Obj 5 Applicant

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Date: **19th January 2006**

Environmental Protection Agency
PO Box 3000
Johnstown Castle Estate
County Wexford

Dear Sir/Madam

MEENABOLL LANDFILL SITE, CO. DONEGAL 215-1

Further to your letter dated 14th December 2005 regarding the Proposed Decision for the Waste Licence for Meenaboll Landfill site (Ref 215-1) please find enclosed on behalf of Donegal County Council an objection to Condition 3.6.1 in accordance with Section 42 of the Waste Management Act 1996. The objection relates to the Lining System for the facility.

One copy of the objection is included as required. Credit Card details for the appropriate fee of €500 as per Article 44 are provided on the Credit Card Sales form.

Yours sincerely
for RPS Consulting Engineers

Donal Doyle
Associate

Enc.

Obj B

APPLICATION

By

Donegal County Council.

To

Environmental Protection Agency

For

Waste Licence

Meenaboll Landfill Site
Meenaboll, Co Donegal

Objection to Proposed Decision

215-1

WASTE LICENCE APPLICATION REF 215-1

ITIONS

BY

DONEGAL COUNTY COUNCIL
COUNTY HOUSE
LIFFORD
CO WNEGAL

Donegal County Council submitted an application for a Waste Licence for a landfill site in Meenaboll in December 2004 in accordance with Waste Management Act, 1996.

This objection has been formulated to reflect concerns of Donegal County Council in relation to a number of conditions in the proposed decision for Meenaboll Landfill Site.

Specific objections together with the grounds for objection are referred to in this document as referenced in the proposed decision.

Condition 3. Infrastructure and Operation

3.6 Landfill Lining

3.6.1 Unless otherwise agreed in writing, the landfill lining system shall comprise:-

(i) A composite liner consisting of a 0.5m layer of Bentonite Enhanced Soil (BES) with a hydraulic conductivity of less than or equal to $1x10^{-10}m^3/m^2/s$, overlain by a 2mm thick high density polyethylene (HDPE) layer;

(ii) A geotextile protection layer placed over the HDPE layer;

(iii) A 500mm thick drainage layer placed over the geotextile layer with a minimum hydraulic conductivity of 1 x $10^{-3}m^3/m^2/s$, of prewashed, uncrushed, granular, rounded stone (16-32mm grain size) incorporating leachate collection drains;

(iv) The lining system on the base of the facility shall be laid to a minimum slope of 1:50; and

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

Condition 3.6.1(iii)

The Waste Licence Application and Environmental Impact Statement (Chapter 6) submitted to the EPA proposed that the leachate drainage layer would consist of a 500 mm deep blanket of 16/32 mm sized crushed rock aggregate. It was proposed that this material would be sourced from excavated rock on the site and crushed to the specified size as referenced in Section 11.35 of the Environmental Impact Assessment. Additional protection will be provided to the HDPE layer by the use of an appropriate protective geotextile demonstrated by the use of the UK's Environment Agency Cylinder Test developed in 1998 for this specific purpose. A source for a suitable rounded gravel in Donegal has proved difficult to identify in previous landfill development contracts in Donegal. As such the closest source for a material that complies with this condition of the proposed decision is likely to be in adjoining counties resulting in long haul distances. As a suitable alternative to rounded gravel, a 16-32mm crushed non-calcareous stone is proposed for use at Meenaboll and will be sourced on site. There is an economic balance when designing for the leachate drainage layer and geomembrane protection layer. The transportation of a limited natural resource such long distance cannot be considered sustainable compared to the sourcing of material on site. Material of this nature is widely used in UK landfill sites for leachate drainage layers.

A Leachate Drainage Stone Report demonstrating the principle of the suitability of crushed stone in the leachate drainage layer was submitted to the Office of Environmental Enforcement in Castlebar on 30 March 2005 in relation to the landfill site at Ballynacarrick, Ballintra (Reference 24-2). We are still awaiting comments from OEE in relation to this and have enclosed a copy of the report in Appendix A for your information. It is requested that this Condition in the Final Waste Licence be amended to reflect the proposed use of a crushed leachate drainage layer.

Condition 3.6.1 (iv)

The site design allows for a longitudinal fall of 1:100 with a cross fall towards the leachate drainage pipework of 1:25. This is in accordance with the EPA Landfill Design Manual. These falls have been designed to suit the existing profile of the site. It is requested that this condition be amended to reflect the design set out in the Environmental Impact Statement and Waste Licence Application.

APPENDIX A

DONEGAL COUNTY COUNCIL

BALLYNACARRICK LANDFILL SITE

LEACHATE DRAINAGE STONE REPORT

MARCH 2005

Prepared by:	D Doyle
Report Ref:	5234-80/Leachate Drainage Stone Report
Status:	Final
Date of Release	30 March 2005
Approved and authorised for issue:	

D J Doyle, Associate **BEng CEng MICE MIEI CMIWM**

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BALLYRAINE
LETTERKENNY
CO DONEGAL

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CONTENTS

APPENDICES

1.0 INTRODUCTION

The selection of a leachate drainage layer and geomembrane protection form a key part of modern landfill design. This report sets out to demonstrate the suitability of a crushed stone as the leachate drainage layer for Ballynacarrick Landfill Site, Ballintra through the use of the UK's Environment Agency Cylinder Test developed in 1998 for this specific purpose.

Condition 3.12.1 of the Ballynacarrick Landfill Waste Licence (24-2) sets out the requirement for the engineering of the landfill lining system. It refers to the use of a rounded gravel for the leachate drainage layer. However Condition 3.12.4 of the Waste Licence offers an opportunity to demonstrate the suitability of an alternative type of leachate drainage stone. This approach is further referenced in the EPA Landfill Design Manual, which specifically refers to the use of the cylinder test to demonstrate the suitability of the leachate drainage layer.

A source for a suitable rounded gravel in Donegal has proved impossible to identify. As such the closest source for a material that complies with the condition 3.12.1 of the waste licence has been identified at Hacketts in Eskra, Co Tyrone some 45 miles from the site along poor quality roads. As a suitable alternative to rounded gravel, a 16-32mm crushed non-calcareous stone is proposed for use at Ballynacarrick and is sourced from Glenstone Quarry in Killybegs some 25 miles from Ballynacarrick. Material of this nature has been used on several sites in Northern Ireland and a similar material was also used as the leachate drainage layer in the first Ballynacarrick engineered cell, which was developed in 2002. A cylinder test has been utilised on these sites to demonstrate the suitability of the leachate drainage stone. Indeed as large areas of the UK have difficulty identifying suitable gravel for use as leachate drainage layer, crushed stone would be widely used on UK landfill sites, and again the cylinder test would be utilised to demonstrate the suitability of the leachate drainage stone and geomembrane protection.

There is an economic balance when designing for the leachate drainage layer and geomembrane protection layer. As a result of the difficulty referred to above in identifying a suitable rounded gravel in close proximity to the site, this has placed significant additional cost on the development of Ballynacarrick Landfill site. The transportation of a limited natural resource such long distance cannot be considered sustainable.

20 CYLINDER TEST

The cylinder test is a site specific, performance test designed to replicate the loading pressures on a HDPE lining system at the base of the landfill. The test duration is 100 hours and has high factors of safety for time related plastic settlement and temperature effects. The objective is to measure the long term strain effects of a stone drainage blanket on a particular liner and to find the most cost effective design for the landfill leachate drainage and geomembrane protection. The UK Environment Agency have recommended that strain levels in the HDPE should not exceed 0.25%.

The maximum depth of waste on Ballynacarrick Landfill Site is 15m (From 104m to 89m). Hence we have undertaken the cylinder tests at a range of pressures equivalent to 15m to 30m head of waste. The tests were undertaken on site specific materials for Ballynacarrick Landfill Site by BICS Laboratories Ltd and these are summarised below.

- 15m head using rounded gravel against a 1200g/m^2 geotextile.
- 15m head using rounded gravel against a 1500g/m^2 geotextile.
- 15m head using crushed stone against a 1200g/m^2 geotextile.
- 15m head using crushed stone against a 1500g/m^2 geotextile.
- 25m head using rounded gravel against a 1200g/m^2 geotextile.
- 25m head using rounded gravel against a 1500g/m^2 geotextile.
- 25m head using crushed stone against a 1200g/m^2 geotextile.
- 25m head using crushed stone against a 1500g/m^2 geotextile.
- 30m head using rounded gravel against a 1200g/m^2 geotextile.
- 30m head using rounded gravel against a 1500g/m^2 geotextile.
- 30m head using crushed stone against a 1200g/m^2 geotextile.
- 30m head using crushed stone against a 1500g/m^2 geotextile.

Test results for these are provided in full in Appendix I.

3.0 CONCLUSIONS

From the test results provided in this report we would consider the 16-32mm crushed stone proposed for use at Ballynacarrick Landfill site to be suitable for use in the leachate drainage stone. The lining system of a 1500g/m^2 geotextile with a crushed stone offers similar protection to a rounded gravel with a 1200g/m^2 geotextile at 15m, which is widely used in landfills in Ireland. The crushed stone with a 1500g/m^2 geotextile provides the most cost effective solution available in Co Donegal while complying with the design specification.

We would also consider sourcing a leachate drainage stone from a gravel pit located over 80 miles from the site to be an unsustainable approach which has major cost implications not just for the first phase of development at Ballynacarrick but also phase 2 and any future landfill development in Donegal.

APPENDIX I

Table 1 - Cylinder Test Results

	Local Strains (%) Crushed Stone (18-22 Feb)	Local Strains (%) Gravel (19-24 Feb)	Difference
15m Head, 1500 g/m2 Geotextile			
X axis	0.17	0.12	0.05
	0.12	0.10	0.02
	0.08	0.07	0.01
	0.12	0.10	0.02
Y axis	0.11	0.09	0.02
	0.20	0.11	0.09
	0.13	0.09	0.04
	0.15	0.10	0.05
15m Head, 1200 g/m2 Geotextile			
X axis	0.24	0.19	0.05
	0.18	0.16	0.02
	0.11	0.10	0.01
	0.18	0.15	0.03
Y axis	0.18	0.13	0.05
	0.26	0.09	0.17
	0.17	0.18	-0.01
	0.20	0.13	0.07
25m Head, 1500 g/m2 Geotextile			
X axis	0.33	0.25	0.08
	0.24	0.14	0.10
	0.14	0.12	0.02
	0.24	0.17	0.07
Y axis	0.21	0.14	0.07
	0.16	0.11	0.05
	0.22	0.22	0.00
	0.20	0.16	0.04

[redacted]

Table 1 - Cylinder Test Results (cont)

25m Head, 1200 g/m2 Geotextile	Local Strains (%) Crushed Stone (23-28 Feb)	Local Strains (%) Gravel (25 Feb-1 Mar)	Difference
X axis	0.38	0.28	0.10
	0.28	0.19	0.09
	0.15	0.13	0.02
	0.27	0.20	0.07
Y axis	0.27	0.17	0.10
	0.23	0.21	0.02
	0.31	0.25	0.06
	0.27	0.21	0.06

30m Head, 1500 g/m2 Geotextile	Local Strains (%) Crushed Stone (21-31 Jan)	Local Strains (%) Gravel (21-31 Jan)	Difference
X axis	0.31	0.21	0.10
	0.23	0.18	0.05
	0.21	0.11	0.10
	0.25	0.17	0.08
Y axis	0.33	0.17	0.16
	0.41	0.22	0.19
	0.16	0.26	-0.10
	0.30	0.22	0.08

30m Head, 1200 g/m2 Geotextile	Local Strains (%) Crushed Stone (21-31 Jan)	Local Strains (%) Gravel (21-31 Jan)	Difference
X axis	0.46	0.33	0.13
	0.34	0.31	0.03
	0.27	0.18	0.09
	0.36	0.27	0.09
Y axis	0.36	0.19	0.17
	0.43	0.24	0.19
	0.19	0.32	-0.13
	0.33	0.25	0.08

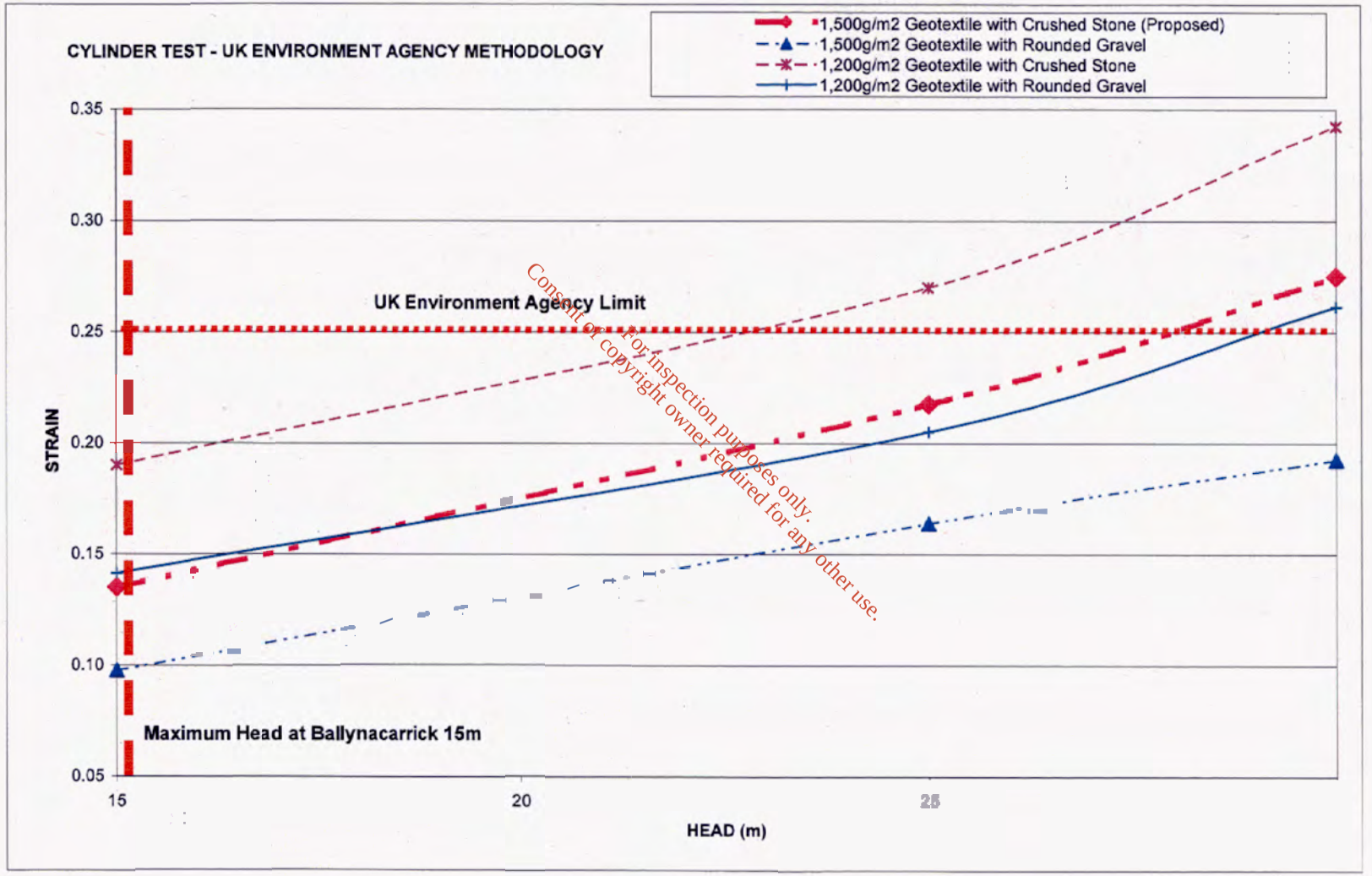
5234.80 Plate Tests Comparison
Prepared By: DJD/NR
Date: 17/01/2006

Table 2 - Average Test Results

	1500g/m² Geotextile				1200g/m² Geotextile			
	Crushed Stone		Rounded Gravel		Crushed Stone		Rounded Gravel	
HEAD (m)	X Direction	Y Direction	X Direction	Y Direction	X Direction	Y Direction	X Direction	Y Direction
15	0.12	0.15	0.10	0.10	0.18	0.20	0.15	0.13
25	0.24	0.20	0.17	0.16	0.27	0.27	0.20	0.21
30	0.25	0.30	0.17	0.22	0.36	0.33	0.27	0.25

Table 3 - X and Y Direction Results Averaged

	1500g/m² Geotextile		1200g/m² Geotextile	
HEAD (m)	Crushed Stone	Rounded Gravel	Crushed Stone	Rounded Gravel
15	0.14	0.10	0.19	0.14
25	0.22	0.16	0.27	0.21
30	0.28	0.19	0.34	0.26



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