0	18.1	15:00	9.9	4:30	4.3	0.0	0.68	6.0	26.0	15:00	SE
10	12.9	15.2	13:00	10.9	24:00	5.2	0.0	0.08	6.3	17.0	3:00	NNE
11	12.3	16.3	16:30	9.8	24:00	5.2	0.0	0.00	7.9	23.0	11:30	N
12	12.3	18.1	16:00	8.3	23:00	5.1	0.0	0.01	4.8	16.0	14:00	N
13	14.2	20.7	14:00	6.8	3:30	4.5	0.0	0.00	5.3	16.0	13:30	W
14	17.0	20.7	15:30	14.2	5:00	0.8	0.0	0.00	7.6	18.0	19:30	W
15	16.1	20.4	17:00	12.3	24:00	1.9	0.0	0.01	9.7	25.0	4:30	NW
16	12.7	16.6	14:00	11.1	3:30	4.4	0.0	0.03	8.3	23.0	18:30	WNW
17	13.7	17.4	14:30	11.7	0:30	3.7	0.0	0.05	7.6	22.0	13:30	WNW
18	14.3	18.7	10:30	11.7	24:00	3.1	0.0	0.08	8.1	23.0	21:00	WNW
19	13.3	18.2	14:30	9.3	24:00	4.5	0.0	0.07	9.1	26.0	9:00	N
20	13.2	19.7	17:30	7.1	6:00	4.9	0.0	0.01	6.2	20.0	18:00	N
21	13.8	19.7	16:00	5.7	5:30	5.6	0.0	0.05	5.6	22.0	20:30	W
22	15.9	20.2	18:00	12.8	24:00	1.8	0.0	0.01	7.1	20.0	10:00	W
23	17.2	24.6	15:30	11.8	1:00	0.1	0.0	0.00	3.6	15.0	13:00	SSE
24	17.2	22.9	15:00	12.9	3:30	0.3	0.0	0.02	5.3	19.0	16:00	ESE
25	17.4	24.2	17:30	14.2	23:30	0.0	0.9	0.01	4.1	15.0	8:00	ESE
26	18.6	25.9	13:30	11.2	6:00	0.0	0.2	0.00	2.0	12.0	16:00	WSW
27	18.9	27.0	16:30	10.2	6:00	0.0	0.3	0.00	2.4	13.0	14:00	S
28	18.1	25.2	15:30	11.2	3:00	0.1	0.0	0.00	5.6	18.0	16:30	ESE
29	16.9	23.5	13:30	13.1	24:00	0.0	0.0	0.93	6.0	24.0	14:30	E
30	16.6	23.0	16:00	12.5	1:00	0.5	0.0	0.23	7.1	22.0	13:00	SSW
31	15.4	20.0	14:00	11.8	1:30	2.4	0.0	0.88	4.8	17.0	17:00	SSE
	14.8	27.0	27	5.7	21	90.0	1.5	5.58	6.4	34.0	1	WNW

Max >= 32.0: 0
Max <= 0.0: 0
Min <= 0.0: 0
Min <= -18.0: 0
Max Rain: 0.93 ON 29/07/08
Days of Rain: 19 (>.01 in) 9 (>.l in) 0 (>1 in)
Heat Base: 18.3 Cool Base: 18.3 Method: (High + Low) / 2

MONTHLY CLIMATOLOGICAL SUMMARY for JUN. 2008

NAME: Cavan Landfill CITY: STATE:
ELEV: LAT: LONG:

TEMPERATURE (°C), RAIN (in), WIND SPEED (mph)

DAY	MEAN TEMP	HIGH	TIME	LOW	TIME	HEAT DEG DAYS	COOL DEG DAYS	RAIN	AVG WIND SPEED	HIGH	TIME	DOM DIR
1	15.9	25.7	12:30	8.6	24:00	1.1	0.0	0.00	3.7	16.0	17:30	E
2	15.5	24.7	14:30	7.7	3:30	2.1	0.0	0.20	3.9	23.0	17:00	SSW
3	13.5	20.3	15:00	7.4	4:30	4.4	0.0	0.00	6.6	23.0	10:30	W
4	10.3	13.8	17:30	6.1	24:00	8.4	0.0	0.37	6.6	25.0	8:30	SSW
5	12.4	18.8	15:00	3.2	4:30	7.3	0.0	0.01	1.9	12.0	16:00	WNW
6												
7												
8												
9	18.2	23.1	17:00	13.3	23:30	0.0	0.0	0.00	10.5	29.0	14:30	NW
10	15.2	20.1	15:00	11.6	5:30	2.4	0.0	0.00	7.2	22.0	17:30	NW
11	12.0	17.1	12:00	8.4	24:00	5.5	0.0	0.12	4.9	16.0	12:00	N
12	11.2	16.8	14:00	7.2	2:30	6.3	0.0	0.02	6.7	21.0	11:30	NNE
13	12.0	18.0	17:00	6.9	5:30	5.8	0.0	0.01	6.0	22.0	14:00	N
14	11.5	18.3	14:30	4.8	5:00	6.8	0.0	0.02	4.2	19.0	15:00	N
15	11.5	17.6	17:00	6.9	4:30	6.0	0.0	0.00	5.1	19.0	14:30	NNE
16	12.2	17.4	10:30	6.8	5:00	6.2	0.0	0.01	4.7	17.0	13:00	W
17	11.2	16.2	15:00	8.3	4:00	6.1	0.0	0.39	10.0	30.0	14:30	WSW
18	12.2	17.3	20:00	8.5	4:00	5.4	0.0	0.04	8.8	28.0	11:30	WSW
19	12.9	18.7	15:00	7.7	5:30	5.1	0.0	0.04	8.5	29.0	15:30	WNW
20	13.1	20.3	18:00	6.1	5:00	5.1	0.0	0.00	5.0	21.0	15:30	WNW
21	10.0	14.1	23:00	6.3	1:00	8.1	0.0	0.57	6.4	27.0	13:30	ESE
22	11.9	13.8	0:30	8.9	24:00	6.9	0.0	0.33	10.6	44.0	13:30	WNW
23	12.7	18.2	13:00	6.9	5:30	5.8	0.0	0.01	3.6	15.0	12:00	W
24	12.5	16.0	12:30	10.6	5:30	5.0	0.0	0.12	6.6	23.0	19:00	S
25	13.9	18.7	15:00	11.3	23:00	3.3	0.0	0.16	14.0	37.0	15:00	W
26	12.7	17.0	11:30	8.8	24:00	5.4	0.0	0.27	9.9	29.0	4:00	W
27	12.9	17.9	15:00	7.7	4:00	5.5	0.0	0.18	8.0	27.0	20:00	W
28	14.4	19.0	14:30	11.7	24:00	2.9	0.0	0.06	10.8	29.0	15:30	W
29	14.0	19.0	14:30	10.3	3:00	3.6	0.0	0.05	10.1	31.0	9:00	W
30	14.4	18.4	17:00	11.7	2:00	3.2	0.0	0.01	10.6	29.0	16:00	SW
	13.0	25.7	1	3.2	5	133.4	0.0	2.99	7.2	44.0	22	W

Max >= 32.0: 0
Max <= 0.0: 0
Min <= 0.0: 0
Min <= -18.0: 0
Max Rain: 0.57 ON 21/06/08
Days of Rain: .16 (>.01 in) 10 (>.l in) 0 (>1 in)
Heat Base: 18.3 Cool Base: 18.3 Method: (High + Low) / 2

MONTHLY CLIMATOLOGICAL SUMMARY for MAY. 2008

NAME: Cavan Landfill CITY: STATE:
ELEV: LAT: LONG:

TEMPERATURE (°C), RAIN (in), WIND SPEED (mph)

DAY	MEAN TEMP	HIGH	TIME	LOW	TIME	HEAT DEG DAYS	COOL DEG DAYS	RAIN	AVG WIND SPEED	HIGH	TIME	DOM DIR
1	8.5	15.5	17:00	4.0	6:00	8.6	0.0	0.09	7.5	27.0	11:30	WNW
2	10.1	15.4	12:00	3.8	4:30	8.7	0.0	0.09	7.8	26.0	13:00	SSW
3	13.5	20.6	16:30	9.1	2:30	3.5	0.0	0.29	13.4	39.0	14:00	S
4	14.3	20.7	17:00	8.7	24:00	3.6	0.0	0.17	8.9	29.0	0:30	W
5	13.6	21.1	15:00	7.1	5:00	4.2	0.0	0.00	6.6	19.0	17:30	SSE
6	14.9	21.2	15:30	8.1	5:00	3.7	0.0	0.00	8.2	24.0	15:30	SE
7	15.8	22.0	15:30	7.9	4:30	3.4	0.0	0.00	6.2	22.0	12:30	SE
8	16.0	21.8	16:00	9.7	3:00	2.6	0.0	0.00	8.6	24.0	11:00	SE
9	12.5	14.1	12:00	11.1	24:00	5.7	0.0	0.04	4.5	13.0	16:00	N
10	12.9	19.2	16:30	10.2	2:00	3.6	0.0	0.03	5.1	15.0	12:30	NE
11	15.2	23.4	14:30	7.5	3:00	2.9	0.0	0.00	2.5	11.0	9:00	E
12	16.4	22.4	14:30	11.1	24:00	1.6	0.0	0.03	7.9	21.0	13:00	E
13	14.9	21.6	14:30	8.9	24:00	3.1	0.0	0.00	6.8	20.0	10:00	ESE
14	12.7	20.4	15:00	6.3	4:00	4.9	0.0	0.00	5.0	16.0	15:30	ENE
15	11.5	18.7	16:30	5.3	24:00	6.3	0.0	0.01	5.4	18.0	14:00	E
16	11.7	21.1	13:30	4.1	3:00	5.8	0.0	0.00	4.5	14.0	17:00	ESE
17	11.2	15.6	13:00	7.7	3:00	6.7	0.0	0.08	5.4	18.0	16:30	ESE
18	11.1	17.0	15:00	3.6	24:00	8.0	0.0	0.04	7.0	20.0	8:00	SE
19	9.8	18.7	12:00	1.3	4:30	8.3	0.0	0.00	5.6	24.0	16:00	SSE
20	9.5	13.7	9:30	4.9	4:30	9.0	0.0	0.03	7.1	24.0	9:30	SSE
21	11.5	16.8	15:00	8.4	23:00	5.7	0.0	0.09	10.1	29.0	13:00	SSE
22	10.9	14.3	15:00	9.1	0:30	6.7	0.0	0.24	8.9	25.0	14:00	SSE
23	13.5	18.4	13:30	9.6	4:30	4.3	0.0	0.01	8.3	24.0	16:30	ESE
24	12.4	18.3	16:30	5.9	24:00	6.2	0.0	0.00	9.6	23.0	11:00	E
25	12.4	19.2	13:00	4.8	2:30	6.3	0.0	0.04	12.3	33.0	14:00	E
26	13.2	18.4	15:00	8.1	5:00	5.1	0.0	0.00	12.9	29.0	14:00	E
27	10.6	15.7	10:30	7.6	5:00	6.7	0.0	0.04	10.4	30.0	14:00	E
28	12.1	16.6	12:00	9.6	0:30	5.3	0.0	0.01	3.8	10.0	9:00	E
29	15.2	21.6	9:30	9.4	24:00	2.8	0.0	0.00	2.6	17.0	17:30	WSW
30	16.0	26.1	14:30	8.8	1:00	0.9	0.0	0.08	2.1	13.0	19:30	ENE
31	13.3	21.6	8:30	11.4	2:30	0.0	0.0	0.00	0.6	6.0	1:00	ENE
	12.8	26.1	30	1.3	19	154.4	0.0	1.41	7.0	39.0	3	E

Max >= 32.0: 0
Max <= 0.0: 0
Min <= 0.0: 0
Min <= -18.0: 0
Max Rain: 0.29 ON 3/05/08
Days of Rain: 15 (>.01 in) 3 (>.l in) 0 (>1 in)
Heat Base: 18.3 Cool Base: 18.3 Method: (High + Low) / 2

MONTHLY CLIMATOLOGICAL SUMMARY for APR. 2008

NAME: Cavan Landfill CITY: STATE:
ELEV: LAT: LONG:

TEMPERATURE (°C), RAIN (in), WIND SPEED (mph)

DAY	MEAN TEMP	HIGH	TIME	LOW	TIME	HEAT DEG DAYS	COOL DEG DAYS	RAIN	AVG WIND SPEED	HIGH	TIME	DOM DIR
1	8.9	12.9	14:00	6.6	22:00	8.6	0.0	0.72	18.3	46.0	11:00	WNW
2	10.5	15.5	16:00	5.6	2:30	7.8	0.0	0.10	7.3	23.0	13:00	WNW
3	11.7	17.1	12:00	8.9	6:00	5.3	0.0	0.00	6.8	19.0	15:30	WNW
4	9.3	14.3	12:00	4.2	21:00	9.1	0.0	0.01	8.3	23.0	10:00	WNW
5	4.7	9.2	15:00	0.0	24:00	13.8	0.0	0.02	11.4	30.0	17:30	NNE
6	2.3	7.6	14:00	-0.9	2:30	15.0	0.0	0.13	12.2	38.0	11:30	N
7	3.2	8.0	14:30	-0.8	5:30	14.8	0.0	0.11	8.3	30.0	12:30	NNE
8	5.6	13.5	14:00	1.5	0:30	10.8	0.0	0.02	3.9	13.0	9:30	WNW
9	5.9	11.0	11:00	1.4	5:00	12.1	0.0	0.01	5.4	18.0	15:00	WNW
10	5.2	10.2	15:30	1.3	6:0-0	12.6	0.0	0.10	7.5	23.0	13:30	W
11	4.2	12.0	12:00	0.4	5:30	12.1	0.0	0.41	5.2	23.0	12:30	W
12	4.3	11.4	13:30	-0.2	5:30	12.7	0.0	0.27	4.5	16.0	14:00	WNW
13	6.6	13.4	14:00	2.1	5:00	10.6	0.0	0.15	6.6	29.0	14:00	N
14	6.8	14.3	16:30	1.5	5:00	10.4	0.0	0.00	5.0	17.0	11:00	N
15	7.2	16.8	17:00	0.2	5:30	9.8	0.0	0.00	4.7	15.0	23:30	N
16	6.7	11.4	12:30	2.1	4:00	11.6	0.0	0.00	10.9	31..0	15:30	SE
17	5.4	9.1	16:30	3.1	8:00	12.2	0.0	0.08	14.1	33.0	10:30	ESE
18	6.8	10.1	14:30	3.1	4:30	11.8	0.0	0.02	13.2	32.0	11:00	ESE
19	7.0	10.7	14:30	3.6	6:00	11.2	0.0	0.00	12.3	28.0	1:00	E
20	6.9	9.2	17:00	4.9	5:30	11.3	0.0	0.08	8.2	21.0	2:00	E
21	8.3	14.2	14:00	4.9	1:00	8.8	0.0	0.00	6.2	18.0	15:00	E
22	9.8	15.9	13:00	4.9	0:30	7.9	0.0	0.21	10.L	25.0	7:30	SSE
23	10.9	17.4	16:00	6.0	3:00	6.6	0.0	0.02	9.4	28.0	18:00	WSW
24	8.9	13.6	13:00	6.4	5:30	8.3	0.0	0.57	9.6	29.0	2:30	W
25	10.8	16.2	15:00	6.9	4:30	6.8	0.0	0.28	12.3	33.0	15:00	WSW
26	11.9	17.3	13:00	5.6	24:00	6.9	0.0	0.02	11.5	33.0	8:30	W
27	10.0	17.8	14:30	4.1	4:30	7.4	0.0	0.01	5.2	17.0	14:30	WSW
28	8.2	15.0	12:00	4.1	24:00	8.8	0.0	0.1.7	5.6	23.0	13:30	WNW
29	7.6	14.7	16:00	1.7	5:00	10.2	0.0	0.08	5.2	21.0	18:30	E
30	8.1	13.7	16:00	4.4	24:00	9.3	0.0	0.02	10.7	23.0	11:30	N
	7.5	17.8	27	-0.9	6	304.3	0.0	3.61	8.7	46.0	1	WNW

Max >= 32.0: 0
Max <= 0.0: 0
Min <= 0.0: 4
Min <= -18.0: 0
Max Rain: 0.72 ON 1/04/08
Days of Rain: 21 (>.01 in) 10 (>.l in) 0 (>1 in)
Heat Base: 18.3 Cool Base: 18.3 Method: (High + Low) / 2

MONTHLY CLIMATOLOGICAL SUMMARY for MAR. 2008

NAME: Cavan Landfill CITY: STATE:
ELEV: LAT: LONG:

TEMPERATURE (°C), RAIN (in), WIND SPEED (mph)

DAY	MEAN TEMP	HIGH	TIME	LOW	TIME	HEAT DEG DAYS	COOL DEG DAYS	RAIN	AVG WIND SPEED	HIGH	TIME	DOM DIR
1												
2	8.1	10.7	18:30	6.1	13:00	0.0	0.0	0.11	14.7	37.0	18:30	WNW
3	1.3	3.2	24:00	0.1	9:00	16.7	0.0	0.08	9.7	27.0	11:30	N
4	5.3	10.3	14:00	1.2	7:00	12.6	0.0	0.02	7.5	26.0	1:30	N
5	6.7	9.4	15:30	3.8	3:00	11.7	0.0	0.01	11.0	28.0	15:30	W
6	7.9	11.1	14:00	3.4	23:00	11.1	0.0	0.39	15.7	42.0	15:00	W
7	5.3	8.8	15:30	2.0	3:00	12.9	0.0	0.18	14.9	39.0	11:30	W
8	6.7	9.8	12:30	2.8	24:00	12.0	0.0	1.27	17.8	52.0	13:30	W
9	3.8	8.2	13:30	0.5	6:30	14.0	0.0	0.25	12.4	40.0	24:00	W
10	4.6	9.9	12:30	0.6	7:30	13.1	0.0	0.61	10.4	41.0	1:00	NW
11	4.4	11.2	12:00	1.9	5:00	11.8	0.0	2.28	17.0	61.0	23:00	W
12	4.9	9.3	16:30	2.3	3:00	12.5	0.0	1.22	17.4	53.0	0:30	WNW
13	4.6	8.2	14:30	1.2	24:00	13.6	0.0	0.24	9.4	34.0	12:00	WSW
14	4.6	9.9	14:00	0.6	1:30	13.1	0.0	0.29	5.6	19.0	15:00	W
15	7.1	8.7	13:30	5.1	24:00	11.4	0.0	0.37	8.7	21.0	18:00	E
16	5.5	9.9	16:00	2.5	21:30	12.1	0.0	0.03	8.5	21.0	2:00	E
17	3.8	10.5	14:00	-1.4	23:30	13.8	0.0	0.00	5.2	19.0	14:00	E
18	2.9	8.8	11:00	-3.6	5:30	15.7	0.0	0.01	3.4	15.0	13:00	ENE
19	4.8	10.7	15:30	-1.4	1:30	13.7	0.0	0.00	5.1	17.0	13:30	N
20	7.5	9.8	15:00	4.1	2:30	11.4	0.0	0.10	13.6	37.0	23:30	NW
21	4.8	9.0	12:00	1.9	24:00	12.9	0.0	0.18	16.9	41.0	3:30	N
22	3.5	7.7	13:00	0.8	24:00	14.1	0.0	0.00	12.8	32.0	11:30	NNE
23	4.7	9.2	14:00	0.9	0:30	13.3	0.0	0.12	11.1	31.0	9:30	N
24	4.4	9.1	13:00	1.0	24:00	13.3	0.0	0.06	6.3	24.0	15:00	N
25	5.2	12.8	14:00	-0.2	2:00	12.8	0.0	0.02	5.4	18.0	11:30	W
26	5.8	12.0	15:00	2.1	6:30	11.3	0.0	0.31	7.3	20.0	16:00	WNW
27	5.6	11.8	15:00	-0.5	6:30	12.7	0.0	0.19	8.6	40.0	23:30	W
28	6.0	10.1	10:00	2.5	24:00	12.0	0.0	0.48	14.0	38.0	1:30	WNW
29	5.3	9.8	14:00	2.1	4:00	12.4	0.0	0.26	12.8	32.0	24:00	WSW
30	7.0	12.8	13:30	1.8	6:30	11.0	0.0	0.01	8.5	32.0	0:30	W
31	7.3	13.6	9:30	1.1	6:00	11.0	0.0	0.07	8.1	37.0	19:30	WSW
	5.3	13.6	31	-3.6	18	369.1	0.0	9.16	10.7	61.0	11	W

Max >= 32.0: 0
Max <= 0.0: 0
Min <= 0.0: 5
Min <= -18.0: 0
Max Rain: 2.28 ON 11/03/08
Days of Rain: 24 (>.01 in) 17 (>.l in) 3 (>1 in)
Heat Base: 18.3 Cool Base: 18.3 Method: (High + Low) / 2

MONTHLY CLIMATOLOGICAL SUMMARY for FEB. 2008

NAME: Cavan Landfill CITY: STATE:
ELEV: LAT: LONG:

TEMPERATURE (°C), RAIN (in), WIND SPEED (mph)

DAY	MEAN TEMP	HIGH	TIME	LOW	TIME	HEAT DEG DAYS	COOL DEG DAYS	RAIN	AVG WIND SPEED	HIGH	TIME	DOM DIR
1	1.1	3.9	11:00	-1.2	19:00	17.0	0.0	0.02	8.6	23.0	0:30	WNW
2	2.4	7.4	24:00	-1.7	8:00	15.5	0.0	0.57	14.0	42.0	22:30	WSW
3	4.5	7.9	3:30	0.5	22:30	14.1	0.0	10.95	15.5	49.0	7:00	SW
4	4.0	9.1	14:30	-0.2	2:00	13.9	0.0	0.25	13.5	44.0	12:00	WSW
5	4.3	6.2	15:00	2.7	2:00	13.9	0.0	0.27	7.2	28.0	7:30	WNW
6	4.4	8.6	14:00	0.3	8:30	13.9	0.0	0.25	8.8	39.0	24:00	SSW
7	11.2	13.9	13:30	7.5	0:30	7.6	0.0	0.14	16.6	33.0	1:00	WSW
8	9.7	10.7	0:30	8.5	16:00	8.8	0.0	2.04	14.6	43.0	6:00	SW
9	9.8	13.3	14:00	6.3	24:00	8.5	0.0	0.00	11.0	30.0	0:30	SW
10	5.6	6.8	0:30	3.6	3:00	13.1	0.0	0.00	3.3	14.0	13:30	S
11	6.0	11.4	15:00	1.7	8:30	11.8	0.0	0.00	5.5	19.0	14:00	SSW
12	5.8	13.4	15:00	0.8	5:00	11.2	0.0	0.00	2.4	12.0	0:30	SSW
13	5.8	14.7	15:00	-0.1	8:00	11.1	0.0	0.00	1.8	9.0	22:30	ENE
14	3.2	5.4	22:30	-0.4	7:00	15.8	0.0	0.01	7.4	23.0	16:30	SE
15	4.9	6.1	12:30	4.1	19:00	13.3	0.0	0.00	6.5	18.0	2:30	SE
16	4.3	10.2	13:30	-0.3	24:00	13.4	0.0	0.00	2.5	11.0	14:00	SSE
17	-1.4	2.3	15:00	-6.1	7:00	20.3	0.0	0.00	1.3	7.0	21:00	ENE
18	-0.4	6.7	16:30	-4.1	24:00	17.1	0.0	0.01	3.4	12.0	14:00	ENE
19	1.1	6.7	15:00	-4.7	1:00	17.3	0.0	0.02	3.3	17.0	13:30	ESE
20	4.8	7.2	16:00	1.8	3:00	13.8	0.0	0.10	9.4	32.0	23:30	W
21	9.1	10.6	14:30	5.9	0:30	10.1	0.0	0.45	19.8	42.0	11:30	W
22	8.5	11.4	12:30	5.1	23:00	10.1	0.0	1.00	18.3	56.0	12:30	WNW
23	8.7	10.5	14:00	5.9	0:30	10.1	0.0	0.64	19.1	40.0	17:30	W
24	5.5	9.0	1:00	1.9	23:30	12.9	0.0	0.13	10.5	33.0	1:00	WNW
25	5.8	9.2	17:30	1.6	0:30	12.9	0.0	2.17	18.6	46.0	22:30	WSW
26	5.8	9.8	12:30	3.6	24:00	11.6	0.0	0.28	15.5	39.0	12:00	W
27	4.9	9.9	13:00	1.4	7:30	12.7	0.0	0.00	5.8	18.0	12:30	W
28	5.4	10.8	14:30	2.0	1:30	11.9	0.0	0.01	6.4	18.0	14:30	W
29	7.6	11.3	16:30	4.3	2:00	10.5	0.0	1.88	20.3	53.0	15:30	WSW
	5.3	14.7	13	-6.1	17	374.1	0.0	21.88	10.0	56.0	22	W

Max >= 32.0: 0
Max <= 0.0: 0
Min <= 0.0: 9
Min <= -18.0: 0
Max Rain: 10.95 ON 3/02/08
Days of Rain: 17 (>.01 in) 14 (>.l in) 5 (>1 in)
Heat Base: 18.3 Cool Base: 18.3 Method: (High + Low) / 2

MONTHLY CLIMATOLOGICAL SUMMARY for JAN. 2008

NAME: Cavan Landfill CITY: STATE:
ELEV: LAT: LONG:

TEMPERATURE (°C), RAIN (in), WIND SPEED (mph)

DAY	MEAN TEMP	HIGH	TIME	LOW	TIME	HEAT DEG DAYS	COOL DEG DAYS	RAIN	AVG WIND SPEED	HIGH	TIME	DOM DIR
1	8.8	10.5	2:30	6.6	22:30	9.8	0.0	0.01	8.0	18.0	11:30	SW
2	5.8	7.1	12:30	2.7	23:30	13.5	0.0	0.00	11.0	29.0	13:30	SSE
3	1.0	3.4	11:30	-3.0	20:30	18.1	0.0	0.00	12.2	36.0	4:30	ESE
4	0.5	4.8	14:30	-3.3	9:00	17.6	0.0	0.16	10.1	32.0	13:00	WSW
5	4.0	6.7	14:00	2.1	22:00	14.0	0.0	0.10	14.8	39.0	6:30	W
6	1.9	5.2	13:00	-0.7	9:00	16.1	0.0	0.67	6.2	24.0	23:30	W
7	3.4	6.1	15:30	1.6	8:00	14.5	0.0	0.05	10.8	29.0	3:00	WSW
8	3.8	8.1	12:00	1.7	19:00	13.4	0.0	0.99	14.8	48.0	18:30	WSW
9	2.5	6.8	24:00	0.4	8:30	14.8	0.0	0.09	12.6	46.0	2:00	W
10	4.4	7.0	0:30	0.6	24:00	14.6	0.0	0.15	9.5	25.0	0:30	WSW
11	0.6	4.2	13:30	-1.3	4:30	16.9	0.0	0.01	4.2	14.0	0:30	W
12	3.3	9.8	24:00	-0.8	1:00	13.8	. 0.0	0.30	8.6	30.0	22:30	W
13	7.2	9.9	0:30	4.3	22:30	11.3	0.0	0.44	9.8	34.0	2:00	SW
14	5.6	8.0	14:00	2.8	24:00	12.9	0.0	0.16	9.7	25.0	17:00	W
15	4.7	7.4	15:30	2.7	23:30	13.3	0.0	0.14	4.3	16.0	15:00	WSW
16	3.9	5.5	14:00	2.7	24:00	14.2	0.0	0.02	4.5	14.0	9:00	SW
17	5.8	7.8	12:30	2.7	0:30	13.1	0.0	0.46	12.4	33.0	10:00	W
18	8.9	12.2	11:30	4.5	4:30	10.0	0.0	0.99	17.1	46.0	11:00	W
19	6.6	7.8	0:30	4.6	9:30	12.1	0.0	0.17	2.9	12.0	1:00	WNW
20	6.4	7.7	6:30	5.6	22:30	11.7	0.0	0.36	2.2	9.0	8:00	WNW
21	5.4	10.6	6:30	0.3	21:00	12.9	0.0	0.89	10.9	43.0	11:30	W
22	6.5	10.4	24:00	0.3	1:00	13.0	0.0	0.28	9.3	24.0	10:30	WSW
23	9.9	11.8	13:00	5.3	24:00	9.8	0.0	0.43	16.6	35.0	8:30	W
24	4.7	8.1	23:30	2.1	7:00	13.3	0.0	0.74	16.6	43.0	23:30	W
25	9.3	10.7	12:30	7.4	0:30	9.3	0.0	5.61	23.0	49.0	18:00	W
26	9.0	10.4	15:00	7.9	22:30	9.7	0.0	1.45	19.8	47.0	2:30	W
27	8.8	12.0	15:30	5.2	24:00	9.8	0.0	0.01	11.4	29.0	3:00	W
28	7.9	10.5	15:30	4.5	8:00	10.8	0.0	0.01	12.6	26.0	21:30	WSW
29	5.9	10.2	1:00	0.5	24:00	13.0	0.0	0.22	8.8	28.0	1:00	WNW
30	3.5	6.6	16:00	-0.2	5:00	15.1	0.0	0.85	14.0	48.0	23:30	W
31	3.2	6.9	3:00	0.4	19:30	14.7	0.0	2.09	20.9	58.0	3:00	WNW
	5.3	12.2	18	-3.3	4	406.4	0.0	17.85	11.3	58.0	31	W

Max >= 32.0: 0
Max <= 0.0: 0
Min <= 0.0: 6
Min <= -18.0: 0
Max Rain: 5.61 ON 25/01/08
Days of Rain: 25 (>.01 in) 21 (>.l in) 3 (>1 in)
Heat Base: 18.3 Cool Base: 18.3 Method: (High + Low) / 2

Corranure Landfill
Waste Licence No. W0077-02

DOCUMENT CONTROL SHEET

Client	Cavan County Council					
Project Title	Corranure Landfill Due Diligence					
Document Title	Closure, Restoration and Aftercare Plan (CRAMP)					
Document No.	MGE0068RR0006					
This Document Comprises	DCS	TOC	Text	List of Tables	List of Figures	No. of Appendices
	1	1	19	1	-	2

Rev.	Status	Author(s)	Reviewed By	Approved By	Office of Origin	Issue Date
F01	Final	M.W.	S.G.	G.C.	Galway	03/08/07

Consulting Engineers

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APPENDICES

1 INTRODUCTION

Cavan County Council is the licencee for Corranure Landfill, Cootehill Road, Cavan, County Cavan. They currently hold the Waste Licence W0077-02 for the facility. RPS Consulting Engineers have been instructed by Cavan County Council to carry out a Closure, Restoration and Aftercare Management Plan (CRAMP) for the landfill facility. This work has been commissioned as part of a due diligence exercise to establish the known future liabilities of Cavan County Council.

The EPA guidance document entitled *'Guidance on Environmental Liability Risk Assessment, Residuals Management Plans and Financial Provisions'* 2006 has been used as a basis for the methodology in preparing this report.

The objectives of the assessment will follow closely these guidelines and will include:

- Evaluation of the existing site (ongoing issues, pollution control, monitoring, non-compliances etc.),
- Consideration of criteria that will be required for a successful closure,
- Estimation of cost associated with successful closure criteria, and
- Plan implementation, updating and review in the future.

While there is no specific requirement to carry out a CRAMP under the current waste licence (W0077-02), Condition 4 of the licence "*Restoration and Aftercare*" does outline details required in decommissioning and restoring the landfill facility at Corranure as follows:

CONDITION 4 - RESTORATION AND AFTERCARE

4.1 The licensee shall restore the facility on a phased basis. The Restoration and Aftercare Plans for the facility shall include the information contained in Section 2.3.8 Closure and Aftercare of the EIS submitted as part of application and shall also include the currently remediated landfill area.

4.2 Within six months of the date of grant of this licence, the licensee shall submit results of an investigation assessment of the impacts on the Corranure and Lismagratty streams from the remediated landfill to include a full sediment and biological assessment. The protocol for the assessment shall be agreed by the Agency prior to the assessment being carried out. The assessment shall include a proposal for further remediation including surface water and groundwater control and abatement as is necessary to prevent pollution of the streams.

4.3 The final height of the facility shall not exceed 129.5mOD (Malin Head).

4.4 Final Capping

4.4.1 Unless otherwise agreed by the Agency, the permanent cap for a cell shall be constructed within twenty-four months of completion of filling in that cell.

4.4.2 Unless otherwise agreed by the Agency, the final capping at Phases 1, 2 and 3 shall consist of the following:-.

a) Top soil (150 -300mm);

b) Subsoils, such that total thickness of top soil and subsoils is at least 1m;

c) Drainage layer of 0.5m thickness having a minimum hydraulic conductivity of $1x10^{-4}$ m/s;

d) Compacted mineral layer of a minimum 0.6m thickness with a permeability of less than $1x10^{-9}$ m/s or a geosynthetic material (e.g. GCL) or similar that provides equivalent protection; and

e) Gas collection layer of natural material (minimum 0.3m) or a geosynthetic layer.

4.5 No material or object that is incompatible with the proposed restoration of the facility shall be present within one metre of the final soil surface levels.

4.6 Where tree planting is to be carried out above waste-filled areas, a synthetic barrier shall be used to augment the clay cap. Combined topsoil and subsoil depths shall be a minimum of 1m.

4.7 The restoration of each of the landfill extension cells (Phases 1, 2 and 3), when filled, shall be undertaken within twelve months of the completion of installation of the permanent cap.

4.8 Soil Storage

4.8.1. All soils shall be stored to preserve the soil structure for future use.

Additionally an amendment to Condition 4 of this licence was issued on the 28th October 2005 by the EPA whereby an additional sub-condition point was added to the licence as follows:

4.9 A final report to include a certificate of completion for the Restoration and Aftercare Plan, for all or part of the site as necessary, shall be submitted to the Agency within three months of execution of the plan. The licensee shall carry out such tests, investigations or submit certification, as requested by the Agency, to confirm that there is no continuing risk to the environment.

The licence requirements as set out above for the landfill facility and all additional closure and aftercare conditions imposed by the EPA in subsequent correspondence with Cavan County Council are relevant to this report.

This CRAMP deals specifically with the closure and aftercare of the remediated (old) landfill and Cells 1 and 2 at Corranure Landfill Facility (Appendix A). The study area for the purpose of this report and unless otherwise stated constitutes these areas only and is referred to as Corranure Landfill for the remainder of this report. Closure of the landfill will include for any related decommissioning, maintenance, monitoring and civils work required to comply with the waste licence and the EPA Manual " *Landfill Restoration and Aftercare"* (1999).

2 SITE DESCRIPTION & EVALUATION

2.1 SITE DESCRIPTION

Corranure Landfill Facility is licenced by the EPA under Waste Licence number W077-02 in accordance with the Third and Fourth Schedules of the Waste Management Act, 1996 - 2005 for waste disposal and waste recovery activities. The different phases of the landfill are detailed below:

Remediated (Old) Landfill

In 2001 remediation works began on this section of the landfill at the south of the existing facility. The landfill was regraded and capped with an impermeable capping system as per the conditions of the original Waste Licence (Reg No. 77-1). Corranure Stream near the landfill was realigned to divert surface water and a leachate interceptor drain was placed around the perimeter of this section of the landfill. Leachate is collected via this drain and is sent to a leachate storage tank. From here it is pumped to a rising main for final treatment at the wastewater treatment plant in Cavan Town. Landfill gas is managed through a series of gas extraction wells that connect up to the gas flare.

Cell 1

Cell 1 is north west of the remediated (old) landfill and was constructed during 2001/2002. This cell was fully lined during construction with a composite lining system consisting of a compacted low permeability clay layer overlain by HDPE. A leachate collection system was constructed for Cell 1 which now collects leachate and conveys it to the leachate tank on site. Gas extraction wells were installed in the Cell at varying stages and are incorporated into the overall gas management system. Cell 1 closed to waste acceptance in late 2005/early 2006 and underwent remediation. The works included the following:

- Regrading the side slopes of the existing waste mass,
- Preparation of existing surface to receive geocomposites including, where necessary, placement of a clay regulation layer,
- Placement of geocomposite gas drainage layer, LLDPE membrane liner and geocomposite surface water drainage layer,
- Placement of subsoil and topsoil, and
- Landscaping

Cell 2

Construction of Cell 2 began in 2004 which like Cell 1 was lined and a leachate collection system was installed. Waste was accepted in this cell from October 2005 to April 2007. Remediation of Cell 2 began in April 2007 and work is due to be completed by August 2007. Remediation of Cell 2 involves the same required steps as highlighted for Cell 1. Cell 2 was connected up to the gas management system in June 2007 following remediation.

Cell 3

A new landfill cell (Cell 3) constructed adjacent to Cell 2 was substantially completed in June 2006. The works comprised the construction of a new 22,000 m^2 composite lined cell. A filling plan for Cell 3 at the landfill was produced, as requested by the Agency. The filling plan includes plans for the ongoing management of landfill gas during the filling of the cell. Horizontal wells will be installed at intervals in the waste and will be connected to a temporary open landfill gas flare which will be used as an odour control method prior to completion of a permanent cap. On completion of permanent capping in each cell, vertical landfill gas extraction wells will be installed in the waste and connected to the permanent enclosed flare.

Closure of this Cell in the future will be undertaken by the private sector facility operator and hence no provision has been made for closure of this cell.

2.2 SITE EVALUATION

2.2.1 Pollution Control Systems

Since landfilling began at Corranure Landfill Facility, landfill technology has advanced considerably and made significant improvements in the protection of the environment. As each cell was developed, more advanced lining and capping systems were installed as detailed above. These systems will be managed and maintained on-site until the EPA approves of their decommissioning. These systems are detailed below.

Landfill Gas Management System

A gas management system operates at the facility which consists of gas extraction wells, pipework and an enclosed gas flare.

There are six gas extraction wells on the remediated landfill with a further seven gas extraction wells in Cell 1. Three horizontal gas wells were installed in Cell 2 following placement of a suitable depth of waste. A further 13 new vertical landfill gas wells were also installed in Cell 2 between March and May 2007. All landfill gas wells are connected to the enclosed flare which has a capacity of 500m^3/hr. A landfill gas analyser on the flare is currently being installed and will be fully operational by the end of July 2007. Resent results suggest that approximately 450m^3/hr is currently being flared.

Leachate Management System

A glass-lined steel leachate tank was installed at the facility in 2006 with a capacity of 1,531 m^3. It is intended that this will be the primary leachate storage unit at the facility. The original lagoon, with a capacity of approximately 270 m^3 is to be used as an emergency overflow to the tank. Therefore, the total available capacity for leachate storage at Corranure Landfill is 1,801 m^3 which exceeds the required storage capacity for 7 days of average leachate generation.

Leachate abstraction wells and interceptor drain remove leachate from the remediated old landfill. Cell 1 was remediated in late 2005/early 2006. Cell 2 is currently being remediated (due for completion in August 2007) and Cell 3 is the active cell.

Surface Water Management System

Surface water from the remediated (old) landfill and Cell 1 drains along the perimeter of the cells towards the south west corner of the site to a culvert beneath the R1888 and into the Corranure Stream. Surface water from Cell 2 drains northwards along the edge of Cell 3 and the proposed Cell 4 to the Lismagratty stream.

2.2.2 Compliance Status

Corranure Landfill Facility should aim to fulfil the requirements of its waste licence. As part of this evaluation, complaints, non-compliances and general observations noted by the public and the EPA are considered here.

Complaints

In 2006, 26 complaints were received by the EPA and Cavan County Council and they all related to odour problems generated from the landfill. In 2005, 10 complaints received were related directly to odour problems.

Incidents

One incident was reported to the Agency on 1st June 2006 with regard to the migration of leachate to the Lismagratty Stream along the south west boundary of Corranure Landfill. The issue was noted on 23rd May 2006 by the Northern Regional Fisheries Board who initially notified the Environment Section of Cavan County Council about this incident who in turn notified the management at the Landfill.

Prosecution

On the 8th December 2005, Cavan County Council pleaded guilty to charges brought by the Environmental Protection Agency in relation to offences under Sections 39(1) and 39(9) of the Waste Management Acts 1996 to 2003 for breaches of its original Waste Licence (Reg. No. 77-1).

The Council admitted breaching conditions of its licence by:

- Failing to install an active landfill gas collection and flaring system,
- Inadequate management of leachate from the landfill, and
- Permitting exceedance of leachate levels.

Cavan County Council was fined €1,900 for their failure to install an active landfill gas collection and flaring system. The other two charges relating to inadequate management of leachate from the landfill were proven and taken into account.

Non-Compliance

All non-compliances relating to Corranure Landfill Facility for 2005 and 2006 have been recorded and are summarized in Appendix B.

3 RESTORATION PROPOSAL

Restoration of the landfill cells will provide for an integrated approach to pollution control. As part of the restoration programme the following pollution control measures are vital to the successful restoration of the landfill in order to protect the environment:

- The landfill capping system acts like a barrier layer and restricts moisture ingress, reduces leachate production and migration of landfill gas.

- The landfill gas management system controls the landfill gas generated within the waste body.

- The leachate management system controls and correctly treats the leachate generated within the waste body prior to discharge.

- The surface water management system ensures that the surface water generated on the restored landfill does not erode the landfill capping, ingress into the waste and affect the underlying groundwater or contaminate the existing streams in the area.

- Fixed monitoring points provide an outlet for monitoring of potential environmental impacts which may be caused by the landfill.

The potential impact of pollution systems on the proposed afteruse and access requirements for monitoring purposes should be continually considered.

Closure and restoration of the landfill will generally be carried out in accordance with the EPA Manual " Landfill Restoration and Aftercare" (1999), Condition 4 of the waste licence and EU Directive 99/31/EC. The fundamental principal of the closure process will be that final cover will be placed and sown or planted on an ongoing basis as the individual landfill cells are filled. To date the remediated (old) landfill and Cell 1 have been successfully regarded, capped and grass has been sown. This has significantly improved the overall site appearance and has also reduced leachate generation in the remediated (old) section of the facility. Capping of Cell 2 is close to completion (August 2007) and grass seed will be sown on this section of landfill as well.

The leachate collection, treatment and disposal system, control facilities (monitoring boreholes) and monitoring points (surface water control points) will be operated and maintained until the waste has stabilised. Monitoring of groundwater, surface water, leachate and gas will continue for 30 years after closure of the facility as recommended in the EU Directive 99/31/EC or as agreed with the EPA.

4 CRITERIA FOR SUCCESSFUL CLOSURE

Successful '**clean closure**' requires that there are no remaining environmental liabilities in existence at the site. In practice, for a facility such as a landfill, monitoring will be required for at least a 30-year-period. Therefore all landfilling areas will be subject to '**non-clean closure**' and an aftercare management plan will have to be maintained as part of this report and its revisions. Table 4.1 outlines criteria that will be required in order to successfully reach a non-clean closure for the remediated (old) landfill, Cell 1 and Cell 2.

Table 4.1 Criteria for Successful Non-Clean Closure for Remediated (Old) Landfill, Cell 1 and Cell 2

Criteria	Action Required
Capping of landfill is complete.	Capping of Cell 2 is close to completion and final cover will be placed and sown as for remediate (old) landfill and Cell 1.
Monitoring parameters for groundwater, surface water, leachate, landfill gas and odour settle to acceptable levels for a continious period of 2 years.	Monitoring frequency can be reduced, however monitoring must continue for these parameters for 30 years after official closure.
Landfill settlement has reduced to non-detectable levels over a 2 year period.	Regular topographical surveys are no longer required once this stage is reached.
Amount of landfill gas produced is no longer sufficient to require a gas flare for a continuous period of 2 years.	Decommissioning of the gas management system will not be undertaken by Cavan County Council as it is required for future landfilling and will not be not under the Councils direct management or ownership.
Leachate concentrations no longer cause a hazard to the aquatic environment for a continuous period of 2 years and leachate levels decrease with no reported outbreaks occurring.	Decommissioning of the leachate management system will not be undertaken by Cavan County Council as it is required for future landfilling and will not be under the Councils direct management or ownership.

Reduction in Monitoring

Monitoring will continue for the parameters as identified in schedule C and D of the waste licence. If monitoring identifies possible environmental pollution, action will be taken to rectify this in accordance with the licence. After parameters settle to normal levels associated with surface water, groundwater, leachate, landfill gas and odour, monitoring will be reduced in

frequency. Subject to meeting relevant criteria the monitoring programme will be reduced on a phased basis.

Identification of On Site Environmental Liabilities at Closure

When a '**non-clean closure**' is being applied an environmental liabilities risk assessment will be carried out in order to assess any outstanding risks which may lead to a potential environmental hazard occurring. The scope of this risk assessment will cover all risks including those to surface water, groundwater, atmosphere, land and human health.

Non Clean Closure Declaration

The remediated (old) landfill and Cells 1 & 2 will be subject to **'non-clean closure'** and a restoration and an aftercare plan will have to be maintained.

5 AFTERCARE MANAGEMENT PROPOSALS

5.1 INTRODUCTION

Cavan County Council will be responsible for the aftercare of Corranure Landfill in accordance with the Waste Management Act 1996 -2005 up until the date when the EPA accepts the surrender of the waste licence. The surrender of the Licence is expected to be some years after completion of final filling and capping at the site. According to Section 48(7) "If *the Agency is satisfied that the condition of the relevant facility is not causing or likely to cause environmental pollution, it shall accept the surrender of the Waste Licence but otherwise shall refuse to accept the surrender of the Waste Licence"*

According to the EPA Manual "*Landfill Restoration and Aftercare*" (1999), the aftercare plan details the operations required after the replacement of the soil to bring the land up to the required standard for afteruse'. Such work will include:

1. Development of the site to its proposed afteruse, through completion of the restoration phase,
2. Environmental monitoring, and
3. Site maintenance.

Section 3 dealt with the proposed restoration of Corranure Landfill as mentioned in point 1 above. Environmental monitoring and site maintenance are discussed in the following sections.

5.2 ENVIRONMENTAL MONITORING

The EPA Manual on Landfill Monitoring, 2nd edition (2003) identifies that monitoring shall continue into the aftercare phase. This will continue until it can be shown that the landfill is no longer posing a risk to the environment.

A limited topographical survey will be carried out within the next two years over the remediated (old) landfill, Cell 1 and Cell 2 to verify if further significant settlement has occurred. Surveys previously completed will also be used to evaluate the structural integrity of the landfill body.

Cavan County Council will have regard to the conditions of the waste licence, the EPA Manual on Landfill Monitoring, 2nd edition (2003) and Annex III of the EU Landfill Directive, which outlines control and monitoring procedures in the aftercare phase to check "that *environmental protection systems are functioning fully as intended".*

A new telemetry system was installed at the landfill in 2006. The purpose of this system is to control the landfill gas and leachate management system. It include the upgrade of the control system at the administration building to include connection of the existing control panel to a new, dedicated desktop computer.

During the aftercare phase the operator will examine all monitoring equipment on a monthly basis to identify where maintenance works are required. The operator will ensure that all works undertaken have minimal impact on the afteruse of the restored site.

5.3 FACILITY MAINTENANCE

The pollution control systems highlighted in Section 2 will be operated and maintained until the waste has stabilised. If maintenance or remedial works are required on the pollution control systems after full restoration has occurred, the following measures will be implemented to ensure minimal impact on the proposed afteruse:

- All operations will be supervised to minimise damage to the restored land. Work will progress only when soil conditions are suitable,
- A minimal practical working area and suitable access will be used to reduce disturbance, and
- Machinery and plant that will cause minimum soil compaction will be used.

Construction records of all underground systems will be kept for reference to prevent damage during works on-site.

Once the landfill is closed successfully, after meeting the criteria of the waste licence and proposed restoration plan, the landfill can revert to grassland.

Any proposed changes to the restoration and aftercare plan shall be agreed with the EPA prior to implementation. The operator will notify the EPA of any significant adverse environmental effects revealed by the monitoring procedures in the aftercare phase.

Surface Profile and Capping System

In the event that maintenance to the capping system is required, it will be ensured that the repaired cap is properly sealed to prevent the ingress of water and the various layers are re-laid. The effectiveness of the drainage system will be monitored and any remedial works to the drainage layer or surface water collection system will be carried out where required.

If required the operator will employ soil specialists to undertake soil maintenance checks to assess the physical and chemical status of the soils.

Surface Water Control

All drainage ditches and outfalls carrying run-off from the site will be regularly checked to ensure effective surface water flows are being maintained. Any depressions created through settlement will be re-profiled to ensure surface water run-off.

Gas Management System

During the aftercare period the maintenance of the gas management system shall include:

- Regular monitoring of boreholes and gas wells, and
- Monitoring of the gas flare for combustion efficiency, and emissions.

Performance and gas yield will identify areas where maintenance works are required. Any remedial work required for wells and pipework will be carried out in a manner with minimal impact on the proposed afteruse.

Decomissioning of the gas management system will not be undertaken by Cavan County Council as it is required for future landfilling activities that will not be under the Councils direct management or ownership.

Leachate Management System

Leachate monitoring will include regular checks of the leachate monitoring points. Any remedial works or modifications to the leachate system, including collection, treatment and monitoring systems, will be carried out with minimal impact on the afteruse.

Decommissioning of the leachate management system will not be undertaken by Cavan County Council as it is required for future landfilling and will not be under the Councils direct management or ownership.

A surface water management plan will be implemented as part of the final capping to prevent the ingress of water.

Landscaping

The long-term aftercare of the site will required vegetation management. This will require fencing, cutting, fertilising and replanting in area where vegetation may not be flourishing.

Security

To protect against vandalism the operator will ensure that the security fencing and gates are maintained adequately given the afteruse at the site.

Infrastructure

All pathways and access points associated with the afteruse of the site will be checked regularly to ensure their integrity and maintenance work will be carried out if required.

6 COSTS

6.1 FINANCIAL PROVISIONS

In accordance with Condition 13.2 of the waste licence, Cavan County Council are required to establish, maintain and review a fund that is adequate to assure the EPA that they are financially capable of implementing the restoration and aftercare plan required by Condition 4.

6.2 COST OF RESTORATION & AFTERCARE PROPOSAL

The estimated costs for the restoration and aftercare of the landfill are supplied below. These costs are based on typical estimates for 2007 and are shown in Table 6.1. As capping of the remediated (old) landfill and Cell 1 are complete these costs are excluded from Table 6.1. As the capping of Cell 2 is near completion (August 2007), 20% of the overall capping contract cost is included here. A timescale of 30 years (2007-2037) is used in developing these costs. A contingency of 25% has also been included.

Table 6.1 "Known Costs- 2007-2037

Item	Description	Cost Estimate (Euro)
Site Maintenance	General management and maintenance of site during the aftercare phase (30 yrs).	€300,000
Environmental Monitoring	- Groundwater - Surface water - Leachate - Landfill gas - Topographical survey	€600,000
Systems Maintenance	- Surface Water Management System - Landfill Gas Management System - Leachate Management System - Telemetry System	€2,000,000
EPA Liaison	Continued reporting for Waste Licence Compliance e.g. AER's, Quarterly Monitoring	€300,000

	Reporting etc.	
Landscaping	- Seeding of capped Cell 2 - Planting of trees - Fencing, cutting, fertilising and replanting in area where vegetation may not be flourishing	€10,000
Restoration of Cell 2	Capping of Cell 2 is close to completion. Therefore an estimated 20% of overall cost is for future remedial works to this cell.	€ 100,000
Contingency (25%)		€827,500
Total (Excluding VAT)		**€ 4,137,500**

7 CLOSURE PLAN UPDATE REVIEW, IMPLEMENTATION & VALIDATION

7.1 PROPOSED SCOPE & FREQUENCY OF REVIEW

The scope of this report is to describe the facility and to outline the closure, restoration and aftercare proposals in relation to the criteria required, management issues and costs. All revisions to this report will update any new proposals in relation to closure, restoration and aftercare management and associated costs and logistics.

This report will be reviewed on an annual basis and updated as required by the licence. The review will check if restoration proposals that were scheduled, were carried out. If scheduled proposals for restoration and aftercare were not carried out, the review of this report assesses if proposals need to be changed and to formulate a new programme for carrying out proposals.

7.2 EPA NOTIFICATIONS

The Plan will be maintained and reviewed annually and proposed amendments will be notified to the Agency for agreement as part of the Annual Environmental Report (AER). No amendments will be implemented without the prior written agreement of the Agency.

7.3 CLOSURE VALIDATION AUDIT & REPORT

Upon closure of the facility a closure validation audit will be carried out by an independent consultant. The audit may be carried out for each distinct area separately and then a final audit will be carried out upon closure of the entire facility.

A final validation report, which will include a certificate of completion for the CRAMP for the facility, will be submitted to the Agency within three months of execution of the plan. Monitoring results and necessary investigations and tests will be carried out to confirm that there is no continuing risk to the environment. This will follow requirements as set out in Section 4.9 of the Waste Licence (as amended).

8 CONCLUSION

This Closure Restoration and Aftercare Management Plan for Corranure Landfill, Co. Cavan, has been prepared using The EPA guidance document entitled *'Guidance on Environmental Liability Risk Assessment, Residuals Management Plans and Financial Provisions'* 2006 as a basis. This CRAMP meets the requirements of the EU Council Directive (1999/31/EC) on the Landfill of Waste.

This Plan is a working document that is held on site at Corranure Landfill Facility for continual review and comment.

APPENDIX A

Map of Relevant Area of Landfill

APPENDIX B

Non-Compliances & Observations

Summary

Main Issues Non-Compliance & Observations	Reoccurrences for 2005/2006/March-2007	Summary
Monitoring	**18**	Issues include inadequate interpretation of quarterly monitoring reports, no investigation into causes of contamination, limited monitoring of landfill gas, no monitoring of flow/volume of leachate at P6V6 going to sewer.
Landfill Gas Management	**16**	The gas flare continues to be non-operational. Problems include condensation build up, not enough gas getting to the flare, high levels of leachate. Despite the remediation of Cell 1 and the provision of additional gas wells the situation has not improved.
Nuisances noise, dust, flies, birds, litter	**12**	This included a noise emission from a machine with a broken exhaust during dry spells additional spraying for flies and roads to reduce dust is required. The EPA also stated no bird control programme was evident. Bird control measures should be reviewed for effectiveness.
Leachate breakouts & leachate pumping & levels	**15**	Leachate has broken out from the landfill cells and has entered the Corranure and Lismagratty Streams on several occasions. An Incident of leachate discharge on May 23rd 2006 was discovered by the Fisheries Board. These leachate breakouts are due to the high level of leachate in the cells. Despite the increase in leachate pumping and new pumps being provided in the restored landfill, pumps installed in gas wells, replacement pumps being provided, additional leachate boreholes being installed in the vicinity of the leachate breakouts there continues to be a problem with leachate runoff.

Cover material (daily and intermediate)	**4**	The EPA has raised the issue of insufficient daily and intermediate cover on a number of occasions. This is a landfill management issue in the main and awareness of the operators.
SW Management and Drainage	**5**	There was evidence of surface water runoff with suspended solids from the landfill site. The surface water management system should be reviewed in general on the site and associated with the construction of new cells. Clean water is also being treated as leachate.
ELV Exceedance	**2**	The trigger level for CO2 was exceeded at a perimeter gas monitoring well and non-reporting of incidents.
Odours	**14**	Local residents have complained to the EPA about the odour issues and the EPA has also noticed strong odour of landfill gas prior to entering the facility.
Working Face	**5**	Non-compliances and observations included the working waste face was two large in size, lack of inspection of the waste face and safety of work at the waste face (all noted by the EPA over the past 2 years).
Wheelwash	**3**	The wheelwash at the facility was not working on three separate occasions.
General Procedures, Facility Management and Record Keeping	**22**	Issues relating to waste records, waste collection permit records, notification of incidents, storage in inappropriate locations, lack of cover on waste, lack of procedures in carrying out odour assessments, waste inspection and acceptance procedures.

Health Report

on the

Extension of Corranure Landfill

Corranure, Co. Cavan, Ireland

by

Dieter Schrenk

MD PhD, Professor of Toxicology

University of Kaiserslautern
Food Chemistry and Environmental Toxicology
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2003

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A. Introduction

Corranure Landfill is located within the townlands of Corranure and Lismagratty adjacent to the Cavan-Cootehill Road (R188) approximately 3 kilometres North-East of Cavan Town.

The site is approximately 8 ha in size and consists of a new lined cell receiving waste since March 2002 and the previous capped landfill which was closed before the end of 2001. The old landfill is adjacent to the road and the new lined cell Is located directly behind.

The new cell is fully lined and has a leachate collection system where all leachate generated is pumped to the wastewater treatment plant in Cavan town for final treatment. The new facility began to accept waste on March 11th, 2002, the Civic Amenity Facility opened in February 2002.

According to the Waste Licence 77-1 for Corranure Landfill (EPA, 2001) the landfill is licensed to accept household waste, commercial waste, non-hazardous treated sludges, industrial non-hazardous treated sludges, cleansing waste, construction and demolition waste and biodegradable waste for composting. However treated sludge waste is no longer accepted for disposal and composting has not been initiated at the landfill to date.

Wastes that will not be accepted at the landfill facility include the following: Animal by-products, excrements and remains, silt and dredgings, untreated sludges, oil/water mixtures, septic tank waste, hazardous waste as defined by the European Waste Catalogue & Hazardous Waste List.

An extension at the Western boundary of the existing landfill is proposed to provide additional disposal capacity.

B. Existing landfill - Monitoring

Monitoring of leachate, surface water and groundwater quality in the vicinity of the landfill, and air and noise quality measurements are part of the assessment of the potential impact of a landfill on human health. In order to obtain more insight in the possible effects of the extension area on human health, these parameters are discussed here in detail, partially based on data obtained from the current landfill.

1. Leachate

Within the proposed extension area, all leachate will be collected and pumped to the on-site leachate storage lagoon. This collected leachate will be pumped via a resing main to the wastewater treatment plant in Cavan Town for final treatment. As yet no leachate has been directly monitored at Corranure Landfill (apart from the discharge point at P6/V6) but four leachate extraction monitoring boreholes have recently been installed at the site (L/G01-G04) and will provide for future monitoring data on the leachate generated.

2. Surface water

Landfill and adjacent area

Information on surface water quality is available from Appendix K, Volume 3 of the EIS. The four sampling points (K1 -K4) are located on the Corranure Stream and one sampling point (A2) is located on the Analee River. The data from 1999, sampling point K2, show relatively high levels of electrical conductivity, ammonia, COD, BOD, chloride, calcium, manganese, potassium, sodium, alkalinity, magnesium, and total organic carbon. The levels of the highly toxic metal cadmium were below or in the range of the limit of detection, chromium was present in the range of 0.003 - 0.056 mg/l. At sampling point K3 a number of these parameters were still above the standard limit, though to a much smaller extent. These data indicate that the Corranure Stream was contaminated by the existing unlined landfill. The surface water quality did not allow its direct use as drinking water and was likely to facilitate the growth of micro-organisms and algae. Measurements from 2000 show a marked improvement in water quality, in particular at sampling point K2. In 2002 and 2003 only a slight - moderate contamination with ammonia levels in the range of 1 - 45 mg/l was monitored. The water quality does not allow the direct use of the water at K2 (or K3) as drinking

water. With the exception of such use, the levels currently found do not represent a danger for human health.

An additional impact of the extension area on water quality is not to be expected since the new cells will be fully lined to prevent any transfer of contaminants into the surface water system.

3. Groundwater (boreholes)

Ground water monitoring is currently being carried out at a borehole north of the current landfill site (SA1) and from a number of private wells. Three new groundwater monitoring wells have recently been installed at the landfill.

The monitoring data reveal that most private wells show an acceptable water quality with ammonia levels below 0.03 mg/l which is assumed to represent the limit of detection of the method used. Slightly higher levels were found in SA1 and in **a** few private wells. Most other parameters were in the normal range except for total and fecal coliformic bacteria. The borehole SA1 to the north of the current landfill site and a few private wells showed levels of faecal coliformic bacteria which indicate poor microbial quality. All of the private wells and groundwater boreholes are upgradient of the current landfill except for PW05 and PW15 which are located downgradient. The groundwater quality at private well PW15 is acceptable however private well PW05 showed poor microbial quality. An alternative supply of water was provided by Cavan County Council at this location. A relationship between the remaining borehole/wells with poor quality and the landfill is not a likely consideration as the main groundwater flow direction is considered to be from the north east to the south west. Farming and septic tanks are likely to be the sources of these contaminations.

4. Landfill gas

In general, landfill gas is the product of microbial degradation of organic material, a major constituent of municipal waste. The major products of this degradation process are carbon dioxide, water, and methane. These products are non-toxic or exhibit a very low toxicity to humans and higher organisms. In addition, minor components are formed such indoles, hydrogen sulphide, organic amines etc.

Some of these products show higher toxicity when compared to the major products. They are formed, however, at much lower concentrations, and are further diluted when leaving the waste. Usually, their concentration in the vicinity of a municipal waste landfill is far below the threshold of acute or chronic toxicity. Nevertheless, these compounds may cause problems because a few of them have a strong odour. This odour can affect people, i.e, cause relevant nuisance. Means to reduce odour include covering of waste with appropriate material (partially adsorbing odorous compounds), and collection of landfill gas. In usual landfill technology, gas is not collected completely. However, even partial collection of landfill gas can contribute substantially to the reduction of odour. Furthermore, methane, and to a lower extend, carbon dioxide, contribute to the so-called green-house effect, i.e., they absorb and or reflect solar radiation and convert it into thermal energy residing in the lower atmosphere. As a result, air temperature rises. Keeping in mind, however, that a large portion of the organic waste contains renewable carbohydrates such as paper, wood, plant fibres, food left-over etc. the role of landfills in generating additional carbon dioxide is minor. Methane is a more effective cause of the greenhouse effect, but is formed in minor amounts when compared to other sources. In summary, however, the use of landfill gas for power generation is recommended because of the following advantages:

- it reduces the amount of (odorous) gas released from the landfill
- it reduces the amount of methane released from the landfill
- it generates power from a (mainly) renewable source.

At Corranure landfill, gas is currently monitored in two wells (W7 and W8). Furthermore, three new boreholes are to be used for gas monitoring (GW01-GW03). Parameters measured are: methane (% v/v), carbon dioxide (% v/v) and oxygen (% v/v).

According to the Cavan County Council, it is anticipated to collect and flare the landfill gas in the future. Possible utilisation of gas will be examined at a later stage.

5. Air quality

In general, a landfill for municipal waste can affect air quality in several ways, mainly by the release of dust and the generation of landfill gas and odour. The vicinity of Corranure landfill mainly comprises grassland, wetlands, and small forests as well as housing areas and roads. Usually air quality in such an area is characterized by so-called background values for rural areas (see Section C). The release of dust from movements of heavy vehicles on the landfill area and outside is anticipated to be a source of dust. A wheelwash facility will be used to remove particulate matter from vehicles. Furthermore, site roads and other areas used by site vehicles will be sprayed with water under dry weather conditions. Dust is monitored three times a year twice during the period May to September using the Standard method as outlined in Waste Licence 77-1. The formation of aerosols form leachate is unlikely since leachate will not be treated on the site, e.g., by aeration. For the aspect of odour please refer to Section B4 on landfill gas.

6. Noise

A recent noise report by Enterprise Ireland (2003) measured the parameters L-Aeqj, $L_{AOI.T}$, $U_{IO.T}$, and $L_{A}9_{O,T}$- The L_{Aeq} levels in the range of 51-52 dB(A) at location NSL1 (house located c. 180 m from the proposed extension) were due to landfill operation with a small number of passing vehicles. The measured noise level of L_{Aeq} of 44 dB(A) at location NSL2 (house located c. 430 m from the proposed extension) was principally due to distant traffic. The landfill activity was not audible at this location. The level measured at NSL1 was below the WHO Guideline Value for housing areas (outdoor) of 55 db(A).

The proposed landfill extension will move away the area of activity from the nearest Noise Sensitive Location. Furthermore, the cell walls and capped cells to the south of the current activity may provide a significant attenuation effect for the residences near this boundary. Nevertheless, the use of compactors with attenuated noise emission is recommended.

C. Existing Environment

1. Human health status in the North Eastern Health Board Region

According to the Irish Health Statistics 2002 (Section B, Life Expectancy and Vital Statistics), life expectancy at birth is slightly lower in Ireland (79.2 years for females, 73.5 years for males) than EU average (female 81.3 yrs, male 75.0 yrs). The standardised mortality rate for Ireland was at 734.3 per 100 000 population in 2001. The value for the North Eastern Health Board/Region was in the same range.

Overall, men and women had similar risks of developing cancer, although men were more likely to die from it. Older people were much more likely to develop cancer, with the risk doubling in every successive decade of life. Between 1994 and 1998 there was no significant change in the risk of developing or dying from cancer. Although some cancers showed trends of increase or decrease with time, the overall pattern was of an unchanged risk.

A comparison of age-standardised mortality rates for overall causes of death and a number of major causes nationwide and in the North Eastern Health Board is given in Table 1.

Table 1. Age-standardised mortality rates for Ireland in comparison to the North-Eastern Health Board/Regional Authority

Parameter	Ireland	North-Eastern
total mortality	**734.3**	**730.1**
all circulatory system diseases	286.8	278.3
ischaemic heart disease	150.2	156.9
stroke	60.9	53.3
all malignant neoplasms	198.0	197.6
trachea, bronchus and lung	39.4	38.2
female breast	35.2	32.1

Whereas the mortality from ischaemic heart disease was slightly higher than the Irish average, no increased mortality for all cancers, neoplasms of the trachea, bronchus and lung, and neoplasms of the female breast were observed.

A detailed analysis of the incidence of individual types of cancer (National Cancer Registry, 2001) shows that the incidence of colorectal cancer in the North Eastern Health Board did not differ significantly from the national average. For female breast cancer and lung cancer (male and female) the age-standardised incidences in the North Eastern Health Board were significantly below the national average. No significant differences were observed for other cancer localizations except for stomach cancer in females being above the national average. In summary, the statistics show that the overall incidence and mortality from all cancers combined and from most types of cancer in the North Eastern Health Board are in the same range or below the values for the rest of Ireland.

In 1998, the infant mortality rate (per 1000 live births), and neonatal mortality rate in the North Eastern Health Board were slightly below, the perinatal mortality rate and the stillbirth rate slightly above the national average (Health Statistics, 1999).

2. Air quality

For Ireland, typical rural levels of relevant airborne contaminants were taken from the Annual Report on Air Quality Monitoring (EPA, 2001 b).

Tab. 2. Mean values for relevant air contaminants in rural areas in Ireland

Contaminant	Range (ug/m^3)
Sulphur dioxide (SO2)	4-8
Nitrogen dioxide (NO2)	3 - 9
Nitrogen oxides (NO_x)	5-11
Ozone (O3)	62-72

Sulphur dioxide and *nitrogen oxides* are typical products of incineration processes, e.g., released from heating or automobiles. For *ozone* the situation is much more complicated since rural areas may show even higher levels than suburban, urban and /or industrialized areas. A major reason for this finding seems to be the fact that UV irradiation is a major factor in ozone formation. Likewise, strong air pollution, e.g. by particulate matter, can even suppress ozone levels by absorbing UV-light and/or by reacting with the ozone formed.

Particulate matter (PM) usually shows higher levels in industrialized urban areas, traffic and heating being major sources of PM. In rural areas, however, PM can also reach high levels under certain circumstances. For example, pollen can lead to seasonal peaks in PM air levels, while agriculture/farming is another major source of PM in rural areas.

There is no indication for any special source of air contamination in the Corranure area. It can be expected that the levels for all relevant air contaminants are in the range typical for rural areas of this type.

D. Impact and mitigation measures

1. General

In the landfill completed cells will be progressively capped and restored. The extension will be situated and designed so as to meet the necessary conditions for the prevention of the pollution of the soil, groundwater and surface water and to ensure efficient collection of leachate in accordance with the EU Directive on Landfill and Waste (99/31/EC), the EPA manuals on 'Landfill Site Design' and BAT principle (Best Available Technology).

2. Impacts and mitigation during the construction phase and during operation

Leachate

Leachate from municipal waste landfill is usually contaminated with nonpathogenic micro-organisms, inorganic salts such as sodium chloride, and products of the biological degradation of organic material. The provision of a composite lining system within the cell will ensure that the groundwater reservoir will be protected from leachate contamination. The occurrence in the leachate of

specific more toxic compounds such as heavy metals, organic solvents or biological toxins in trace amounts cannot be excluded completely. The complete collection of leachate, however, does exclude even trace amounts of such chemicals from entering the groundwater.

All leachate will be pumped to the rising main and transferred to the wastewater treatment plant at Cavan. This will have no impact on health quality of the population living in the vicinity of the landfill or on the environment.

Landfill gas

Landfill gas contains the gases carbon dioxide and methane as major constituents. Both gases show extremely low toxicity and are natural constituents of the lower atmosphere. Both gases are contributors to the so-called green house effect which was related to global heating. The major source of carbon dioxide is the burning of fossil fuels such as coal, oil, petrol and natural gas used for heating, power generation, and in automobiles.

Landfill gas also contains trace amounts of other gaseous compounds generated during the microbial degradation of organic waste. Some of these compounds, though not occurring in toxic concentrations, can be sensed by humans because of the low smelling threshold for such compounds, e.g., for hydrogen sulphide. Odour, it most instances, does not represent any direct harm to human health but can be very disturbing. Therefore, landfill gas should be collected as completely as possible. Currently, gas is not collected. However in the near future gas will be collected and flared. The possible utilisation of landfill gas for energy generation will be examined at a later stage. Flaring or generation of electric power may destroy most if not all smelling organic constituents converting them to carbon dioxide and water. Both the current practice, and collection (and use) of landfill gas for the generation of power will have no impact on human health.

Groundwater protection

Groundwater in many areas is a major source of drinking water. The quality of groundwater, therefore, has to be protected rigorously. In addition, many plants and other organisms as well as part of the surface water depend on groundwater reservoirs. The lining of the extension of Corranure landfill will prevent any

leachate from reaching groundwater thus making sure that groundwater quality, human health, and the environment will not be affected by the extension.

Control of rodents

Rodents can be harmful since they may transfer pathogenic viruses, micro-organisms, parasites etc. and may, therefore, represent an important factor for the spreading of various disease. Control of rodents is a mandatory prerequisite for any landfill.

A commercial pest control company will be contracted if required to avoid the occurrence of any rodents which may affect human health or the environment. Furthermore, the tipping face is kept as small as possible, the waste is compacted regularly, the tipping area is covered every evening with Geo-Hess cover material, and all areas except the tipping area are covered with 300 mm of soil.

Control of birds and flies

To prevent the occurrence of birds and flies, the tipping area will be kept as small as possible, and will be covered every evening with Geo-Hess cover material. Furthermore, the waste will be compacted and covered with 300 mm of soil after deposition.

These measures will help to prevent access of birds and flies to the waste. Furthermore, Bird Control Ireland Ltd. has been appointed to control birds by the use of bird control equipment and by two falcons on site.

During fly season a licensed insecticide will be sprayed on tipping area, offices, machinery and residents' houses as appropriate or required.

Dust and odour

Dust originating from landfills usually contains organic and inorganic particles such as cellulose, salts, oxides etc. In addition, micro-organisms and spores may be found in landfill dust. No specific diseases originating from exposure to dust have been reported from the vicinity of well-maintained landfills.

Nevertheless, any avoidable exposure to dust should be prevented by appropriate measures since, in general, particulate matter is discussed as a contributing factor in the development of diseases of the inhalation tract such as asthma, chronic bronchitis and allergic reactions.

To avoid this, the waste will be covered at the end of each day to prevent any litter or waste dispersal by wind. Furthermore, during dry weather, site roads and other areas used by site vehicles are sprayed with water.
To avoid odour, the tipping face will be kept as small as possible, the waste will be compacted, the tipping area will be covered every evening with Geo-Hess cover material, and waste lorries will be appropriately covered on site.

Contamination of local roads

All HCVs leaving the landfill go through a wheelwash station to prevent any transfer of contaminated material to the local road network. Contamination of local roads will be kept to a minimum. No impact on human health is to be expected.

Traffic

A new traffic report based on data from 2003 comes to the conclusion that the number of daily vehicular movements generated by the landfill was 242 including 68 HGV movements. These movements took place on a regional road (R188). The busiest hour of the day was 12.00 to 01.00 pm where 36 landfill generated movements including 12 HCV movements took place. The peak hour for non-landfill related traffic was between 09.00 and 10.00 am. It is concluded that the landfill traffic will not have a large impact on peak hour flows on R188. The AADT was predicted as 2519 (306 HCV) in the Cootehill direction and 3051 (307 HCV) in the Cavan direction.

Monitoring

All parameters listed in the EPA licence will be monitored as part of an ongoing monitoring programme.

E. Residual Impacts

Data from the existing landfill suggest that the original landfill has had some impact on surface water quality. This is mainly reflected by the rise in salts including ammonia downstream of the landfill in Corranure stream. Poor groundwater quality is considered to be due to other sources of pollution. Due to

complete collection of leachate, it is not expected that the extension will have any adverse effect on groundwater or surface water quality.

The generation of noise as measured did not exceed WHO guidelines. Nevertheless, the use of equipment with attenuated generation of noise is recommended.

Effects on air quality will not lead to any concentrations of airborne contaminants which could affect human health. Nevertheless, the collection of landfill gas for flaring or the generation of power is recommended in order to further minimize the release of odorous components of landfill gas.

The impact of landfill traffic on overall traffic on R188 is expected to be negligible.

F. Non-technical Summary

Corranure landfill currently consists of a capped cell and a current filling cell (Phase 1). Phase 2 which will incorporate a new cell will be operational in the year 2005. The proposed extension area to which, this EIS and Waste Licence Review refers to will consist of two new cells which will be known as Phase 3. Phase 1, Phase 2 and Phase 3 have been and will be constructed according to national and international standards.

These Phases contain cells lined with a composite lining system, which prevents the transfer of any leachate into the groundwater or surface water, the regular compaction and coverage of waste, control of birds, vermin and flies, and measures to reduce dust, litter and noise.

A monitoring programme will be carried out to control any impact of the extension area on groundwater, surface water, and air quality and on dust release. Estimates of the future impact do not suggest a relevant effect on traffic.

The collection of landfill gas for flaring or power generation is recommended in order to reduce odour and the release of the greenhouse gas methane. The use of equipment with attenuated noise release should be considered.

The health status in the North Eastern Health Board was found to be within the usual ranges for rural regions of Ireland and/or comparable areas. No indication for a specific effect of the landfill on human health was found.

In summary, no relevant effects of the development of the proposed extension area on human health in general and on the health of residents living in the vicinity of the landfill in particular can be expected.

G. Bibliography

Enterprise Ireland (2003) Report 134703; Environmental Impact Study, Noise and Vibration Aspect. Environmental Protection Agency (2001a) Waste Licence 77-1 for Corranure Landfill, Cootehill Road, Cavan, Co. Cavan. Environmental Protection Agency (2001b) Air Quality Monitoring. Annual Report 2001. Health Statistics of Ireland (1999) Department of Health and Children. National Cancer Registry (2001) Fifth Report on Cancer in Ireland.

Submission to Cavan County Council

in respect of a

Road Safety Audit

for

The Provision of a Waste Recovery & Biological Treatment Facilities at Corranure,

Co. Cavan

Prepared by:

Frank Burke & Associates
Consulting Engineer
Baldara
Trim Road
Navan

For
Oxigen Environmental Ltd.
Corranure Landfill
Cavan

August 2008

Safety Audit for Proposed Waste Transfer Station at Corranure Landfill, Cootehill, Road, Cavan.

1.0 Introduction

1.0 Frank Burke and Associates in association with James Lynch Consulting Engineering Ltd. were engaged by Oxigen to carry out a road safety audit on the impact of a proposal to construct two new waste treatment facilities at Corranure, Cavan on the Cootehill Road. ***The request arises from a request from Cavan County Council in respect of a proposed planning application for a biological treatment facility (BTF) and a waste recovery facility (WRF) at the Corranure Landfill***

1.1 In relation to this issue, the request from the council required that the submission for planning be accompanied by a an Environmental Inpact Statement and a ***Road Safety Audit***

1.2 The background study and safety audit was carried out by me, Frank Burke Chartered Engineer of Frank Burke & Associates, Consulting Engineers of Baldara, Trim Road, Navan. I am a former Louth County Engineer with over twenty years experience in road design and construction. I was involved in a number of major road projects at a senior level including the Navan Inner Relief Road, Clonee Bypass, Dunleer Bypass, Dunleer Dundalk Motorway etc.

1.3 The recommendations of the Audit were checked by James Lynch, Chartered Engineer of James Lynch Consulting Engineering Limited of 85 Brookfield, Mullingar, Co. Westmeath. He is a former Kildare County Engineer with over twenty years experience in road design and construction and was involved in a number of major road projects at a senior level including the Navan Inner Relief Road, Clonee Bypass, Kildare Bypass, Celbridge Interchange, Moone/Timolin Bypass etc.

1.4 This report describes a stage 1/2 Road Safety Audit

1.5 Background research for the analysis included an examination of the documents relating to the proposed scheme supplied by Oxigen together with a site visit carried out on the 4th of July last.

1.6 The proposed development includes for the provision of the waste facilities and associated works opening onto the existing internal access road to the landfill, the latter accesses the R188, a regional road linking Cootehill and Cavan Town. The entrance to the landfill is located outside the speed limit for Cavan.

1.7 The stage 1/2 audit was carried out in accordance with the relevant section of NRA HD 19/01. In this regard, only those issues within the layout relating to road safety implications of the existing entrance to the complex

in which the facilities are to located were considered.

1.8 Appendix A contains photographs illustrating various features of the existing road in the vicinity of the proposed entrance, which is the subject of this report.

2.0 Safety Issues Arising From the Audit

2.1. The existing entrance arrangement as shown in the photographs incorporates a right turning lane that also serves a land, which is located adjacent to the existing entrance to the landfill.

2.2 We would consider the existing entrance adequate but would endorse the following recommendations, set out in the Traffic Impact Report prepared as part of the EIS for this project, which were: -

- Set back the fence along the existing field boundary of the field to the northeast in order to provide sightlines of 160m at a set back of 4.5m. This would guarentee entrance sightlines in full compliance with NRA DMRB for a design speed of 85km/hr or as a minimum continue to maintain the height of the hedge of the field to the northeast to a maximum height of lm. The proposed arrangement to be adopted is shown on the site layout drawing.

- Consideration should be given to providing traffic route lighting on the Rl 88 at the entrance and for 250m on both approaches.

- Provide advance warning signs on the Rl88 by erecting warning signs, 2 no., indicating the presence of the landfill entrance on each approach. The location, wording and size of signs to be agreed with Cavan County Council.

- Adequate parking is to be provided on site to cater for additional staff car parking, truck parking.

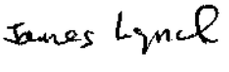
3.0 Conclusion & Certification

Arising from the above, We would be of the view that the existing entrance onto the R188 can accommodate the traffic generated by proposed development in a safe manner.

We would indicate that we are of the view that the safety at the entrance can be improved if the mitigation proposals detailed above are carried out at the entrance and as such the traffic generated by the proposed development will have no detrimental impact on the safe use of the entrance onto the R188.

In this regard, We certify that we have examined the entrance on the ground. This examination was carried out with the purpose of identifying any features of the existing entrance that could be modified or improved within the land available to the developer with a view to improving the safety for road users in accessing/egressing

the regional road by way of the entrance.



Frank Burke **James Lynch**

Chartered Engineer **Chartered Engineei**

Dated: - 26/8/08

Encl.: - Appendix A - Photographs

Waste Facilities at Corranure, Cavan - Road Safety Audit

Appendix A - Photographs

Submission to Cavan County Council

in respect of a

Traffic Impact Assessment

for

The Provision of a Waste Recovery and Biological Treatment Facilities at Corranure

Co. Cavan

Prepared by:
Frank Burke and Associates
Consulting Engineer
Baldara
Trim Road
Navan

For:
Oxigen Environmental
Corranure Landfill,
Cavan

August 2008

Introduction

This traffic impact report relates to the preparation of an EIS arising from a proposal to submit a planning application for the provision of both a materials recovery facility (MRF) dealing with construction and demolition waste (C&D) as well as other commercial and industrial waste and a biological waste treatment (BTF -composting) facility at an existing landfill site at Corranure, Cootehill Road, Cavan. The existing landfill facility at Corranure is owned by Cavan County Council but is operated under license by Oxigen Environmental Ltd.

As was indicated elsewhere in the EIS and reiterated above the existing landfill facility in operated on behalf of the Local Authority by the applicants. As well as the landfill facility, the site includes a civic amenity facility which is opened to the general public for the recycling of a wide range of recyclable materials including glass, paper, cardboard, electrical goods, batteries, metals, organic waste, bottles etc. Under the existing grant of planning and the terms of the waste license, there is capacity for some 4 to 5 years in the existing landfill at current disposal rates. We must point out that in the future we would expect that volumes of waste going to landfill will reduce significantly as waste disposal practice is developed in line with the national policy to reuse and recycle. There is at least a further 20-30 year operational life left in the civic amenity facility. It is not proposed in this assessment to allow for any reduction in traffic generated by the predicted move away from landfill to greener options for waste disposal, as such this report is somewhat conservative in regard to traffic.

The proposal considered in this assessment concerns the impact of the additional traffic generated by the proposal to provide two new waste facilities on the site at Corranure to provide for the recycling of waste (MRF) including C& D material and the biological treatment/composting of organic waste (BTF) over existing traffic levels. The provision of these facilities would be fully compatible with the policies and strategies set out in the Waste Management Strategy for the North East Region where the emphasis is on reuse and recycling with disposal as the least favoured option.

Corranure Landfill is situated some 3.5km north east of Cavan Town along the Cavan/Cootehill Regional Road (R188) and about 2km northeast of the recently constructed Cavan Bypass (N3). The landfill is the largest in Cavan and serves as the disposal site for waste collected by the Cavan Local Authorities within their jurisdiction as well as serving as a disposal site for private waste collectors. As indicated there is a large civic amenity facility on site, which is opened to the general public (free of charge). Currently from the traffic generation aspect both the landfill (mainly HGV movements) and in particular the amenity area (cars/ light goods) generate considerable volumes of traffic. It is assumed that the level of traffic associated with these facilities will continue at current levels.

Existing Environment

The entrance to the landfill is located on a Regional Road (R188) running between Cavan & Cootehill. The R188 (i.e. the receiving road) serves as a regional link road as well as the local community of northeast Cavan in that it is a link road between the N2 at Carrickmacross & Castleblaney and the N3 at Cavan Town. The geometrics and alignment of the R188 varies in standard in that it would have poor to good alignment in places in both the horizontal and vertical. In the vicinity of the landfill, the alignment of the R188 is best described as "fair" in that while there is reasonable forward visibility on the road, the horizontal alignment of the R188 is such that it provides very limited passing opportunity. Structurally the pavement of the section of the receiving road in the vicinity of the entrance to the landfill is in reasonable condition. The cross-section of the R188 in the area generally consists of a pavement varying in width from 6.0 to 7.5m, with grass verges on both sides also varying in width from 0 to 3m.

There is good exit visibility at the landfill entrance in both directions (see Appendix 1) and the entrance is wide enough to easily accommodate HGV's entering and leaving. The sightline in the north-eastern direction is achieved by way of a hedge reduction in the adjacent field to the northeast, while the sightline to the southwest is achieved by way of a fence set back. We would also indicate that there is a lane (cul-de-sac c. 3m in width) serving one house and farmlands located immediately adjacent to the entrance, as such the junction of the facility entrance and the R188 serves traffic exiting both the facility and the lane. The fence set back on the Cavan side, referred to above, allowed for the provision of a slip lane for traffic coming from the Cavan direction and turning left into the landfill. Further the overall road width between fences outside the facility allowed for the provision of a 3m right-turning lane for traffic coming from the Cootehill direction and turning right into the facility. As such there is very little impact of turning traffic leaving the R188 on the free flow of traffic on the regional road at the site entrance.

We would indicate that Table C4.2 in RT180 "Geometric Design Guidelines" indicates that a 7m road would have a 2-way capacity of 700 and 1300 plus for levels of service C&D respectively. We would indicate that we have taken that the percentage passing sight distance greater than 460m in the case of the R188 as zero. We would also indicate that the publication "Metric Handbook – Planning & Design Data" by David Adler in the section on design for the vehicle indicates that on a 5.5m wide road all vehicles can pass each other. Given existing traffic levels (see baseline traffic survey) the net result is that traffic on the regional road in the vicinity of the site experience a high level of service.

Baseline Traffic Survey

As was indicated above the landfill site incorporates both a landfill operation and a civic amenity site, as such traffic is generated by both operations, including journey to work trips for staff and servicing. In respect of the landfill operation, traffic in the main consists of refuse collection

vehicles (RGV's), while the civic amenity facility generates in the main car traffic. There would be a small number of staff, visitors and servicing trips associated with the existing facilities. Current staff levels on site amounts to 12 and includes both office staff and general operatives.

Current operating hours for the landfill facility and civic amenity facility are 8.00 am to 5.00pm during the week, i.e. Monday to Friday and 8am to 1pm on Saturday. Acceptance hours for waste at the landfill facility are 8am to 4.30pm at the civic amenity facility during the week, i.e. Mondays to Friday and 8am to 12.30pm on Saturday. It is proposed to change the operating hours, these changes are detailed later.

A short duration traffic count carried out at the facility entrance on the Friday the 4th of July last (8am to 6pm) with the following objectives: -

1) To determine the existing traffic flows on the R188 at the entrance to the facility
2) To determine the traffic generated by the facility and the existing traffic patterns at the entrance
3) To establish the base line in order to enable a traffic assessment of the overall development (existing and proposed) to be carried out

The details of the count are shown in Table 1 for each hour of the survey period and cover the following movements: -

1) Cootehill to Cavan Town
2) Cootehill to Landfill
3) Cavan to Cootehill
4) Cavan to Landfill
5) Landfill to Cootehill
6) Cootehill to Cavan Town

In effect all the movements at the junction were counted. There is an office/weighbridge on site, wherein all HGV movements are recorded together with some of the larger household/miscellaneous loads that enter the civic amenity facility. This allowed for a cross check of the HGV's entering the landfill. The largest volume of vehicle movements into and out of the landfill site observed during the survey were cars/vans etc. using the civic amenity site.

Table 1 - Results of Traffic Count at Landfill Entrance

Time	Landfill		Cootehill App		Cavan App		Total	Total	Total
	Left	Right	Straight Note 1	To Landfill Note 2	Straight Note 3	To Landfill Note 4	Landfill	Cootehill	Cavan
8 – 9	3(0)	9(1)	113(8)	4(0)	91(8)	9(1)	25(2)	212(16)	222(16)
9 – 10	6(1)	28(2)	139(10)	4(0)	117(11)	24(3)	62(6)	256(22)	308(26)
10 – 11	5(1)	36(2)	156(11)	5(1)	133(12)	39(2)	85(6)	299(25)	364(27)
11 - 12	7(1)	64(4)	158(12)	8(2)	135(12)	56(3)	135(10)	308(27)	413(29)
12 – 1	6(1)	49(1)	164(8)	10(3)	148(15)	46(3)	111(8)	328(27)	407(27)
1 – 2	6(0)	51(5)	166(12)	12(1)	134(12)	54(6)	116(12)	312(25)	405(35)
2 - 3	6(2)	60(6)	175(12)	7(3)	167(16)	63(7)	136(18)	355(33)	465(41)
3 - 4	7(0)	58(2)	204(14)	6(1)	170(14)	59(1)	130(4)	387(29)	491(31)
4 – 5	3(0)	30(1)	220(12)	3(0)	176(16)	29(1)	65(2)	402(28)	455(30)
5 - 6	1(0)	15(1)	240(14)	0(0)	180(15)	1(1)	17(2)	421(29)	435(31)

Note 1: From Cootehill straight to Cavan

Note 2: From Cootehill to Cavan but turning right into the landfill

Note 3: From Cavan Town to Cootehill

Note 4: From Cavan Town to Cootehill but turning left into the landfill

The figures in brackets denote HGV trips. Arising from the survey, the following would be the main points: -

1) During the survey period the facility generated some 880 traffic movements of which 72 were HGV movements, the remainder been cars/light goods
2) Some 11.5% of the overall movements were from or towards Cootehill, the remainder originated or had a destination in the direction of Cavan Town/Cavan Bypass.
3) Some 15% of the HGV movements were from or towards Cootehill.
4) It was observed during the survey that some vehicles, mainly cars using the facility that came from the Cootehill direction continued towards Cavan.
5) There was virtually no traffic on the adjacent lane.

The survey indicated that that the Annual Average Daily Traffic (AADT) on the R188 northeast (Cootehill side) of the facility was 4460 vehicles per day with a HGV content of 8 % during the working day, while the AADT on the southwest of the facility was 5545 vehicles per day with a HGV content of 7.4%. We would indicate that the short duration count were expanded in accordance with RT201 to yield the AADT's (factor used was that for a 7 hour count - 9am to 1 pm & 2pm to 5pm). The confidence level for the predicted AADT's is 17%. It should be noted that from a traffic aspect the worst hours are 5-6pm for the R188 Cootehill side and 3-4pm on the Cavan side, the former would be the expected norm while the latter resulted from the usage of the civic amenity site. We would indicate that the predicted AADT on the Cootehill side would correspond quite favourable with figures supplied by Cavan County Council, wherein a count on the R188 at Corravahan in January 2007 (c. 3 km on the Cootehill side of the landfill) indicated an

AADT of 4088 for the R188 with a HGV content of 7%. Yearly peak hour flow for the R188 based on the predicted AADT's are 490 & 609 on the Cootehill & Cavan sides respectively (5-6pm on a Friday in August). It should be noted that the 5-6 peak hour flow would lower in practice as the civic amenity site would be closed during this hour. In this regard, a yearly peak hour flow of 550 would be more applicable.

As we indicated Table C4.2 in RT180 "Geometric Design Guidelines" indicates that a 7m road would have a 2-way capacity of 700 and 1300 plus for levels of service C & D respectively, clearly there is spare capacity on the receiving road at present.

Accident Statistics on R188

Accident statistics on the R188 in the vicinity of the existing landfill entrance were examined. The following table shows the statistics for the period 1988 to 2005 for the section of the regional road extending c. 3 km each side of the entrance: -

Table 2 – Accident Statistics on R188

Period	Material Damages	Minor Inj.	Serious Inj.	Fatality	Total	Remarks
88 - 98	18	3	3	0	24	Extract from previous EIS on landfill
99 - 02	13	6	1	0	20	Cavan Co Co records
02 - 05	12	2	3	0	17	Cavan Co Co records
Totals	**43**	**11**	**7**	**0**	**61**	

The statistics indicate that some 3 accidents were recorded within 100m of the entrance in the period 99-02, there were no recorded accidents in the period 02-05. The statistics indicate that the accident record on the R188 would be normal for the class of road and traffic in that over the 6km stretch some 3.6 accidents per year on average were recorded (or 0.6accidents/kilometer). The majority of the accidents recorded were minor been either material damage or minor injury.

It would appear from the statistics that the entrance as far as traffic safety is concerned, as previously indicated the existing arrangement includes a right turning lane and left turning slip road, and is working well. ***In this regard it is essential that the sightline to the northeast is maintained (existing hedge of the field is cut down to c. 0.8m in height), by either setting back the fence to the northeast (preferred option -see mitigation measures) to provide 160m sightlines from a set back of 4.5m from the edge of the carriageway or to continue to maintain the height of the hedge/bank to the northeast to a maximum of 1m in height so as to achieve the same result (current situation).*** Either option will provide the full sightlines but the permanent fence set back would be the preferred solution. In relation to the latter, the land we understand is owned by the local authority as such the fence set back should be incorporated into the proposed new works.

Traffic Generation

As indicated above, the proposal is to add two new facilities at the Corranure Landfill site to include for the provision of both a waste recycling facility (WRF) dealing with C&D waste as well as commercial and industrial waste together with a Mechanical & Biological Waste Treatment (MBT - composting) facility at an existing landfill site

In line with the proposed new facilities, it is proposed to change the operating hours of the existing facilities as follows: -
(1) The facility will operate 6 days per week i.e. Monday to Saturday inclusive.

Table 3 – Traffic Generation

Facility	Operating Hours	Waste Acceptance Hrs	Construction
Landfill	6.30 – 19.30	7.00 – 19.00	8.00 – 18.00
Civic Amenity	8.00 – 17.00	8.00 – 16.30	Not applicable
MRF	6.00 – 22.30	6.30 – 22.00	8.00 – 18.00
BTF	Continuous (24hrs)	6.30 – 22.00	8.00 – 18.00

Traffic Generated by the Biological Treatment Facility (BTF)

The projected throughput of the BTF facility will amount to 65,000 tonnes per annum. In this regard, 60,000 tonnes will be imported, while some 5,000 tonnes will be sourced from the civic amenity facility on site. Imported material will be transported to the site in both skip lorries (8t loads) and HGV's (22t loads) in an estimated trip ratio of 3:2. As such the average tonnage imported per working day (based on a 52 week year & 6 day week) is 193 tonne. In this regard, we would estimate 30 HGV movements made up of 18 skip movements (9 in & 9 out) and 12 HGV movements (6 in & 6 out). Some 48,750 tonnes of compost will be produced at the BTF will be exported after allowing for reduction during the process and waste separated during the screening process prior to composting and screening of the final compost. The screened waste will be disposed off on-site in the landfill. The final compost material will be exported in HGV's (22t) for packing/use elsewhere. It should be noted that different vehicles will be used for exporting the final product from those used to import the raw material for the composting process.

In this regard average tonnage exported per working day is 157 tonnes. We would estimate 16 HGV movements made up 8 out and 8 in movements would be generated from the product. Some

6 staff will be employed at the BTF, with occasional additional trips generated by visitors, veterinary inspections, servicing etc., as such we would estimate that an additional 20 other vehicle movements would be created during the day. In all some 66 movements, 46 HGV & 20 others would be created over the working day at the BFT. This would average 5 movements per hour, the worst periods would be the 7.30 to 8.30 period in the morning and the 5-6 pm period in the evening when some 10 trips would be generated mainly associated with the journey to work.

Traffic Generated by the Recycling Facility (MRF)

The throughput of the recycling facility will amount to 180,000 tonnes per annum. In this regard, the 175,000 tonnes will be imported and some 5,000 tonnes will be sourced from the civic amenity facility on site. Imported material will be transported to the site by different means of transport including ejector lorries (20t loads), skip lorries (8t loads) and hook lorries (15t containers) carrying an estimated 45,000tonne, 12,000 tonnes & 18,000tonnes respectively. Arising from this the average tonnage imported per working day (based on a 52 week year & 6 day week) is 561 tonne. In this regard, we would estimate 66 HGV movements made up of 48 ejector lorry movements (24 in & 24 out), 10 skip movements (5 in & 5 out) and 8 hook lorry movements (4 in & 4 out). Some 137,700 tonnes of recyclables will be exported after allowing for waste separated during the screening/separation process (10% of imported tonnage) and the use of an estimated 24,300 tonnes (15% of the remainder) of C&D material, rubble and fines used on-site as landfill cover etc.. The separated waste from the screening process will be disposed on-site in the landfill.

The final recyclable material will be exported in HGV's (20t) for reuse. It should be noted that the same ejector vehicles will be used for exporting the final product as those used to import the raw material. In this regard, we would estimate that some 23 outward movements would be required, as there are 24 inward loads per day, in theory no additional outward trips should be generated. This is not practicable, as such for assessment purposes, we have allowed for 10 additional movements per day made up 5 out and 5 in movements to cater for logistic bottlenecks. In relation to the provision of this facility, it is proposed to locate all drivers, helpers, operatives and additional office staff on-site at the Corranure facility (estimated 60 at full production), with occasional additional trips generated by visitors, servicing etc., as such and allowing for car sharing we would estimate that at worst an additional 100 vehicle movements would be created during the day. In all some 176 movements, 76 HGV & 100 others would be created over the working day. This would average 12 movements per hour during the working day, the worst periods would be the 7.30 to 8.30 period in the morning and the 5.00 to 6.00 pm period in the evening when an estimated 30 trips would be generated, these would mainly be car movements.

It will be necessary to provide a car/truck parking area on-site to cater for both staff and HGV parking for the new facility.

Arising from the above, in total, some 242 movements created by the provision of the new facilities, 122 HGV & 120 others would be created over the working day. This would average 17 movements per hour, the worst periods would be the 7.30 to 8.30 period in the morning (journey to work and outward truck movements) and the 5.00 to 6.00 pm period in the evening (trucks to base and journey home) when an estimated 40 trips (32 car & 8 HGV movements) would be generated.

From a traffic aspect, the worst case would arise when construction on extending the cells in the landfill would coincide with the full operation of the site (all facility fully operational). We would estimate that construction of the cells would generate some 60 (30 HGV & 30 others) trips per day or some 10 trips during the morning and evening peaks. There will be some reduction in trips allowing for the extended operating hours of the landfill, we have not taken this into consideration. As such the worst case scenario from a traffic aspect would be that an estimated 302 additional trips would be generated per day or 50 in the peak hours, this is set out in the following table:-

Table 4 - Traffic Generated by the New Facilities

Facility	Day (HGV)	Day (other)	Day Total	Peak Hr. (HGV)	Peak Hr (other)	Peak Hr Total
BTF	46	20	66	4	6	10
MRF	76	100	176	6	24	30
Construction	30	30	60	3	7	10
Totals	152	150	**302**	13	37	**50**

Significant Impacts

As we indicated above, we expect the proposed new facilities to generate some 302 movements per day (worst case) or an estimated 50 trips in the peak hour. New HGV movements would be reasonably evenly spread over the working day and would not correspond with peak hour flows on the receiving road. Some 90% of these trips would head for Cavan town based on the current usage.

Given the background yearly peak hour traffic is of the order of 550 (worst case), compared with the capacity for levels of service C&D of 700 & 1300 respectively, it is reasonable to assume that traffic will split in the same ration as existing traffic in that the bulk of the traffic will head for Cavan Town/Bypass where it will diverse quickly. It is reasonable to conclude that the most affected section of the receiving road, i.e. the section of the R188 from the entrance to the N3

bypass, in the opening year will still operate at a level of service C, when the traffic on the section will rise to some 595 vehicles in the peak hour, and will continue to do so for some 8-9 years thereafter, after which it will drop to a level of "high" D as background traffic increases. We have taken that the growth rate on the R188 will be of the order of 2% per annum in line with the predictions for non-national roads set out in the NRA publication "Future Traffic Forecasts - 2002-2040". The R188 to the northeast of the landfill will continue to operate at a level of service C for many years to come as background and generated traffic on that section of road will be much lower.

The other main impacts of the additional traffic on the receiving environment would be two-fold: -

- Traffic entering and leaving the landfill safely
- Impact on the structure of the road pavement for the long-term

In respect of the former, a number of mitigation measures can be taken to maximise the safe use of the existing entrance, these are listed below. In respect of the latter, traffic from the facility will mean an increase in “loaded HGV” movements on the pavement over the current position this will result in a reduction in the effective life of the existing pavement. This is a road maintenance issue and it is normal for the local authority to include a development levy in any grant of planning to cater for any expenditure incurred by them on upgrading the receiving road.

Construction Traffic for Proposed New Facilities

Traffic during the construction phase for the new facilities will in volumetric terms be much lower than that generated by the operation of both facilities with an estimated peak staffing level of 25-30 site staff generating some 60 car movements and 60 HGV movements per day (30 in & 30 out). Clearly the impacts in respect of traffic during the construction phase will be less than that occurring during the operational phase

Mitigation Measures

In respect of the maximising safety for both passing traffic on the R188 and traffic using the entrance to the landfill, we would propose the following mitigation measures: -

- Set back the fence along the existing field boundary of the field to the northeast in order to provide sightlines of 160m at a set back of 4.5m. This would guarantee entrance sightlines in full compliance with NRA DMRB for a design speed of 85km/hr or as a minimum continue to maintain the height of the hedge of the field to the northeast to a maximum height of 1m. The proposed arrangement to be adopted is shown on the site layout drawing.

- Consideration should be given to providing traffic route lighting on the R188 at the entrance and for 250m on both approaches.

- Provide advance warning signs on the R188 by erecting warning signs, 2 no., indicating the presence of the landfill entrance on each approach. The location, wording and size of signs to be agreed with Cavan County Council.

- Adequate parking is to be provided on site to cater for additional staff car parking, truck parking. The proposed parking arrangement is also shown on the site layout drawing.

Conclusion

We would be of the view that the use of the existing entrance to the landfill had in the past and will have in the future no major impact from a traffic perspective and as such would in our view not be a traffic hazard. The safe use of the entrance could be further improved by undertaking the mitigation measures suggested in above.