ENVIRONMENTAL IMPACT STATEMENT

FOR THE INTENSIFICATION OF

DERRYCLURE LANDFILL

CO. OFFALY

Volume 3 of 3 – Appendices

ORIGINAL

Prepared for:

Offaly County Council
Charleville Road
Tullamore
Co. Offaly

Prepared by:

Fehily Timoney & Co.
Core House
Pouladuff Road
Cork.

October 2008

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FOR THE INTENSIFICATION OF

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Volume 3 of 3 – Appendices

User is Responsible for Checking the Revision Status of this Document

Rev. Nr.	Description of Changes	Prepared by:	Checked by:	Approved by:	Date
0	Issue to Client	SM			23.10.08

Client: Offaly County Council

Keywords: landfill, intensification

Abstract: This document comprises part of the EIS for the proposed intensification of Offaly County Council's landfill at Derryclure, Co. Offaly. The site operates under a waste licence from the Environmental Protection Agency (W0029-02). This document forms Volume 3 of the EIS – Appendices.

APPENDICES

Appendix 1: Consultation Letters Sent to Consultees

Appendix 2: Replies received to Consultation Letters

Appendix 3: Leachate Water Balance Calculations

Appendix 4: Summary of Landfill Gas Model

Appendix 5: Picady Traffic Model Output Data

Appendix 6: Designated Sites within 10 km of Derryclure Landfill

Appendix 7: List of protected species recorded within 10 km of Derryclure

Appendix 1

Consultation Letters Sent to Consultees

FEHILY TIMONEY & COMPANY

CONSULTANTS IN ENGINEERING & ENVIRONMENTAL SCIENCES

CORK DUBLIN

CE07

Our Ref: Q[redacted]/286/01/Let003/SM/LY

Mr David McInerney
Southern Regional Fisheries Board
Anglesea Street
Clonmel
Co Tipperary

22 July 2008

RE: Offaly County Council – Proposed intensification of waste acceptance activities at Derryclure Landfill

Dear Mr. McInerney

I am writing to notify you of the intention of Offaly County Council (OCC) to submit an Environmental Impact Statement (EIS) to An Board Pleanala (ABP) for approval in relation to proposed intensification of waste acceptance activities at Derryclure Landfill.

AES Ireland Ltd. has retained Fehily Timoney & Company (FTC) to prepare this EIS. FTC is also preparing the review of the existing facility waste licence. According to standard procedures for the Environmental Impact Assessment process, FTC seeks any observations or concerns you may have regarding the proposed development.

Derryclure Landfill is located approximately 5km south of Tullamore on the N80 national secondary route. The facility is currently licenced to accept 40,000 tonnes per annum of waste. OCC proposes to increase this capacity to approximately 100,000 tonnes per annum. This increase in waste acceptance requires the submission of an environmental impact statement for ABP approval. It should be noted that the proposed development will not require any extension of the existing footprint of the landfill facility. No additional gross landfill capacity will be created as a result of this proposal.

The EIS will address the various aspects of the environment on which *the intensification of waste acceptance* could have an impact. These impacts will include traffic, ecology, noise, landscape, cultural heritage, material assets, water, climate, etc.

This letter is being sent as part of the environmental impact assessment process. While your reply is not obligatory, it would be of benefit to us if you could send any comments, relevant to your area of operation, for consideration in the environmental impact assessment.

We would be grateful if you could send your comments to the undersigned not later than Tuesday 05 August 2008.

Yours sincerely

Mr. Sean Meyler
for and on behalf of **Fehily Timoney & Company**

CORE HOUSE, POULADUFF ROAD, CORK, IRELAND
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FEHILY TIMONEY & COMPANY

CONSULTANTS IN ENGINEERING & ENVIRONMENTAL SCIENCES

CORK DUBLIN

Our Ref: Q:CE08/286/01/Let003/SM/LY

The Secretary
Department of Enterprise, Trade and Employment
23 Kildare St,
Dublin 2

22 July 2008

RE: Offaly County Council – Proposed intensification of waste acceptance activities at Derryclure Landfill

Dear Sir/Madam

I am writing to notify you of the intention of Offaly County Council (OCC) to submit an Environmental Impact Statement (EIS) to An Board Pleanala (ABP) for approval in relation to proposed intensification of waste acceptance activities at Derryclure Landfill.

AES Ireland Ltd. has retained Fehily Timoney & Company (FTC) to prepare this EIS. FTC is also preparing the review of the existing facility waste licence. According to standard procedures for the Environmental Impact Assessment process, FTC seeks any observations or concerns you may have regarding the proposed development.

Derryclure Landfill is located approximately 5km south of Tullamore on the N80 national secondary route. The facility is currently licenced to accept 40,000 tonnes per annum of waste. OCC proposes to increase this capacity to approximately 100,000 tonnes per annum. This increase in waste acceptance requires the submission of an environmental impact statement for ABP approval. It should be noted that the proposed development will not require any extension of the existing footprint of the landfill facility. No additional gross landfill capacity will be created as a result of this proposal.

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CONSULTANTS IN ENGINEERING & ENVIRONMENTAL SCIENCES

CORK DUBLIN

Our Ref: Q:CE08/286/01/Let003/SM/LY

Tara Spain
The National Roads Authority
St Martin's House
Waterloo Road
Dublin 4

22 July 2008

RE: Offaly County Council – Proposed intensification of waste acceptance activities at Derryclure Landfill

Dear Ms Spain

I am writing to notify you of the intention of Offaly County Council (OCC) to submit an Environmental Impact Statement (EIS) to An Board Pleanala (ABP) for approval in relation to proposed intensification of waste acceptance activities at Derryclure Landfill.

AES Ireland Ltd. has retained Fehily Timoney & Company (FTC) to prepare this EIS. FTC is also preparing the review of the existing facility waste licence. According to standard procedures for the Environmental Impact Assessment process, FTC seeks any observations or concerns you may have regarding the proposed development.

Derryclure Landfill is located approximately 5km south of Tullamore on the N80 national secondary route. The facility is currently licenced to accept 40,000 tonnes per annum of waste. OCC proposes to increase this capacity to approximately 100,000 tonnes per annum. This increase in waste acceptance requires the submission of an environmental impact statement for ABP approval. It should be noted that the proposed development will not require any extension of the existing footprint of the landfill facility. No additional gross landfill capacity will be created as a result of this proposal.

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Paul Kelly Stephen Byrne Sarah Toal Tony Ambrose Company Secretary: Declan O'Sullivan

Registered in Ireland, Fehily Timoney & Company Ltd. Number 180497
Registered Office: Core House, Pouladuff Road, Cork. VAT Registration Number: IE6580497D

FEHILY TIMONEY & COMPANY

CONSULTANTS IN ENGINEERING & ENVIRONMENTAL SCIENCES

CORK DUBLIN

Our Ref: Q:CE08/286/01/Let003/SM/LY

The Secretary
Bus Eireann
Central Bus Station
Store St,
Dublin 1

22 July 2008

RE: Offaly County Council – Proposed intensification of waste acceptance activities at Derryclure Landfill

Dear Sir/Madam

I am writing to notify you of the intention of Offaly County Council (OCC) to submit an Environmental Impact Statement (EIS) to An Board Pleanala (ABP) for approval in relation to proposed intensification of waste acceptance activities at Derryclure Landfill.

AES Ireland Ltd. has retained Fehily Timoney & Company (FTC) to prepare this EIS. FTC is also preparing the review of the existing facility waste licence. According to standard procedures for the Environmental Impact Assessment process, FTC seeks any observations or concerns you may have regarding the proposed development.

Derryclure Landfill is located approximately 5km south of Tullamore on the N80 national secondary route. The facility is currently licenced to accept 40,000 tonnes per annum of waste. OCC proposes to increase this capacity to approximately 100,000 tonnes per annum. This increase in waste acceptance requires the submission of an environmental impact statement for ABP approval. It should be noted that the proposed development will not require any extension of the existing footprint of the landfill facility. No additional gross landfill capacity will be created as a result of this proposal.

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FEHILY TIMONEY & COMPANY

CONSULTANTS IN ENGINEERING & ENVIRONMENTAL SCIENCES

CORK DUBLIN

Our Ref: Q:CE08/286/01/Let003/SM/LY

Mr. Ronnie Creighton
Minerals and Mining Industry
Geological Survey of Ireland
Beggars Bush
Haddington Road
Dublin 4

22 July 2008

RE: Offaly County Council – Proposed intensification of waste acceptance activities at Derryclure Landfill

Dear Mr. Creighton

I am writing to notify you of the intention of Offaly County Council (OCC) to submit an Environmental Impact Statement (EIS) to An Board Pleanala (ABP) for approval in relation to proposed intensification of waste acceptance activities at Derryclure Landfill.

AES Ireland Ltd. has retained Fehily Timoney & Company (FTC) to prepare this EIS. FTC is also preparing the review of the existing facility waste licence. According to standard procedures for the Environmental Impact Assessment process, FTC seeks any observations or concerns you may have regarding the proposed development.

Derryclure Landfill is located approximately 5km south of Tullamore on the N80 national secondary route. The facility is currently licenced to accept 40,000 tonnes per annum of waste. OCC proposes to increase this capacity to approximately 100,000 tonnes per annum. This increase in waste acceptance requires the submission of an environmental impact statement for ABP approval. It should be noted that the proposed development will not require any extension of the existing footprint of the landfill facility. No additional gross landfill capacity will be created as a result of this proposal.

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CONSULTANTS IN ENGINEERING & ENVIRONMENTAL SCIENCES

CORK DUBLIN

Our Ref: Q:CE08/286/01/Let003/SM/LY

Ms Patricia Kelly
Environmental Section
Department of Agriculture and Food
Johnstown Castle Estate
Co Wexford

22 July 2008

RE: Offaly County Council – Proposed intensification of waste acceptance activities at Derryclure Landfill

Dear Ms Kelly

I am writing to notify you of the intention of Offaly County Council (OCC) to submit an Environmental Impact Statement (EIS) to An Board Pleanala (ABP) for approval in relation to proposed intensification of waste acceptance activities at Derryclure Landfill.

AES Ireland Ltd. has retained Fehily Timoney & Company (FTC) to prepare this EIS. FTC is also preparing the review of the existing facility waste licence. According to standard procedures for the Environmental Impact Assessment process, FTC seeks any observations or concerns you may have regarding the proposed development.

Derryclure Landfill is located approximately 5km south of Tullamore on the N80 national secondary route. The facility is currently licenced to accept 40,000 tonnes per annum of waste. OCC proposes to increase this capacity to approximately 100,000 tonnes per annum. This increase in waste acceptance requires the submission of an environmental impact statement for ABP approval. It should be noted that the proposed development will not require any extension of the existing footprint of the landfill facility. No additional gross landfill capacity will be created as a result of this proposal.

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FEHILY TIMONEY & COMPANY

CONSULTANTS IN ENGINEERING & ENVIRONMENTAL SCIENCES

CORK DUBLIN

Our Ref: Q:CE08/286/01/Let003/SM/LY

Ms Ciara Maxwell
Environmental Protection Agency
McComiskey House
Richview
Clonskeagh Rd.
Dublin 14

22 July 2008

RE: Offaly County Council – Proposed intensification of waste acceptance activities at Derryclure Landfill

Dear Ms Maxwell

I am writing to notify you of the intention of Offaly County Council (OCC) to submit an Environmental Impact Statement (EIS) to An Board Pleanala (ABP) for approval in relation to proposed intensification of waste acceptance activities at Derryclure Landfill.

AES Ireland Ltd. has retained Fehily Timoney & Company (FTC) to prepare this EIS. FTC is also preparing the review of the existing facility waste licence. According to standard procedures for the Environmental Impact Assessment process, FTC seeks any observations or concerns you may have regarding the proposed development.

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FEHILY TIMONEY & COMPANY

CONSULTANTS IN ENGINEERING & ENVIRONMENTAL SCIENCES

CORK DUBLIN

Our Ref: Q:CE08/286/01/Let003/SM/LY

The Secretary
Health and Safety Authority
The Metropolitan Building
James Joyce Square
Dublin 1

22 July 2008

RE: Offaly County Council – Proposed intensification of waste acceptance activities at Derryclure Landfill

Dear Sir/Madam

I am writing to notify you of the intention of Offaly County Council (OCC) to submit an Environmental Impact Statement (EIS) to An Board Pleanala (ABP) for approval in relation to proposed intensification of waste acceptance activities at Derryclure Landfill.

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CONSULTANTS IN ENGINEERING & ENVIRONMENTAL SCIENCES

CORK DUBLIN

Our Ref: Q:CE08/286/01/Let003/SM/LY

The Secretary
Health Service Executive
Oak House
Limetree Avenue
Millenium Park
Naas
Co Kildare

22 July 2008

RE: Offaly County Council – Proposed intensification of waste acceptance activities at Derryclure Landfill

Dear Sir/Madam

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CONSULTANTS IN ENGINEERING & ENVIRONMENTAL SCIENCES

CORK DUBLIN

Our Ref: Q:CE08/286/01/Let003/SM/LY

Dr Stephen Newton
Senior Conservation Officer (Research and Surveys)
Birdwatch Ireland
Rockingham House
Newcastle
Co Wicklow

22 July 2008

RE: Offaly County Council – Proposed intensification of waste acceptance activities at Derryclure Landfill

Dear Dr. Newton

I am writing to notify you of the intention of Offaly County Council (OCC) to submit an Environmental Impact Statement (EIS) to An Board Pleanala (ABP) for approval in relation to proposed intensification of waste acceptance activities at Derryclure Landfill.

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CORK DUBLIN

Our Ref: Q:CE08/286/01/Let003/SM/LY

Mr. Conor McDermott
Office of Public Works
51 St. Stephen's Green
Dublin 2

22 July 2008

RE: Offaly County Council – Proposed intensification of waste acceptance activities at Derryclure Landfill

Dear Mr. McDermott

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CONSULTANTS IN ENGINEERING & ENVIRONMENTAL SCIENCES

CORK DUBLIN

Our Ref: Q:CE08/286/01/Let003/SM/LY

Ms Sarah Fields
Development Officer
Irish Wildlife Trust
Sigmund Business Centre
93A Lagan Road
Dublin Industrial Estate
Glasnevin
Dublin 11

22 July 2008

RE: Offaly County Council – Proposed intensification of waste acceptance activities at Derryclure Landfill

Dear Ms Fields

I am writing to notify you of the intention of Offaly County Council (OCC) to submit an Environmental Impact Statement (EIS) to An Board Pleanala (ABP) for approval in relation to proposed intensification of waste acceptance activities at Derryclure Landfill.

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FEHILY TIMONEY & COMPANY

CONSULTANTS IN ENGINEERING & ENVIRONMENTAL SCIENCES

CORK DUBLIN

Our Ref: Q:CE08/286/01/Let003/SM/LY

The Secretary
Tullamore Town Council
Acres Hall
Cormac Street
Tullamore
Co Offaly

22 July 2008

RE: Offaly County Council – Proposed intensification of waste acceptance activities at Derryclure Landfill

Dear Sir/Madam

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Derryclure Landfill is located approximately 5km south of Tullamore on the N80 national secondary route. The facility is currently licenced to accept 40,000 tonnes per annum of waste. OCC proposes to increase this capacity to approximately 100,000 tonnes per annum. This increase in waste acceptance requires the submission of an environmental impact statement for ABP approval. It should be noted that the proposed development will not require any extension of the existing footprint of the landfill facility. No additional gross landfill capacity will be created as a result of this proposal.

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This letter is being sent as part of the environmental impact assessment process. While your reply is not obligatory, it would be of benefit to us if you could send any comments, relevant to your area of operation, for consideration in the environmental impact assessment.

We would be grateful if you could send your comments to the undersigned not later than Tuesday 05 August 2008.

Yours sincerely

Mr. Sean Meyler
for and on behalf of **Fehily Timoney & Company**

CORE HOUSE, POULADUFF ROAD, CORK, IRELAND
T: +353 21 4964133 F: + 353 21 4964464 E: info@ftco.ie W: www.fehilytimoney.ie

FEHILY TIMONEY & COMPANY

CONSULTANTS IN ENGINEERING & ENVIRONMENTAL SCIENCES

CORK DUBLIN

Our Ref: Q:CE08/286/01/Let003/SM/LY

Mr Michael McCarthy
Environment Assessment Division
Department of Environment, Heritage and Local Government
Development Applications Unit
The National Parks and Wildlife Service
Dun Sceine
Harcourt Lane
Dublin 8

22 July 2008

RE: Offaly County Council – Proposed intensification of waste acceptance activities at Derryclure Landfill

Dear Mr. McCarthy

I am writing to notify you of the intention of Offaly County Council (OCC) to submit an Environmental Impact Statement (EIS) to An Board Pleanala (ABP) for approval in relation to proposed intensification of waste acceptance activities at Derryclure Landfill.

AES Ireland Ltd. has retained Fehily Timoney & Company (FTC) to prepare this EIS. FTC is also preparing the review of the existing facility waste licence. According to standard procedures for the Environmental Impact Assessment process, FTC seeks any observations or concerns you may have regarding the proposed development.

Derryclure Landfill is located approximately 5km south of Tullamore on the N80 national secondary route. The facility is currently licenced to accept 40,000 tonnes per annum of waste. OCC proposes to increase this capacity to approximately 100,000 tonnes per annum. This increase in waste acceptance requires the submission of an environmental impact statement for ABP approval. It should be noted that the proposed development will not require any extension of the existing footprint of the landfill facility. No additional gross landfill capacity will be created as a result of this proposal.

The EIS will address the various aspects of the environment on which *the intensification of waste acceptance* could have an impact. These impacts will include traffic, ecology, noise, landscape, cultural heritage, material assets, water, climate, etc.

This letter is being sent as part of the environmental impact assessment process. While your reply is not obligatory, it would be of benefit to us if you could send any comments, relevant to your area of operation, for consideration in the environmental impact assessment.

We would be grateful if you could send your comments to the undersigned not later than Tuesday 05 August 2008.

Yours sincerely

Mr. Sean Meyler
for and on behalf of **Fehily Timoney & Company**

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FEHILY TIMONEY & COMPANY

CONSULTANTS IN ENGINEERING & ENVIRONMENTAL SCIENCES

CORK DUBLIN

Our Ref: Q:CE08/286/01/Let003/SM/LY

Mr Paddy Matthews
Failte Ireland
Baggot Street Bridge
Dublin 2

22 July 2008

RE: Offaly County Council – Proposed intensification of waste acceptance activities at Derryclure Landfill

Dear Mr. Matthews

I am writing to notify you of the intention of Offaly County Council (OCC) to submit an Environmental Impact Statement (EIS) to An Board Pleanala (ABP) for approval in relation to proposed intensification of waste acceptance activities at Derryclure Landfill.

AES Ireland Ltd. has retained Fehily Timoney & Company (FTC) to prepare this EIS. FTC is also preparing the review of the existing facility waste licence. According to standard procedures for the Environmental Impact Assessment process, FTC seeks any observations or concerns you may have regarding the proposed development.

Derryclure Landfill is located approximately 5km south of Tullamore on the N80 national secondary route. The facility is currently licenced to accept 40,000 tonnes per annum of waste. OCC proposes to increase this capacity to approximately 100,000 tonnes per annum. This increase in waste acceptance requires the submission of an environmental impact statement for ABP approval. It should be noted that the proposed development will not require any extension of the existing footprint of the landfill facility. No additional gross landfill capacity will be created as a result of this proposal.

The EIS will address the various aspects of the environment on which *the intensification of waste acceptance* could have an impact. These impacts will include traffic, ecology, noise, landscape, cultural heritage, material assets, water, climate, etc.

This letter is being sent as part of the environmental impact assessment process. While your reply is not obligatory, it would be of benefit to us if you could send any comments, relevant to your area of operation, for consideration in the environmental impact assessment.

We would be grateful if you could send your comments to the undersigned not later than Tuesday 05 August 2008.

Yours sincerely

Mr. Sean Meyler
for and on behalf of **Fehily Timoney & Company**

CORE HOUSE, POULADUFF ROAD, CORK, IRELAND
T: +353 21 4964133 F: + 353 21 4964464 E: info@ftco.ie W: www.fehilytimoney.ie

FEHILY TIMONEY & COMPANY

CONSULTANTS IN ENGINEERING & ENVIRONMENTAL SCIENCES

CORK DUBLIN

Our Ref: Q:CE08/286/01/Let003/SM/LY

Mr Paddy Matthews
The National Heritage Council
Rothe House
Kilkenny

22 July 2008

RE: Offaly County Council – Proposed intensification of waste acceptance activities at Derryclure Landfill

Dear Mr.Matthews

I am writing to notify you of the intention of Offaly County Council (OCC) to submit an Environmental Impact Statement (EIS) to An Board Pleanala (ABP) for approval in relation to proposed intensification of waste acceptance activities at Derryclure Landfill.

AES Ireland Ltd. has retained Fehily Timoney & Company (FTC) to prepare this EIS. FTC is also preparing the review of the existing facility waste licence. According to standard procedures for the Environmental Impact Assessment process, FTC seeks any observations or concerns you may have regarding the proposed development.

Derryclure Landfill is located approximately 5km south of Tullamore on the N80 national secondary route. The facility is currently licenced to accept 40,000 tonnes per annum of waste. OCC proposes to increase this capacity to approximately 100,000 tonnes per annum. This increase in waste acceptance requires the submission of an environmental impact statement for ABP approval. It should be noted that the proposed development will not require any extension of the existing footprint of the landfill facility. No additional gross landfill capacity will be created as a result of this proposal.

The EIS will address the various aspects of the environment on which *the intensification of waste acceptance* could have an impact. These impacts will include traffic, ecology, noise, landscape, cultural heritage, material assets, water, climate, etc.

This letter is being sent as part of the environmental impact assessment process. While your reply is not obligatory, it would be of benefit to us if you could send any comments, relevant to your area of operation, for consideration in the environmental impact assessment.

We would be grateful if you could send your comments to the undersigned not later than Tuesday 05 August 2008.

Yours sincerely

Mr. Sean Meyler
for and on behalf of **Fehily Timoney & Company**

CORE HOUSE, POULADUFF ROAD, CORK, IRELAND
T: +353 21 4964133 **F:** + 353 21 4964464 **E:** info@ftco.ie **W:** www.fehilytimoney.ie

FEHILY TIMONEY & COMPANY

CONSULTANTS IN ENGINEERING & ENVIRONMENTAL SCIENCES

CORK DUBLIN

Our Ref: Q:CE08/286/01/Let003/SM/LY

Mr Ian Lumley
Heritage Officer
An Taisce
Tailor's Hall
Backlane
Dublin 8

22 July 2008

RE: Offaly County Council – Proposed intensification of waste acceptance activities at Derryclure Landfill

Dear Mr.Lumley

I am writing to notify you of the intention of Offaly County Council (OCC) to submit an Environmental Impact Statement (EIS) to An Board Pleanala (ABP) for approval in relation to proposed intensification of waste acceptance activities at Derryclure Landfill.

AES Ireland Ltd. has retained Fehily Timoney & Company (FTC) to prepare this EIS. FTC is also preparing the review of the existing facility waste licence. According to standard procedures for the Environmental Impact Assessment process, FTC seeks any observations or concerns you may have regarding the proposed development.

Derryclure Landfill is located approximately 5km south of Tullamore on the N80 national secondary route. The facility is currently licenced to accept 40,000 tonnes per annum of waste. OCC proposes to increase this capacity to approximately 100,000 tonnes per annum. This increase in waste acceptance requires the submission of an environmental impact statement for ABP approval. It should be noted that the proposed development will not require any extension of the existing footprint of the landfill facility. No additional gross landfill capacity will be created as a result of this proposal.

The EIS will address the various aspects of the environment on which *the intensification of waste acceptance* could have an impact. These impacts will include traffic, ecology, noise, landscape, cultural heritage, material assets, water, climate, etc.

This letter is being sent as part of the environmental impact assessment process. While your reply is not obligatory, it would be of benefit to us if you could send any comments, relevant to your area of operation, for consideration in the environmental impact assessment.

We would be grateful if you could send your comments to the undersigned not later than Tuesday 05 August 2008.

Yours sincerely

Mr. Sean Meyler
for and on behalf of **Fehily Timoney & Company**

CORE HOUSE, POULADUFF ROAD, CORK, IRELAND
T: +353 21 4964133 **F:** + 353 21 4964464 **E:** info@ftco.ie **W:** www.fehilytimoney.ie

Appendix 2

Replies received to Consultation Letters

Suirbhéireacht Gheolaíochta Éireann
Tor an Bhacaigh
Bóthar Hadington
Baile Átha Cliath 4

Geological Survey of Ireland
Beggars Bush
Haddington Road
Dublin 4
Tel. +353 1 6707444
Fax. +353 1 6681782
http://www.gsi.ie

Mr Sean Meyler
Fehily Timoney & Company
Core House
Pouladuff Road
Cork

24/07/2008

RE: Offaly County Council – Proposed intensification of waste acceptance activities at Derryclure Landfill

Dear Sir,

I would like to acknowledge receipt of your letter of July 22nd 2008 concerning the above scheme.

The Geological Survey of Ireland (GSI) is the national earth science agency and has datasets on Bedrock Geology, Quaternary Geology, Geological Heritage Sites, Mineral deposits, Groundwater Resources and the Irish Seabed. These comprise maps, reports and extensive databases that include mineral occurrences, bedrock/mineral exploration groundwater/site investigation boreholes, karst features, wells and springs. Please see our website at http://www.gsi.ie for data availability.

Please note that some maps/databases are available on the GSI website under "Online Mapping" or "Web Mapping"- direct link: http://www.gsi.ie/Mapping.htm
Data currently available is for Bedrock, Groundwater, Karst, Geotechnical boreholes, Mineral locations and the Quarry Directory. Geological Heritage data is in the process of being migrated to this website, but please continue to contact Sophie Preteseille at sophie.preteseille@gsi.ie, Sarah Gatley at sarah.gatley@gsi.ie, or Bernie Mockler at Bernadette.mockler@gsi.ie, directly.

Please note that it would greatly facilitate our database search if the site location in all EIS and related planning enquiries is given in Irish National Grid (ING) co-ordinates, i.e. as six-digit Eastings (X) and six-digit Northings (Y) [For example, O'Connell Bridge, Dublin would be X 315988 Y 234396].
Co-ordinates in this format can be obtained from GSI's online mapping service at http://www.gsi.ie/Mapping.htm

There is currently a 1-2 week turnaround for answering EIS enquiries. We will endeavour to meet your closing date. However, we would like to bring to your attention the frequent late arrival in this office of requests for input into EIS, etc for proposed developments, rendering GSI unable to comment within the specified timeframe.

If you need any further information, please do not hesitate to contact this office.

Yours sincerely,

_____
John Butler/Ronnie Creighton
Senior Geologist, Head Geotechnical Programme

Suirbhéireacht Gheolaíochta Éireann
Tor an Bhacaigh
Bóthar Hadington
Baile Átha Cliath 4

Geological Survey of Ireland
Beggars Bush
Haddington Road
Dublin 4

Tel. +353 1 6782781
Fax. +353 1 6782569

Dear Sir/Madam,

Re: Environmental Impact Assessments (EIA)/Environmental Impact Statements (EIS)

Thank you for your enquiry. Unfortunately, the Groundwater Section does not have the resources to assess, or make observations on, specific EIAs/EISs.

However, we do advise that when considering environmental impacts of planned activities/developments that all of the Groundwater Section's datasets are taken into consideration. These data comprise:

1) National Maps, which can be obtained from the GSI's website (www.gsi.ie), and include:

- *Generalised Bedrock Map*, which groups the different Irish bedrock formations (>1000) into 28 classes based on their stratigraphy and the main lithological and structural properties that influence their groundwater flow properties;
- *Bedrock Aquifer Map*: subdivides Irish bedrock into three main categories and seven sub-categories depending on their specific aquifer properties;
- *Gravel Aquifer Map*: identifies the Irish sand/gravel deposits that function as aquifers and sub-divides them into two categories depending on their specific properties;
- *Interim Vulnerability Map*, which is a composite map comprising (i) full[1] and interim[2] vulnerability mapping undertaken by the GSI for Local Authorities (i.e. the Groundwater Protection Schemes – 11 available digitally) and (ii) interim vulnerability mapping undertaken by consultants working for one or more of each of the seven River Basin Districts (RBDs);
- *Source Protection Areas Map*, which constitute the outer (zone contributing groundwater to the abstraction point) and inner (estimated 100 day time of travel of the groundwater to the abstraction point) source protection areas delineated by the GSI (120 sources) and other consultants (5 sources).

2) National Data, which can be requested from Groundwater Section enquiries desk (Groundwaterinfo@gsi.ie), and include:

- *Groundwater Body (GWB) Delineation and Descriptions*: subdivision of the aquifers based on their flow regime and no-flow boundaries. Each GWB is fully described, with all available data and information sources referenced.
- *Wells Database*: c.36,000 wells and boreholes, from different sources, with varying amounts of information e.g. location, depth to bedrock, yields.
- *Karst Features Database*: c.4,000 recorded features with varying amounts of information.
- *Karst Tracer-Tests Database*: c.275 recorded connections with varying amounts of information.

[1] Full vulnerability maps comprise up to five vulnerability classes– E (Rock near Surface or Karst), Extreme, High, Moderate and Low).
[2] Interim vulnerability maps comprise three vulnerability classes – E (Rock near Surface or Karst), Extreme and undifferentiated High-Low.

3) Other Reports

- *Groundwater Protection Scheme (GWPS) Reports*: more recent (digital) GWPSs are available for 11 counties, older schemes are available for 4 counties and 2 are due to be completed in 2007 (Groundwaterinfo@gsi.ie).
- *Source Protection Reports*, which describe all available information for the particular source and how the source protection zones were delineated (Groundwaterinfo@gsi.ie).
- *Various historic reports*, which can be obtained on the Document Management System (via the GSI's Customer Centre).

It is hoped that most of these data will be soon available through the website. In the meantime, when making an enquiry, please supply a location map and/or grid coordinates in order to facilitate the data search.

Other useful and related data can be found on Water Framework Directive Ireland website (http://www.wfdireland.ie)

I hope that you find this information of use.

Yours faithfully,

Monica Lee.
Groundwater Section.

Environmental Protection Agency
An Ghníomhaireacht um Chaomhnú Comhshaoil

Regional Inspectorate
McCumiskey House, Richview,
Clonskeagh Road, Dublin 14, Ireland

Cigireacht Réigiúnach, Teach Mhic Chumascaigh
Dea-Radharc, Bóthar Cluain Sceach
Baile Átha Cliath 14, Éire

T: +353 1 268 0100
F: +353 1 268 0199
E: info@epa.ie
W: www.epa.ie

LoCall: 1890 33 55 99

Mr. Seán Meyler
Fehily Timony & Company
Core House
Pouladuff Road
Cork

29th July 2008

Ref.: W0029-02

Re.: Offaly County Council – Proposed intensification of waste acceptance activities at Derryclure Landfill.

Dear Mr. Meyler,

I acknowledge receipt of your letter dated 23rd July 2008 in relation to the intention of Offaly County Council to submit an Environmental Impact Statement (EIS) to An Bord Pleanála for approval in relation to proposed intensification of waste acceptance at Derryclure Landfill.

I can confirm that a waste licence review would be necessary for the proposed intensification - an increase in waste acceptance from 40,000 tonnes per annum to 100,000 tonnes per annum – and that the licence review application must be accompanied by the Environmental Impact Statement.

I am to advise you that the EPA does not propose to make any comments with regard to the environmental impact assessment at this time. The EPA will take into account any environmental considerations in relation to the proposed development as part of the licensing process. In addition I wish to advise that the licensee and/or representatives should consult with the EPA, by means of a pre-application meeting, prior to the submission of the review application and EIS.

Should you wish to discuss this matter further, please do not hesitate to contact me.

Yours sincerely,

Ciara Maxwell
Licensing Inspector
Office of Climate, Licensing & Resource Use

Sean Meyler

From: Sophie Preteseille [Sophie.Preteseille@gsi.ie]

Sent: 01 August 2008 15:51

To: Sean Meyler

Subject: RE: FAO Sean Meyler / Offaly County Council - Proposed intensification of wasted acceptance activities at Derryclure Landfill, Ref: Q:CE08/286/01/Let003/SM/LY

Sean,

With reference to your letter of the 22nd July 2008, concerning the above scheme, **there are no geological heritage sites** currently on our database that lie within or near the area.

For your information, the Geological Survey of Ireland (GSI) is in partnership with the National Parks and Wildlife Service (NPWS) of the Department of Environment, Heritage and Local Government to identify and select important geological and geomorphological sites throughout the country for designation as NHAs (Natural Heritage Areas). This is being addressed under 16 different geological themes. For each theme a larger number of sites from which to make the NHA selection are being examined, in order to identify the most significant scientifically. Our criterion of designating the minimum number of sites to exemplify the theme means that many sites of national importance are not selected as the very best examples. However, a second tier of County Geological Sites (CGS) (as per the National Heritage Plan) means that many of these can be included in County Development Plans and receive a measure of recognition and protection through inclusion in the planning system. Please note that we are still in the process of finalizing these proposed sites.

Should development go ahead (all other factors considered), GSI would much appreciate a copy of reports detailing any site investigations carried out. The data would be added to GSI's national database of site investigation boreholes, implemented to provide a better service to the civil engineering sector.

GSI would also request notification of ground excavations, etc. undertaken that might provide good geological exposures for our examination. This would allow recording, fossil or rock sample collecting and gathering of new data in order to enhance our understanding of the area.

Should any significant bedrock cuttings be created, we would ask that they be designed to remain visible as rock exposure rather than covered with soil and vegetated.

The Geological Survey of Ireland (GSI) is the national earth science agency and has datasets on Bedrock Geology, Quaternary Geology, Geological Heritage Sites, Mineral deposits, Groundwater Resources and the Irish Seabed. These comprise maps, reports and extensive databases that include mineral occurrences, bedrock/mineral exploration groundwater/site investigation boreholes, karst features, wells and springs. Please see our website at http://www.gsi.ie for data availability.

Please note that some maps/databases are available on the GSI website under "Online Mapping" or "Web Mapping"- direct link: http://www.gsi.ie/Mapping.htm
Data currently available is for Bedrock, Groundwater, Karst, Geotechnical boreholes, Mineral locations and the Quarry Directory. Geological Heritage data is in the process of being migrated to this website, but please continue to contact Sophie Preteseille at sophie.preteseille@gsi.ie, Sarah Gatley at sarah.gatley@gsi.ie, or Bernie Mockler at Bernadette.mockler@gsi.ie, directly.

I hope that these comments are of assistance, and if the GSI can be of any further help, please contact me.

Regards,
Sophie

Sophie Préteseille
Irish Geological Heritage Programme
& Copper Coast Geopark

Geological Survey of Ireland
Beggars Bush
Haddington Road
Dublin 4

T. +353(0)16782741

http://www.gsi.ie
http://www.coppercoastgeopark.com

14/10/2008

http://www.planetearth.ie

From: Sean Meyler [mailto:sean.meyler@FTCO.IE]
Sent: 31 July 2008 12:51
To: Sophie Preteseille
Subject: RE: FAO Sean Meyler / Offaly County Council - Proposed intensification of wasted acceptance activities at Derryclure Landfill, Ref: Q:CE08/286/01/Let003/SM/LY

Hi Sophie,

Grid coordinates to approximately the centre of the facility as follows:

Easting 235512.94 m
Northing 220452.09 m

Regards,

Sean Meyler

From: Reception
Sent: 31 July 2008 12:37
To: Sean Meyler
Subject: FW: FAO Sean Meyler / Offaly County Council - Proposed intensification of wasted acceptance activities at Derryclure Landfill, Ref: Q:CE08/286/01/Let003/SM/LY
Importance: High

FYI - Mary

From: Sophie Preteseille [mailto:Sophie.Preteseille@gsi.ie]
Sent: 31 July 2008 12:03
To: Reception
Subject: FAO Sean Meyler / Offaly County Council - Proposed intensification of wasted acceptance activities at Derryclure Landfill, Ref: Q:CE08/286/01/Let003/SM/LY
Importance: High

Dear Mr Meyler,

We received your letter dated of the 22nd July regarding the above proposed development.
In order to prepare the response from the Irish Geological Heritage Programme, I would be grateful if you could provide us with a **grid reference** (central point will do) for us to locate the Derryclure landfill as land surface appearance from aerial photos can be misleading.

Regards,
Sophie

Sophie Préteseille
Irish Geological Heritage Programme
& Copper Coast Geopark

Geological Survey of Ireland
Beggars Bush
Haddington Road
Dublin 4

T. +353(0)16782741

http://www.gsi.ie
http://www.coppercoastgeopark.com
http://www.planetearth.ie

Sean Meyler

From: Reception
Sent: 05 August 2008 14:31
To: Sean Meyler
Subject: FW: Proposed Intensification of Waste Acceptance Activities at Derryclure Landfill
Attachments: EDMS 65417_EIS_DerryclureLandfill_Aug'08.doc

From: Olivia Morgan [mailto:OMORGAN@nra.ie]
Sent: 05 August 2008 14:24
To: Reception
Subject: Proposed Intensification of Waste Acceptance Activities at Derryclure Landfill

Dear Sir/Madam

Please find attached NRA comments in relaiotn to above. Original in post

Kind regards
Olivia Morgan

<<EDMS 65417_EIS_DerryclureLandfill_Aug'08.doc>>

National Roads Authority
An tÚdarás um Bóithre Náisiúnta

St. Martin's House / Waterloo Road / Dublin 4
Tel: +353 1 660 2511 / Fax: +353 1 668 0009

Mr. Sean Meyler
Fehily Timoney & Company
Core House
Pouladuff Road
Cork

Date	Our Ref.	Your Ref.
5th August 2008	EDMS 65417	

Re: EIS Scoping for proposed intensification of waste acceptance activities at Derryclure Landfill

Dear Mr Meyler

Thank you for your letter of 22nd July 2008 regarding the above.

The Authority wishes to advise that it is not in a position to engage directly with planning applicants in respect to proposed developments.

The Authority will endeavour to consider and respond to planning applications referred to it given its status and duties as a statutory consultee under the Planning Acts. The approach to be adopted by the Authority in making such submissions or comments will seek to uphold official policy and guidelines as outlined in our Circular 6/2006 **"Policy Statement on Development Management and Access to National Roads"** and other relevant circulars, which are available at www.nra.ie.

The issuing of this correspondence is provided as best practice guidance only and does not prejudice the NRA's statutory right to make any observations, requests for further information, objections or appeals following the examination of any valid planning application referred.

With respect to EIS scoping issues, the recommendations indicated below provide only general guidance for the preparation of EIS, which may affect the National Roads Network.

The developer should have regard, *inter alia*, to the following:

- Consultations should be had with the relevant Local Authority/National Roads Design Office with regard to locations of existing and future national road schemes.
- The Authority would be specifically concerned as to potential significant impacts the development would have on any national roads. In particular the Authority would be keen that the EIS consider the proximity of the proposed development to the existing N80.

- The developer should assess visual impacts from the existing national road.
- The developer should have regard to any Environmental Impact Statement and all conditions and/or modifications imposed by An Bord Pleanála regarding road schemes in the area. The developer should in particular have regard to any potential cumulative impacts.
- The developer, in conducting Environmental Impact Assessment, should have regard to the NRA DMRB and the NRA Manual of Contract Documents for Road Works.
- The developer, in conducting Environmental Impact Assessment, should have regard to the NRA's Environmental Assessment and Construction Guidelines, including the *Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes* (National Roads Authority, 2006);
- The EIS should consider the Environmental Noise Regulations 2006 (SI 140 of 2006) and, in particular, how the development will affect future action plans by the relevant competent authority. The developer may need to consider the incorporation of noise barriers to reduce noise impacts (see *Guidelines for the Treatment of Noise and Vibration in National Road Schemes* (1st Rev., National Roads Authority, 2004));
- It would be important that, where appropriate, subject to meeting the appropriate thresholds and criteria, a Traffic and Transport Assessment be carried out in accordance with relevant guidelines and best practice, noting traffic volumes attending the site and traffic routes to/from the site with reference to impacts on the national road network and junctions of lower category roads with national roads. The Authority's Traffic and Transport Assessment Guidelines (2003) should be referred to in this regard;
- The designers are asked to consult the National Roads Authority's *Road Safety Audit Guidelines* (NRA HA 42/04) and *Road Safety Audit* (NRA HD 19/04) to determine whether a Road Safety Audit is required.
- The EIS should address the impacts of dust generated by activities on roads including:
    - The soiling of roads from dust generated from both the development activity and vehicles traveling to and from the site;
    - Whether such soiling may increase the risk of accidents; and,
    - The affect such soiling and runoff will have on the existing road drainage system.

Notwithstanding, any of the above, the developer should be aware that this list is non-exhaustive, thus site and development specific issues should be addressed in accordance with best practise.

I hope that the above comments are of use in your scoping process.

Yours sincerely

Olivia Morgan

Olivia Morgan
Programme & Regulatory Unit

Comhshaol, Oidhreacht agus Rialtas Áitiúil
Environment, Heritage and Local Government

8 August 2008

Our Ref: G2008/628

Mr. Sean Meyler,
Fehily Timoney & Co.,
Core House,
Pouladuff Road,
Cork.

Re: Proposed intensification of waste acceptance activities at Derryclure landfill, Co. Offaly.

A Chara,

We refer to your letter dated 22 July 2008 regarding the above-proposed development. Outlined below are the archaeological recommendations of the Department of the Environment, Heritage and Local Government.

We note from your letter that no groundworks are necessary to provide for the intensification of activities at the site. This being so, this Department would have no archaeological objection to the works proceeding as planned.

Should this situation change and groundworks become necessary, this Department should be consulted again.

Finally, this recommendation is based on the papers submitted to this Department on a pre-planning basis and is made without prejudice to any decision the Minister may take upon sight of a formal planning application or the submission of an Environmental Impact Statement.

Mise le Meas,

Teresa Halloran

Teresa Halloran,
Development Applications Unit.

OPW
The Office of Public Works
Oifig na nOibreacha Poiblí

Engineering Services
17-19 Lower Hatch Street
Dublin 2

Seirbhísí Innealtóireachta
17-19 Sráid Haiste Íochtar
Baile Átha Cliath 2

Our Ref: 1080-2008
Your Ref: Q:CE08/286/01/Let003/SM/LY

Mr. Sean Meyler,
Fehily Timoney & Company,
Core House,
Pouladuff Road,
Cork.

Re: Offaly County Council – Proposed intensification of waste acceptance activities at Derryclure Landfill

Dear Mr. Meyler,

I refer to your correspondence dated 22nd July 2008 in relation to the above matter.

The documentation submitted has been examined and it has been determined that the proposed intensification of waste acceptance at this location will not impinge on OPW maintenance works (see attached map).

It should be noted that the construction of any new bridges or the alteration of existing bridges over channels or watercourses as part of this project will require the consent of the Commissioners of Public Works under the terms of Section 50 of the Arterial Drainage Act, 1945. This consent must be sought **PRIOR** to the commencement of any such works.

I have enclosed the relevant Section 50 for your information and any completed application forms should be sent to Mr. Shane Flaherty, Office of Public Works, Newtown, Trim, Co. Meath.

Yours sincerely,

Conor McDermott

Conor McDermott
Engineering Services
13th August 2008

Telephone/Teileafón: (01) 647 6000 Fax/Faics: (01) 647 6486 / (01) 676 9821
Email/Ríomhphost: info@opw.ie Website/Suíomh Gréasáin: www.opw.ie

OPW

Construction, Replacement or Alteration of Bridges and Culverts
Application for Consent under Section 50 of the Arterial Drainage Act, 1945

Project Name	Structure Ref No.

Applicant (Correspondence will issue to agent)

Company or Organisation Name:

Postal Address:

Contact Person:

Phone: Fax:

E-mail:

Agent (Correspondence will issue to agent)

Company or Organisation Name:

Postal Address:

Contact Person:

Phone: Fax:

E-mail:

Location and Parameters of crossing

Watercourse: Catchment:

Address (Townland – County):

Grid Reference X: Y:

Hydrometric Station(s) utilized (including reference number):

Area of Contributing Catchment: Km^2 Road Reference:

Design Flood Flow: m^3/s Annual Exceedance Probability (AEP): %

Statement of Authenticity

I hereby certify that the information contained in this application form, along with all appended supporting information, has been checked by me and that all statements are true and accurate.

Name:

Company/Organisation:

Signature:

Date:

Application Check List	☐
COMPLETED APPLICATION FORM	☐
SUPPORTING HYDROLOGICAL AND HYDRAULIC INFORMATION	☐
PHOTOGRAPHS COVERING SITE OF ALL PROPOSED WORKS	☐
SCALED PLAN OF BRIDGE/CULVERT/APPROACH EARTHWORKS	☐
SCALED CROSS SECTION OF BRIDGE/CULVERT/APPROACH EARTHWORKS	☐
SCALED LONG SECTION OF CHANNEL THROUGH BRIDGE/CULVERT	☐
DETAILS OF RELEVANT EXISTING STRUCTURES	☐
COMPLETED STATEMENT OF AUTHENTICITY	☐
PLAN OF CATCHMENT AREA	☐
COPY OF NOTICE OF GRANT OF PLANNING PERMISSION WITH CONDITIONS	☐

For OPW use only	*Date of Receipt*							
OPW Drainage Maintenance Region	*East*	☐	*South East*	☐	*South West*	☐	*West*	☐
Correspondence Number		*OPW Register No:*						
		Consent Issued	☐					

If the application form is not completed correctly, and in its entirety, the application may be deemed invalid and returned for correction.

ADDITIONAL INFORMATION

Hydrological Analysis

Methodology Applied

Method Used	Tick box if used or state other	Flow *1 (m^3/sec)
6 - Variable FSR Catchment Characteristics	☐	
3 - Variable FSR Catchment Characteristics	☐	
IH 124	☐	
Gauged Flow	☐	
Unit Hydrograph	☐	
Other	☐	
Other	☐	
Comments		

Factors Applied

Type of Factor	Value Used
Factor for Standard Error	
Climate Change	
Irish Growth Curve	
Drained Channel	
Other	
Tidal ☐	

Hydraulic/Structure Details

Description of Structure *2

Effective Conveyance Area *3 m^2

Upstream Invert Level	mOD	Downstream Invert Level	mOD
Upstream Soffit Level	mOD	Downstream Soffit Level	mOD
Upstream Design Flood Level	mOD	Downstream Design Flood Level	mOD

NOTES :

1. A copy of the notice of grant of planning permission with all conditions should be enclosed with all applications that are not exempt development under the Planning and Development Act, 2000.
2. Flow is the estimated flow from the catchment, without any factors applied.
3. The following details are to be included: the channel bed level, invert and soffit levels of the structure along with the width, length and total conveyance area. Any environmental considerations such as bed depression, baffles, mammal walkways etc. should be described.
4. Effective conveyance area is from channel bed level to design flood level.
5. All levels must be given to Ordnance Datum, Malin Head.

If the application form is not completed correctly, and in its entirety, the application may be deemed invalid and returned for correction.

Section 50 of the Arterial Drainage Act, 1945

(1) No local authority, no railway company, canal company or other similar body, and no industrial concern shall construct any new bridge or alter, reconstruct, or restore any existing bridge over any watercourse without the consent of the Commissioners or otherwise than in accordance with plans previously approved of by the Commissioners.

(2) If any person shall construct or begin to construct or partially construct a new bridge in contravention of this section, the Commissioners may serve by post on such person a notice requiring him:-

- If such bridge has not been completely constructed to desist forthwith from the construction thereof,

- In any case, to remove, within a time specified in that behalf in such notice, such bridge or so much thereof as shall have been constructed.

(3) If any person shall alter, reconstruct, or restore an existing bridge in contravention of this section or shall begin so to do or shall partially so do, the Commissioners may serve by post on such person a notice requiring him:-

- If such alteration, reconstruction, or restoration has not been completed, to desist forthwith therefrom, or

- In any case, to remove, within a time specified in that behalf in such notice, all work done on such bridge, or

- In any case, within a time specified in that behalf in such notice, to restore such bridge to its original condition.

(4) If any person on whom a notice has been served by the Commissioners under the foregoing provisions of this section fails to comply with such notice the following provisions shall apply and have effect, that is to say:-

- Such person shall be guilty of an offence under this section and shall be liable, on summary conviction thereof, to a fine not exceeding fifty pounds together with a further fine not exceeding five pounds for every day during which such failure is continued;

- It shall be lawful for the Commissioners (whether such person has or has not been prosecuted under the foregoing paragraph of this sub-section) to enter upon and remove all work done in contravention of this section and to recover from such person in any court of competent jurisdiction as a simple contract debt the expenses (as certified by the Commissioners) incurred by the Commissioners in effecting such removal.

(5) Any person who claims that the Commissioners have unreasonably refused their approval of plans submitted by him for the construction of a new bridge or the alteration, reconstruction of an existing bridge may, by notice in writing to the Commissioners, require such claim to be referred under this sub-section and thereupon:-

- If such person is a local authority, such claim shall be referred to the Minister for Local Government and Public Health, whose decision thereon shall be final, or

- In any other case such claim shall be referred to an arbitrator appointed by the Reference Committee from the Panel of Drainage Arbitrators whose decision thereon shall be final and conclusive.

(6) In this section, the word "bridge" includes a culvert or other like structure.

Back To Top

THE DEPARTMENT OF
AGRICULTURE, FISHERIES & FOOD
AN ROINN TALMHAÍOCHTA, IASCAIGH & BIA

1st September, 2008

Mr. Sean Meyler
Fehily, Timoney & Co.
Core House
Pouladuff Road
Cork

Your Ref: Q:CE08/286/01/Let003/SM/LY

Re: Offaly County Council – Proposed intensification of waste acceptance activities at Derryclure Landfill.

Dear Mr. Meyler,

Thank you for your letter dated 22nd July, 2008. I wish to apologise that this Department has not returned any comments on the above by your deadline of 5th August, 2008.

We will have our comments/observations back to you as soon as possible.

Yours Sincerely,

Joan Stone

Joan Stone
Environment Section

Tel: 053 9163400 Fax: 053 9142839

www.agriculture.gov.ie VAT.Reg. IE4773186Q

Johnstown Castle Estate,
Co. Wexford, Ireland.

Eastát Chaisleán Bhaile Sheonach,
Chontae Loch Garman, Éire.

THE DEPARTMENT OF
AGRICULTURE, FISHERIES & FOOD
AN ROINN TALMHAÍOCHTA, IASCAIGH & BIA

4th September, 2008.

Mr. Sean Meyler
Fehily, Timoney & Co.
Core House
Pouladuff Road
Cork

Your Ref: Q:CE08/286/01/Let003/SM/LY

Re: Offaly County Council – Proposed Intensification of waste acceptance activities at Derryclure Landfill

Dear Mr. Meyler,

I refer to your request dated 22 July, 2008 for observations from this Department concerning the above matter. I wish to apologise for the delay in replying to your letter. I suggest that your firm consider the likely impact, if any, of the proposed intensification of waste acceptance activities at the Derryclure facility on agriculture/agricultural activities in the locality as part of the environment impact assessment. Aspects that should be considered include the following:

- Impact on local water supplies (quality)
- Impact of increased traffic (safety)
- Impact of scavenging birds, vermin
- Impact of dust generated
- Impact of litter
- Odour impacts
- Methane emissions
- Impact of noise

Yours sincerely,

Michael MacCarthy
Environment Section

Johnstown Castle Estate,
Co. Wexford, Ireland.

Tel: 053 9163400 Fax: 053 9142839

www.agriculture.gov.ie VAT.Reg. IE4773186Q

Eastát Chaisleán Bhaile Sheonach,
Chontae Loch Garman, Éire.

Appendix 3

Leachate Water Balance Calculations

FEHILY TIMONEY & COMPANY

CONSULTANTS IN ENGINEERING & ENVIRONMENTAL SCIENCES

Cork : Tel 021-4964133 Fax 021-4964464

DESIGNED:	TM	**CHECKED:**	SM
DATE:	15.8.08	**REVISION:**	2
JOB NUMBER:	CE07-286-01		
CALC NUMBER:	C-04		
FILE	Q:\2007\CE07\286\01\Calculations\Water balance\CE07-286-01 Calc Set 04 rev2 EIS Water balance.xls		
SHEET	scenario no.1		

PROJECT: **Derryclure waste licence review**

DESCRIPTION: **Water Balance Calculation for *Scenario 1: 40,000 tpa Intake***

Appendix A

Year	Rainfall	Potential Evapotran-spiration	Effective Rainfall	Waste Input	Active Area	Temp. Covered Area	Perm. Capped Area	Infiltration			Absorptive Capacity	Leachate Generation			Total Predicted Leachate	Cumulative Predicted Leachate
								Active	Temp. Covered	Perm. Capped		Active Leachate	Temp. Covered	Perm. Capped		
	(mm)	(mm)	(mm)	(tonnes)	(m^2)	(m^2)	(m^2)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)
2009	804.10	435.22	368.89	40,000	25,000	0	71,000	20,103	0	1,310	2,800	17,303	0	1,310	18,612	18,612
2010	804.10	435.22	368.89	40,000	16,667	8,333	71,000	13,402	922	1,310	2,800	10,602	922	1,310	12,833	31,445
2011	804.10	435.22	368.89	40,000	8,333	16,667	71,000	6,701	1,844	1,310	2,800	3,901	1,844	1,310	7,055	38,500
2012	804.10	435.22	368.89	40,000	16,875	0	96,000	13,569	0	1,771	2,800	10,769	0	1,771	12,540	51,040
2013	804.10	435.22	368.89	40,000	12,656	4,219	96,000	10,177	467	1,771	2,800	7,377	467	1,771	9,614	60,655
2014	804.10	435.22	368.89	40,000	8,438	8,438	96,000	6,785	934	1,771	2,800	3,985	934	1,771	6,689	67,343
2015	804.10	435.22	368.89	40,000	4,219	12,656	96,000	3,392	1,401	1,771	2,800	592	1,401	1,771	3,764	71,107
2016	804.10	435.22	368.89	40,000	16,875	0	112,875	13,569	0	2,082	2,800	10,769	0	2,082	12,851	83,958
2017	804.10	435.22	368.89	40,000	12,656	4,219	112,875	10,177	467	2,082	2,800	7,377	467	2,082	9,926	93,884
2018	804.10	435.22	368.89	40,000	8,438	8,438	112,875	6,785	934	2,082	2,800	3,985	934	2,082	7,000	100,884
2019	804.10	435.22	368.89	40,000	4,219	12,656	112,875	3,392	1,401	2,082	2,800	592	1,401	2,082	4,075	104,959
2020	804.10	435.22	368.89	40,000	14,375	0	129,750	11,559	0	2,393	2,800	8,759	0	2,393	11,152	116,111
2021	804.10	435.22	368.89	40,000	10,781	3,594	129,750	8,669	398	2,393	2,800	5,869	398	2,393	8,660	124,771
2022	804.10	435.22	368.89	40,000	7,188	7,188	129,750	5,779	795	2,393	2,800	2,979	795	2,393	6,168	130,939
2023	804.10	435.22	368.89	40,000	3,594	10,781	129,750	2,890	1,193	2,393	2,800	90	1,193	2,393	3,676	134,615
2024	804.10	435.22	368.89	40,000	14,375	0	144,125	11,559	0	2,658	2,800	8,759	0	2,658	11,417	146,032
2025	804.10	435.22	368.89	40,000	9,583	4,792	144,125	7,706	530	2,658	2,800	4,906	530	2,658	8,095	154,127
2026	804.10	435.22	368.89	40,000	4,792	9,583	144,125	3,853	1,061	2,658	2,800	1,053	1,061	2,658	4,772	158,898
2027	804.10	435.22	368.89	40,000	8,625	0	158,500	6,935	0	2,923	2,800	4,135	0	2,923	7,059	165,957
2028	804.10	435.22	368.89	40,000	4,313	4,313	158,500	3,468	477	2,923	2,800	668	477	2,923	4,068	170,026
2029	804.10	435.22	368.89	40,000	15,525	0	167,125	12,484	0	3,082	2,800	9,684	0	3,082	12,766	182,792
2030	804.10	435.22	368.89	40,000	7,763	7,763	167,125	6,242	859	3,082	2,800	3,442	859	3,082	7,383	190,175
2031	804.10	435.22	368.89	40,000	5,750	0	182,650	4,624		3,369	2,800	1,824	0	3,369	5,192	195,368
2032	804.10	435.22	368.89	33,758	0	0	188,400	0	0	3,475	2,363	0	0	3,475	3,475	198,842
Total	**8,845**	**4,787**	**4,058**	**953,758**				**108,051**	**8,369**	**19,339**	**30,800**	**129,418**	**13,682**	**55,742**	**198,842**	

Infiltration rates (%)	
Active Area	100
Temp. Covered Area	30
Temp. Restored Area	5

† Absorptive Capacity (m^3/tonne) 0.07

FEHILY TIMONEY & COMPANY

CONSULTANTS IN ENGINEERING & ENVIRONMENTAL SCIENCES

Cork : Tel 021-4964133 Fax 021-4964464

DESIGNED: TM **CHECKED:** SM

DATE: 15.8.08 **REVISION:** 2

JOB NUMBER: CE07-286-01

CALC NUMBER: C-04

FILE Q:\2007\CE07\286\01\Calculations\Water balance\CE07-286-01 Calc Set 04 rev2 EIS Water balance.xls

SHEET scenario no.2

PROJECT: **Derryclure waste licence review**

DESCRIPTION: **Water Balance Calculation for *Scenario 2: 100,000 tpa Intake***

Appendix B

Month	Rainfall	Potential Evapotran-spiration	Effective Rainfall	Waste Input	Active Area	Temp. Covered Area	Perm. Capped Area	Infiltration			Absorptive Capacity	Leachate Generation			Total Predicted Leachate	Cumulative Predicted Leachate
								Active	Temp. Covered	Perm. Capped		Active Leachate	Temp. Covered	Perm. Capped		
	(mm)	(mm)	(mm)	(tonnes)	(m^2)	(m^2)	(m^2)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)
2009	804.10	435.22	368.89	100,000	25,000	0	71,000	20,103	0	1,310	7,000	13,103	0	1,310	14,412	14,412
2010	804.10	435.22	368.89	100,000	16,875	0	96,000	13,569	0	1,771	7,000	6,569	0	1,771	8,340	22,752
2011	804.10	435.22	368.89	100,000	16,875	0	96,000	13,569	0	1,771	7,000	6,569	0	1,771	8,340	31,092
2012	804.10	435.22	368.89	100,000	16,875	0	112,875	13,569	0	2,082	7,000	6,569	0	2,082	8,651	39,743
2013	804.10	435.22	368.89	100,000	14,375	0	129,750	11,559	0	2,393	7,000	4,559	0	2,393	6,952	46,695
2014	804.10	435.22	368.89	100,000	14,375	0	129,750	11,559	0	2,393	7,000	4,559	0	2,393	6,952	53,647
2015	804.10	435.22	368.89	100,000	14,375	0	144,125	11,559	0	2,658	7,000	4,559	0	2,658	7,217	60,864
2016	804.10	435.22	368.89	100,000	8,625	0	158,500	6,935	0	2,923	7,000	0	0	2,923	2,923	63,788
2017	804.10	435.22	368.89	100,000	21,275	0	167,125	17,107	0	3,082	7,000	10,103	0	3,082	13,190	76,977
2018	804.10	435.22	368.89	53,758	5,750	0	182,650	4,624	0	3,369	3,763	861	0	3,369	4,229	81,207
2019	804.10	435.22	368.89	0	0	0	188,400	0	0	3,475	0	0	0	3,475	3,475	84,682
2020	804.10	435.22	368.89	0	0	0	188,400	0	0	3,475	0	0	0	3,475	3,475	88,156
2021	804.10	435.22	368.89	0	0	0	188,400	0	0	3,475	0	0	0	3,475	3,475	91,631
2022	804.10	435.22	368.89	0	0	0	188,400	0	0	3,475	0	0	0	3,475	3,475	95,106
2023	804.10	435.22	368.89	0	0	0	188,400	0	0	3,475	0	0	0	3,475	3,475	98,581
2024	804.10	435.22	368.89	0	0	0	188,400	0	0	3,475	0	0	0	3,475	3,475	102,056
2025	804.10	435.22	368.89	0	0	0	188,400	0	0	3,475	0	0	0	3,475	3,475	105,531
2026	804.10	435.22	368.89	0	0	0	188,400	0	0	3,475	0	0	0	3,475	3,475	109,006
2027	804.10	435.22	368.89	0	0	0	188,400	0	0	3,475	0	0	0	3,475	3,475	112,481
2028	804.10	435.22	368.89	0	0	0	188,400	0	0	3,475	0	0	0	3,475	3,475	115,956
2029	804.10	435.22	368.89	0	0	0	188,400	0	0	3,475	0	0	0	3,475	3,475	119,431
2030	804.10	435.22	368.89	0	0	0	188,400	0	0	3,475	0	0	0	3,475	3,475	122,905
2031	804.10	435.22	368.89	0	0	0	188,400	0	0	3,475	0	0	0	3,475	3,475	126,380
2032	804.10	435.22	368.89	0	0	0	188,400	0	0	3,475	0	0	0	3,475	3,475	129,855
Total	**8,845**	**4,787**	**4,058**	**953,758**				**124,153**	**0**	**27,227**	**66,763**	**57,455**	**0**	**72,401**	**129,855**	

Infiltration rates (%)	
Active Area	100
Temp. Covered Area	30
Perm. Restored Area	5

† Absorptive Capacity (m^3/tonne) 0.07

Appendix 4

Summary of Landfill Gas Model

Ref.

Output

i references

1 landgem-v302-guide by US EPA
Q:\2007\CE07\286\01\Calculations\Gas model\CE07-286-01_landgem-v302 guide.pdf
2 Bord na Móna EIS, Nov 2001 pp 37

3 EPA Waste Licence, 29-2
Q:\2007\CE07\286\01\Waste licence\WL029-02.pdf
4 Telephone conversation with Landfill Manager Brendan King on 24-06-08

5 Water balance for site comparing the different waste input rates
Q:\2007\CE07\286\01\Calculations\Water balance\CE07-286-01 Calc Set 04 rev0 EIS Water balance.xls

ii List of FTC Drawings

iii List of Appendices

Ref.

Output

i List of References
ii List of Drawings
iii List of Appendices

Contents

Fehily Timoney Co.,
Core House,
Pouladuff Rd.,
Cork
Tel 021 4964133

Ref.

Output

1.0 Introduction & Purpose

The purpose of this Calc Set is to develop a gas production model using US EPA software package, LandGEM v3.02, to quantify present and future volumes of landfill gas production from the old and new cells at Derryclure Landfill. The model will compare the gas production under the existing rate of waste placement (40,000tpa) with the gas production under the new proposed rate of waste placement (100,000tpa).

Fehily Timoney Co.,
Core House,
Pouladuff Rd.,
Cork
Tel 021 4964133

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

DESIGNED:	TM	**CHECKED:**	SM
DATE:	15.8.08	**REVISION:**	3
JOB NUMBER:	CE07-286-01		
CALC NUMBER:	C-04		
FILE	Q:\2007\CE07\286\01\Calculations\Gas model\CE07-286-01_Calc Set 04_Gas Model rev3 15-08-08.xls		
SHEET	Calc Sheet		

PROJECT: Derryclure waste licence review

DESCRIPTION: Gas Production Model

Ref. Output

2.0 Input Data

App B **2.1 Waste Input existing**

Opening Year: 1977

Closure Year: 2047 Estimated

2,3

Year	Total Input (t)	Waste In Place (t)	Year	Total Input (t)	Waste Already In Place (t)
1977*	500	0	2012	40,000	852,780
1978*	1,000	500	2013	40,000	892,780
1979*	1,800	1,500	2014	40,000	932,780
1980*	2,300	3,300	2015	40,000	972,780
1981*	3,000	5,600	2016	40,000	1,012,780
1982*	3,300	8,600	2017	40,000	1,052,780
1983*	4,000	11,900	2018	40,000	1,092,780
1984*	7,000	15,900	2019	40,000	1,132,780
1985*	9,700	22,900	2020	40,000	1,172,780
1986*	10,100	32,600	2021	40,000	1,212,780
1987*	11,500	42,700	2022	40,000	1,252,780
1988*	12,500	54,200	2023	40,000	1,292,780
1989*	13,800	66,700	2024	40,000	1,332,780
1990*	15,000	80,500	2025	40,000	1,372,780
1991*	16,200	95,500	2026	40,000	1,412,780
1992*	18,800	111,700	2027	40,000	1,452,780
1993*	20,800	130,500	2028	40,000	1,492,780
1994*	23,700	151,300	2029	40,000	1,532,780
1995*	24,500	175,000	2030	40,000	1,572,780
1996*	26,800	199,500	2031	40,000	1,612,780
1997*	26,300	226,300	2032	33,758	1,652,780
1998*	30,000	252,600		total	1,686,538
1999*	41,000	282,600			
2000*	37,300	323,600			
2001*	40,000	360,900			
2002#	40,000	400,900			
2003#	40,000	440,900			
2004#	40,000	480,900			
2005#	40,000	520,900			
2006¥	45,405	560,900			
2007¥	67,469	606,305			
2008Δ	59,006	673,774			
2009	40,000	732,780			
2010	40,000	772,780			
2011	40,000	812,780			

The figures marked * above come from the 2001 EIS prepared by Bord na Móna Environmental Consultancy Services for Offaly Co. Council . The figures marked # are based on the allowable annual intake from Waste Licence 29-2. Input quantities after 2008 are estimated at an annual intake of 40,000 tonnes per annum for a further forty years i.e. up to 2047. For the year marked Δ 38,006t waste placed up to end May 2008. Assume 3.000t/month thereafter

Fehily Timoney Co.,
Core House,
Pouladuff Rd.,
Cork
Tel 021 4964133

App B **2.2 Waste Input proposed**

Opening Year: 1977
Closure Year: 2024 Estimated

Quantities are in metric tonnes

2,3

Year	Total Input (t)	Waste In Place (t)	Year	Total Input (t)	Waste Already In Place (t)
1977*	500	0	2003#	40,000	440,900
1978*	1,000	500	2004#	40,000	480,900
1979*	1,800	1,500	2005#	40,000	520,900
1980*	2,300	3,300	2006¥	45,405	560,900
1981*	3,000	5,600	2007¥	67,469	606,305
1982*	3,300	8,600	2008Δ	59,006	673,774
1983*	4,000	11,900	2009	100,000	732,780
1984*	7,000	15,900	2010	100,000	832,780
1985*	9,700	22,900	2011	100,000	932,780
1986*	10,100	32,600	2012	100,000	1,032,780
1987*	11,500	42,700	2013	100,000	1,132,780
1988*	12,500	54,200	2014	100,000	1,232,780
1989*	13,800	66,700	2015	100,000	1,332,780
1990*	15,000	80,500	2016	100,000	1,432,780
1991*	16,200	95,500	2017	100,000	1,532,780
1992*	18,800	111,700	2018	53,758	1,632,780
1993*	20,800	130,500		total	1,686,538
1994*	23,700	151,300			
1995*	24,500	175,000			
1996*	26,800	199,500			
1997*	26,300	226,300			
1998*	30,000	252,600			
1999*	41,000	282,600			
2000*	37,300	323,600			
2001*	40,000	360,900			
2002#	40,000	400,900			

The figures marked * above come from the 2001 EIS prepared by Bord na Móna Environmental Consultancy Services for Offaly Co. Council . The figures marked # are based on the allowable annual intake from Waste Licence 29-2. Input quantities after 2008 are estimated at an annual intake of 40,000 tonnes per annum for a further forty years i.e. up to 2047. For the year marked Δ 38,006t waste placed up to end May 2008. Assume 3,000t/month thereafter

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1 **2.3 Model Parameters**

1 **2.3.1 Methane Generation Rate (k)**

The Methane Generation Rate, k, determines the rate of methane generation for the mass of waste in the landfill. The higher the value of k, the faster the methane generation rate increases and then decays over time. The value of k is primarily a function of four factors:

- Moisture content of the waste mass,
- Availability of the nutrients for microorganisms that break down the waste to form methane and carbon dioxide,
- pH of the waste mass, and
- Temperature of the waste mass.

The k value as it is used in the first-order decomposition rate equation, is in units of 1/year, or year-1. The five k values used by LandGEM are shown in Table 2. Arid area landfills are located in areas that receive less than 25 inches of rainfall per year. The default k value is the CAA k value for conventional landfills. The value of k typically falls between 0.02-0.7 year $^{-1}$

1 **2.3.2 Potential Methane Generation Capacity (Lo)**

The Potential Methane Generation Capacity, Lo, depends only on the type and composition of waste placed in the landfill. The higher the cellulose content of the waste, the higher the value of Lo. The default Lo values used by LandGEM are representative of MSW. The Lo value, as it is used in the first-order decomposition rate equation, is measured in metric units of cubic meters per megagram to be consistent with the CAA.
The default Lo value is the CAA Lo value for conventional landfills.
Lo typically varies between 96-170 m^3/Mg

1 **2.3.3 Nonmethane Organic Compound Concentration**

The NMOC Concentration in landfill gas is a function of the types of waste in the landfill and the extent of the reactions that produce various compounds from the anaerobic decomposition of waste. NMOC Concentration is measured in units of parts per million by volume (ppmv) and is used by LandGEM only when NMOC emissions are being estimated. The NMOC Concentration for the CAA default is 4,000 ppmv as hexane. The NMOC Concentration for the inventory default is 600 ppmv where co-disposal of hazardous waste has either not occurred or is unknown and 2,400 ppmv where co-disposal of hazardous waste has occurred. The default NMOC Concentration is the CAA value. If you use a site-specific value for NMOC concentration, then you must correct for air infiltration.

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1 **2.3.4 Methane Content**

For LandGEM, landfill gas is assumed to be 50 percent methane and 50 percent carbon dioxide, with additional, trace constituents of NMOCs and other air pollutants. When using LandGEM for complying with the CAA, Methane Content must remain fixed at 50 percent by volume (the model default value).
You may choose other methane amounts for the Methane Content using the User-specified selection if data exist to support using another concentration. However, using LandGEM at landfills that have methane content outside the range of 40 to 60 percent is not recommended. The first-order decomposition rate equation used by LandGEM to determine emissions may not be valid outside of this range.
The production of methane is determined using the first-order decomposition rate equation and is not affected by the concentration of methane. However, the concentration of methane affects the calculated production of carbon dioxide. The production of carbon dioxide (QCO2) is calculated from the production of methane (QCH4) and the methane content percentage (PCH4) using the equation

$$Q_{CO2} = Q_{CH4} \times \left\{\left[1/\left(P_{CH4}/100\right)\right] - 1\right\}$$

This equation is derived as follows:

$$Q_{total} = Q_{CH4} + Q_{CO2}$$
$$Q_{CH4} = Q_{total} \times \left(P_{CH4}/100\right)$$
$$Q_{CO2} = Q_{total} - Q_{CH4} = \left[Q_{CH4}/\left(P_{CH4}/100\right)\right] - Q_{CH4}$$
$$Q_{CO2} = Q_{CH4} \times \left\{\left[1/\left(P_{CH4}/100\right)\right] - 1\right\}$$

where Qtotal is the total production of landfill gas.

2.3.5 CAA & Inventory Paramters

LandGEM contains two sets of default parameters:

CAA Defaults—The CAA defaults are based on requirements for MSW landfills laid out by the Clean Air Act (CAA), including the NSPS/EG and NESHAP. This set of default parameters yields conservative emission estimates and can be used for determining whether a landfill is subject to the control requirements of the NSPS/EG or NESHAP.

Inventory Defaults—With the exception of wet landfill defaults, the inventory defaults are based on emission factors in the U.S. Environmental Protection Agency's (EPA's) Compilation of Air Pollutant Emission Factors (AP-42). This set of defaults yields average emissions and can be used to generate emission estimates for use in emission inventories and air permits in the absence of site-specific test data.

2.3.6 Site Specific Parameters

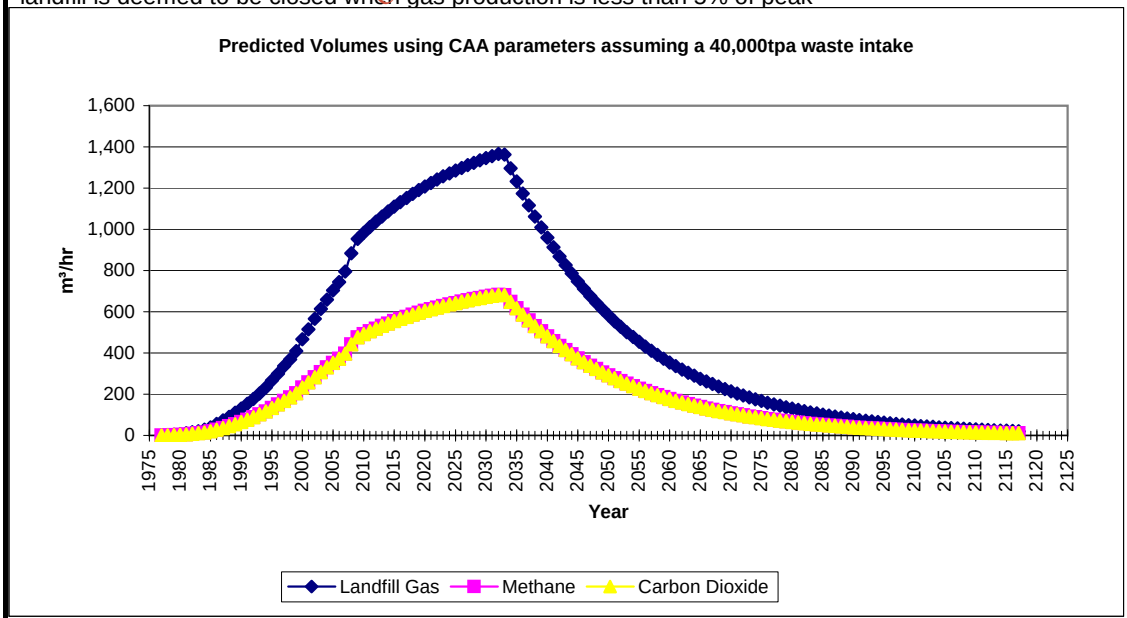
Where site specific data is available for the actual quantities of gas produced, the model can be calibrated by varying the parameters to match the predicted volumes to the actual volumes as closely as possible

3.0 Calculations

3.1 LandGEM using CAA parameters (40,000tpa)

Methane Generation Rate, k	0.05	$year^{-1}$
Potential Methane Generation Capacity, Lo	170	m^3/Mg
Methane Content	50	% by volume
Peak Production Year:	**2032**	
Peak Volumes:	1,365	m^3/hr landfill gas
	683	m^3/hr methane
	683	m^3/hr carbon dioxide
Average Volumes:		
The average volumes from 2008 to 2058 are	979	m^3/hr landfill gas
	489	m^3/hr methane
	489	m^3/hr carbon dioxide
Current Volume being produced:	884	m^3/hr landfill gas
Total volume produced over lifetime*	**563,265,276**	m^3 landfill gas

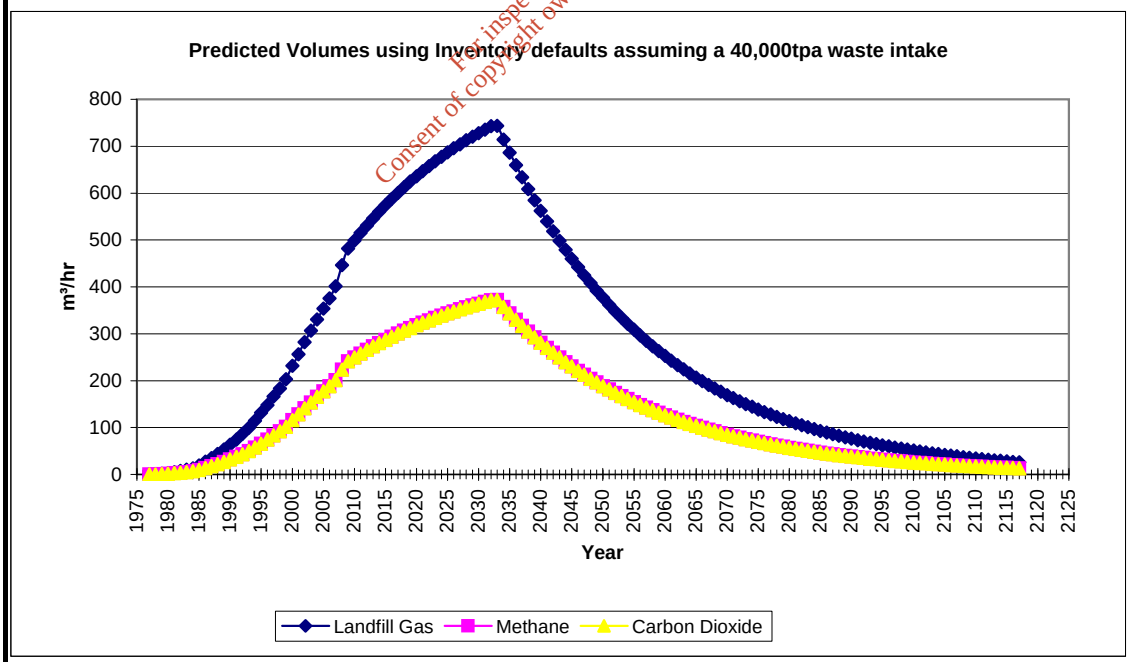
*landfill is deemed to be closed when gas production is less than 5% of peak



Ref. Output

3.2 LandGEM using Inventory defaults (40,000tpa)

Methane Generation Rate, k	0.04	$year^{-1}$
Potential Methane Generation Capacity, Lo	100	m^3/Mg
Methane Content	50	% by volume
Peak Production Year:	**2032**	
Peak Volumes:	744	m^3/hr landfill gas
	372	m^3/hr methane
	372	m^3/hr carbon dioxide
Average Volumes:		
The average volumes from 2008 to 2058 are	546	m^3/hr landfill gas
	273	m^3/hr methane
	273	m^3/hr carbon dioxide
Current Volume being produced:	446	m^3/hr landfill gas



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DESIGNED:	TM	**CHECKED:**	SM
DATE:	15.8.08	**REVISION:**	3
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CALC NUMBER:	C-04		
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SHEET	Calc Sheet		

PROJECT: Derryclure waste licence review

DESCRIPTION: Gas Production Model

Ref. Output

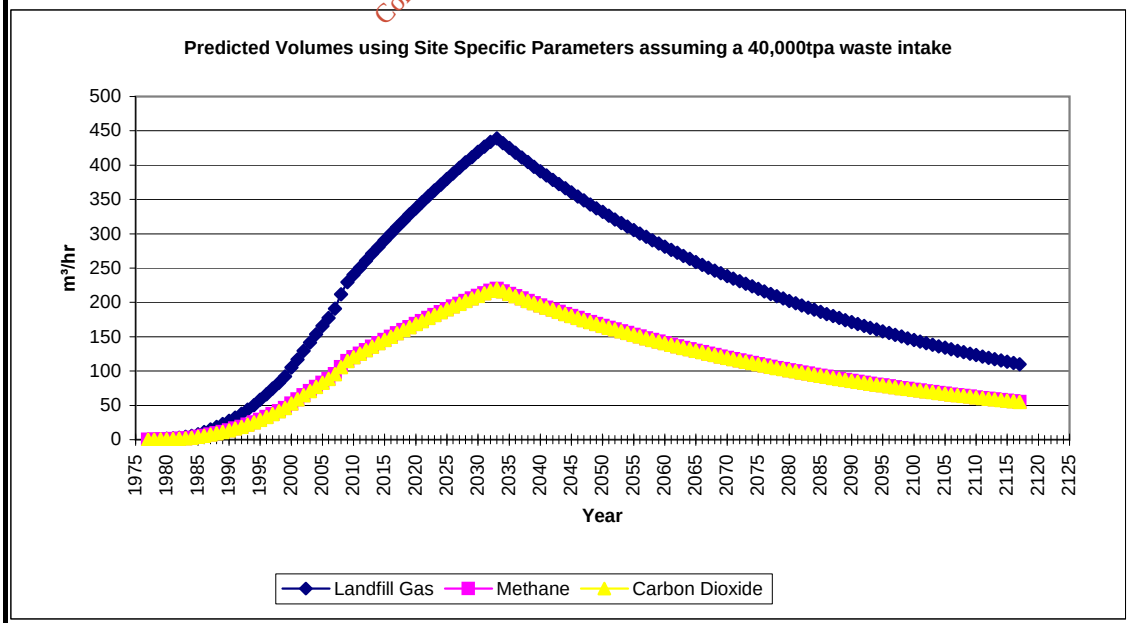
3.3 LandGEM using Site Specific Parameters (40,000tpa)

Site specific parameters are based on the following data

In 2008 the average hourly gas burnt in the flare for 2056hrs from 10-04-08 to 08-07-08 was estimated to be approx. 200 m^3/hr

This gives an approximate yearly production figure for 2008 of: 1,644,800 m^3/yr

Methane Generation Rate, k	0.017	$year^{-1}$
Potential Methane Generation Capacity, Lo	96	m^3/Mg
Methane Content	50	% by volume
Peak Production Year:	**2032**	
Peak Volumes:	439	m^3/hr landfill gas
	220	m^3/hr methane
	220	m^3/hr carbon dioxide
Average Volumes:		
The average volumes from 2008 to 2058 are	347	m^3/hr landfill gas
	173	m^3/hr methane
	173	m^3/hr carbon dioxide
Current Volume being produced:	200	m^3/hr landfill gas



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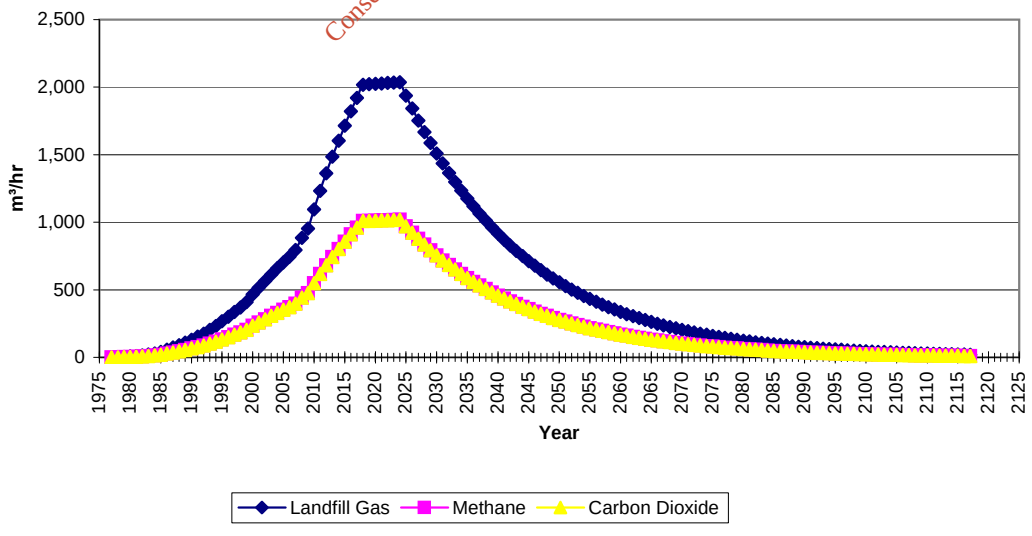
3.4 LandGEM using CAA Parameters (100,000tpa)

Methane Generation Rate, k	0.05	$year^{-1}$
Potential Methane Generation Capacity, Lo	170	m^3/Mg
Methane Content	50	% by volume
Peak Production Year:	**2024**	
Peak Volumes:	2,037	m^3/hr landfill gas
	1,018	m^3/hr methane
	1,018	m^3/hr carbon dioxide
Average Volumes:		
The average volumes from 2008 to 2058 are	1,191	m^3/hr landfill gas
	595	m^3/hr methane
	595	m^3/hr carbon dioxide
Current Volume being produced:	884	m^3/hr landfill gas
Total volume produced over lifetime*	**649,149,083**	m^3 landfill gas

*landfill is deemed to be closed when gas production is less than 5% of peak

Predicted Volumes using CAA parameters assuming a 100,000tpa waste intake



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DESIGNED:	TM	**CHECKED:**	SM
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JOB NUMBER:	CE07-286-01		
CALC NUMBER:	C-04		
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SHEET	Calc Sheet		

PROJECT: Derryclure waste licence review

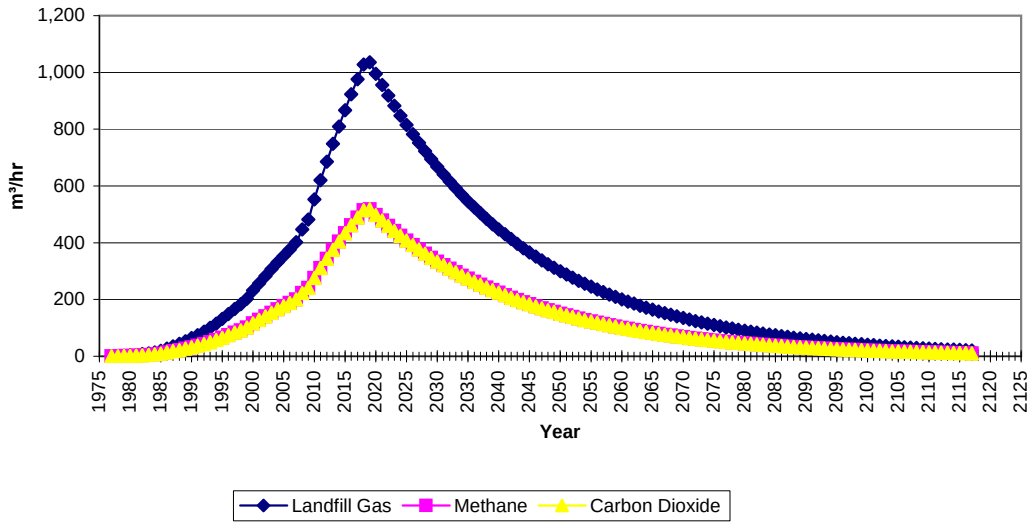
DESCRIPTION: Gas Production Model

Ref. Output

3.5 LandGEM using Inventory Defaults (100,000tpa)

Methane Generation Rate, k	0.04	$year^{-1}$
Potential Methane Generation Capacity, Lo	100	m^3/Mg
Methane Content	50	% by volume
Peak Production Year:	**2024**	
Peak Volumes:	1,036	m^3/hr landfill gas
	518	m^3/hr methane
	518	m^3/hr carbon dioxide
Average Volumes:		
The average volumes from 2008 to 2058 are	573	m^3/hr landfill gas
	286	m^3/hr methane
	286	m^3/hr carbon dioxide
Current Volume being produced:	446	m^3/hr landfill gas

Predicted Volumes using Inventory defaults assuming a 100,000tpa waste intake



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SHEET	Calc Sheet		

PROJECT: Derryclure waste licence review

DESCRIPTION: Gas Production Model

Ref. Output

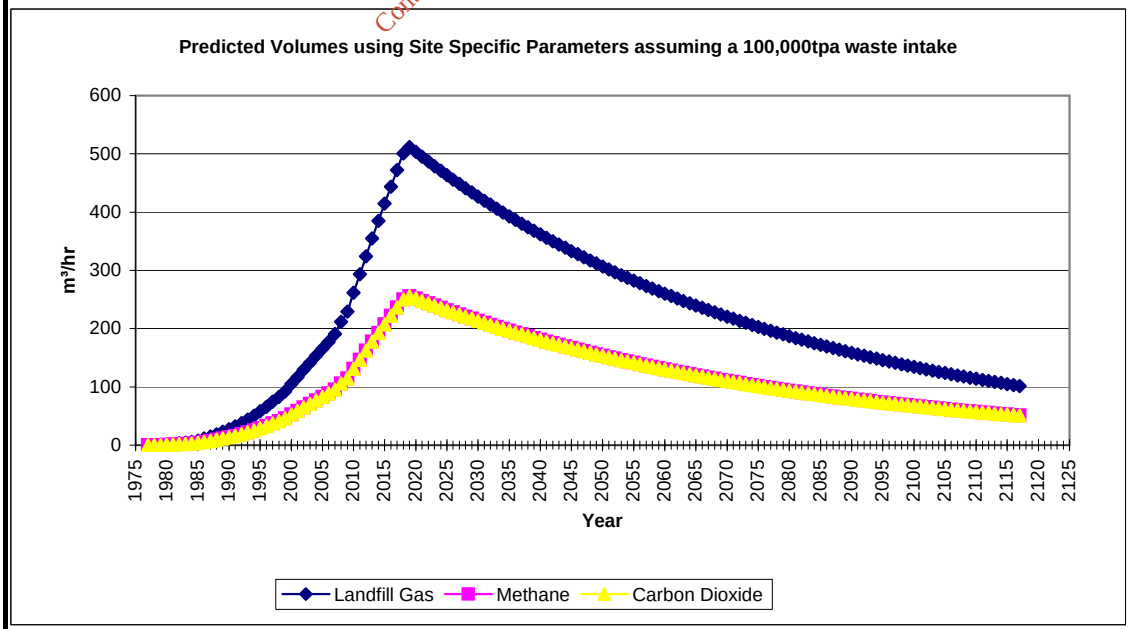
3.6 LandGEM using Site Specific Parameters (100,000tpa)

Site specific parameters are based on the following data

In 2008 the average hourly gas burnt in the flare for 2056hrs from 10-04-08 to 08-07-08 was estimated to be approx. 200 m^3/hr

This gives an approximate yearly production figure for 2008 of: 1,644,800 m^3/yr

Methane Generation Rate, k	0.0322	$year^{-1}$
Potential Methane Generation Capacity, Lo	150	m^3/Mg
Methane Content	50	% by volume
Peak Production Year:	**2024**	
Peak Volumes:	512	m^3/hr landfill gas
	256	m^3/hr methane
	256	m^3/hr carbon dioxide
Average Volumes:		
The average volumes from 2008 to 2058 are	373	m^3/hr landfill gas
	186	m^3/hr methane
	186	m^3/hr carbon dioxide



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4.0 Summary

The volumes of gas predicted vary with the input parameters selected as summarised below:

4.1 Summary (40,000tpa waste intake)

Model	k	L_o	Predicted LFG produced (2008)	Peak Year	LFG (peak year)	Avg. LFG 2008-2058
	$year^{-1}$	m^3/Mg	m^3/hr		m^3/hr	m^3/hr
CAA	0.05	170	884	2032	1,365	979
Inventory	0.04	100	446	2032	744	546
Site Specific	0.0165	96	200	2032	439	347

4.2 Summary (100,000tpa waste intake)

Model	k	L_o	Predicted LFG produced (2008)	Peak Year	LFG (peak year)	Avg. LFG 2008-2058
	$year^{-1}$	m^3/Mg	m^3/hr		m^3/hr	m^3/hr
CAA	0.05	170	884	2024	2,037	1,191
Inventory	0.04	100	446	2024	1,036	573
Site Specific	0.0165	96	0	2024	512	373

4.3 Total LFG volume (40,000tpa waste intake)

	m^3(1977-2117)
CAA	571,366,109
Inventory	332,438,437
Site Specific	266,260,825

4.4 Total LFG volume (100,000tpa waste intake)

	m^3(1977-2117)
CAA	663,147,506
Inventory	333,571,616
Site Specific	270,607,721

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5.0 Conclusion

Various gas generating scenarios are outline above. The parameters used to generate these scenarios are based on parameters provided in the LandGEM software and on parameters calibrated from current gas production on site. The site specific parameters are unreliable as they are based on gas volumes currently being extracted from operational gas wells in some areas of the site. It should also be noted that operators on site are having difficulty in documenting gas production due to operational difficulties with the flare on site.

It has been decided to utilise the Inventory figures as they represent average Production volumes as stated by LandGEM. CAA defaults yield more conservative values, and the available site data appears to give low figures and as such is considered unreliable. In any case, this calculation is for the purpose of making comparison of relative gas production between the existing and proposed developments, so the actual aprameters used are not vital, so long as the same parmaters are assigned to each scenario.

Using Inventory parameters, intensifying waste input will result in a higher peak LFG volume of 1,036m^3/hr, as compared with a peak LFG production of 744m^3/hr for the current waste input scenario. The peak production year for the intensified waste intake will occur in 2024 while it is expected to occur in 2032 otherwise.

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Appendix 5

Picady Traffic Model Output Data

Appendix 6

Designated Sites within 10 km of Derryclure Landfill

SITE NAME: HAWKSWOOD BOG NHA

SITE CODE: 002355

Hawkswood bog is located 5 km south of Tullamore, in the townlands of Hawkswood and Derrybeg, Co. Offaly. The site comprises a raised bog that includes both areas of high bog and cutover bog and adjoins Clonard Wood NHA (574) to the west. It can be accessed from the local road to the south of the site.

This raised bog is at the southern extreme of the range of raised bogs in Ireland and is in close proximity to Screggan Bog NHA (921) and Pallis Lough NHA (916). The high bog has pools present and is still wet and quaking in places with very little drainage and no forestry. The wet areas occur in depressions on the high bog, causing re-wetting of the bog surface. Cutover is found all around the high bog margins. There are esker ridges with broadleaved woodland to the south and north of the site.

Much of the high bog has vegetation typical of a Midland Raised Bog, dominated by abundant White Beak-sedge (*Rhyncospora alba*) with Cross-leaved Heath (*Erica tetralix*), Hare's-tail Cottongrass (*Eriophorium vaginatum*), Ling Heather (*Calluna vulgaris*), Deergrass (*Scirpus cespitosus*) and Bog Asphodel (*Narthecium ossifragum*). There are some wet algal hollows present. Hummocks of the bog mosses *Sphagnum papillosum, S. magellanicum* and *S. subnitens* occur and Bog-rosemary (*Andromeda polifola*) is also present. The abundance of *Rhyncospora* may be an indication of lowering water levels and recent burning. This is also indicated by the presence of Bog Asphodel hollows and small Ling Heather, which is slower to recover from fire than Cross-leaved Heath and so is not as dominant. Lichens (*Cladonia* spp.) are scarce on the bog due to this burning. Some small scattered hummocks of the bog moss *S. imbricatum* with the liverwort *Odontoschisma sphagni* are regenerating. There are some good pools with *Sphagnum cuspidatum* but these are becomming algal. Dead, burnt hummocks are being colonised by the moss *Campylopus introflexus*. Towards the centre of the high bog there are larger hummocks (2 m in diameter) of the bog moss *S. imbricatum* overgrown with Cross-leaved Heath. An old burn-line is present on the high bog to the east of the site. The eastern high bog has recovered from an older burn with dead hummocks still present. Ling Heather and Cottongrasses dominate with Lichens, abundant Bog Asphodel and Carnation Sedge (*Carex panicea*) locally abundant. The lichen (*Cladonia fleurkiana*) is also present, which along with the moss *Campylopus introflexus* is indicitative of burning. There are very few living bog moss hummocks. White Beak-sedge is also locally abundant.

To the north of the high bog, there is a very wet area with frequent pools. These are mostly algal, but some are filled with bog moss (*S. cuspidatum)*. Between the pools White Beak-sedge, Cross-leaved Heath, Cottongrasses and Ling Heather dominate. This area is very wet and slightly quaking with extensive lawns of the bog moss *S. magellanicum*. There is also abundant Bog-rosemary present. There is a lot of surface water present.

This area adjoins a wet flush of Common Reed (*Phragmites australis*) with Cottongrasses and Ling Heather present. There is some Birch (*Betula* spp) and Scots Pine (*Pinus sylvestris*) encroaching on the high bog. This area is slightly quaking with White Beak-sedge hollows. There is abundant bog moss *S. cuspidatum* along with the moss *Polytrichum commune*. There are few hummocks here but extensive *Sphagnum* lawns. This flush of Common Reed and Birch is probably

occurring on shallow peat. Old peat-cutting to the north is dominated by Bracken and Gorse. A small area of reclaimed grassland occurs between the high bog and the wooded esker ridge to the south. This ridge has mature woodland of Oak (*Quercus* spp.) and Beech (*Fagus sylvatica*). A smaller ridge with woodland (Hawkswood) occurs to the north of the site.

Numerous Snipe have been recorded on the bog.

Current landuses on the site include peat-cutting, agriculture and forestry. There appears to be very little peat-cutting, with only limited domestic peat-cutting to the south and south-west, but otherwise there is little damaging operations. Damaging activities associated with these landuses include burning of the high bog and drainage at the bog margins. These activities have resulted in the loss of habitat, damage to the hydrological status of the site, and pose a continuing threat to its viability.

Hawkswood Bog NHA is a site of considerable conservation significance comprising as it does a raised bog, a rare habitat in the E.U. and one that is becoming increasingly scarce and under threat in Ireland. This site supports a good diversity of raised bog microhabitats, including hummocks, lawns and pools. Its southern location adds further interest. Ireland has a high proportion of the total E.U. resource of raised bog (over 50%) and so has a special responsibility for its conservation at an international level.

SITE NAME: CLONAD WOOD pNHA

SITE CODE: 000574

Clonad Wood is an area of deciduous woodland situated on low-lying agricultural land bordering the Clodiagh River, 5 km south of Tullamore.

The high canopy of the wood is dominated by Pedunculate Oak (*Quercus robur*) which has been underplanted with Beech (*Fagus sylvatica*) and conifers. The understorey also contains a rich diversity of native species including Holly (*Ilex aquifolium*), Ash (*Fraxinus excelsior*), Elm (*Ulmus glabra*), Hazel (*Corylus avellana*), Spindle tree (*Eunonymus europaeus*), Guelder rose (*Viburnum opulus*) and Field Rose (*Rosa arvensis*).

The rare Alder Buckthorn (*Frangula alnus*) and Bird Cherry (*Prunus padus*) are found in the woodland, while Irish Whitebeam (*Sorbus hibernica*) is also abundant.

This woodland was described by Praeger in the last century as being one of the few remnants of true original forest. Although much of the original site has by now been planted, resulting in fragmentation into small areas of woodland along the road and adjacent to conifer plantations, there are still tracts of relic broadleaf forest which contain an interesting flora.

SITE NAME: CHARLEVILLE WOOD pNHA and SAC

SITE CODE: 000571

Charleville Wood is a large Oak woodland surrounded by estate parkland and agricultural grassland located about 3 km south-west of Tullamore. The site, which is underlain by deep glacial deposits, includes a small lake with a wooded island, and a stream runs along the western perimeter. The woodland is considered to be one of very few ancient woodlands remaining in Ireland, with some parts undisturbed for at least 200 years.

Some 10% of the woodland has been underplanted with conifers and other exotic trees, but the rest of the area is dominated by Pedunculate Oak (*Quercus robur*). Apart from Oak, there is much Ash (*Fraxinus excelsior*) and scattered Wych Elm (*Ulmus glabra*), while Birch (*Betula* spp.) is a feature of the boggier margins. The shrub layer is composed largely of Hazel (*Corylus avellana*), Hawthorn (*Crataegus monogyna*) and Blackthorn (*Prunus spinosa*). The ground layer is varied, including damp flushed slopes with Ramsons (*Allium ursinum*) and drier, more open areas with a moss sward composed largely of *Rhytidiadelphus triquetris*. The fungal flora of the woodland is notable for the presence of several rare Myxomycete species, namely *Hemitrichia calyculata, Perichaena depressa, Amaurochaete atra, Collaria arcyrionema, Stemonitis nigrescens* and *Diderma deplanata*. A number of unusual insects have also been recorded in Charleville Wood, notably *Mycetobia obscura* (Diptera), a species known from only one other site in Ireland. The site is also notable for the presence of a large population of the rare snail species, *Vertigo moulinsiana*.

Extensive swamps of Bulrush (*Typha latifolia*) and Bottle Sedge (*Carex rostrata*) have developed in the lake shallows. The lake is an important wildfowl habitat - it supports populations of Mute and Whooper Swan and a number of duck species, including Teal, Wigeon, Shoveler, Pochard and Tufted Duck. The wooded island at its centre is famed for its long history of non-disturbance. Hazel, Spindle (*Euonymus europaeus*) and Ivy (*Hedera helix*) reach remarkable sizes here.

Charleville Wood is one of the most important ancient woodland sites in Ireland. The woodland has a varied age structure and is relatively intact with both areas of closed canopy and open areas with regenerating saplings present. The understorey and ground layers are also well represented. Old Oak woodland is a habitat listed on Annex I of the EU Habitats Directive, while the rare snail species, *Vertigo moulinsiana*, is listed on Annex II of this directive. The wetland areas, with their associated bird populations, the rare insect and Myxomycete species contribute further to the conservation significance of the site.

SITE NAME: SCREGGAN BOG NHA

SITE CODE: 000921

Screggan Bog NHA is situated approximately 7km south-west of Tullamore, mainly in the townlands of Ross and Killurin in County Offaly. The site comprises a raised bog that includes both areas of high bog and cutover bog. The Clodiagh River flows at the east of the site, and Pallas Lough bounds the site at the west, while the other margins are bounded by areas of cutover, woodland and grassland.

Screggan Bog consists of three main sections divided by roads and tracks. There are areas with occasional small pools, and some poorly developed hummock/hollow systems in the largest section. Much of the bog is quite dry due to drainage and peat-cutting at the margin. An unusual feature is the extensive colonisation of its south-east portion by Scots Pine (*Pinus sylvestris*). There are large areas of coniferous forestry on the cutover areas of the site, along with areas of deciduous woodland and scrub.

The high bog at Screggan shows features typical of a Midland Raised Bog. The bog surface is soft and wet in places, and is largely comprised of bog mosses (*Sphagnum* spp.) including two notable hummock-forming species *S. imbricatum* and *S. fuscum*. *S. papillosum, S. capillifolium, S. tenellum, S. auriculatum* and *S. cuspidatum* are also found. The hummocks are colonised by Ling Heather (*Calluna vulgaris),* Hare's-tail Cottongrass (*Eriophorum vaginatum*) and Bog-rosemary (*Andromeda polifolia*). In the wet channels between hummocks Common Cottongrass (*Eriophorum angustifolium*) and White Beak-sedge *(Rhynchospora alba*) are common. Around the margin of the high bog a range of habitats which have developed on the cutover areas. Frequently, the flat cutover surface is covered by Ling Heather and Purple Moor-grass (*Molinia caerulea*). In some places it has been colonised by Downy Birch (*Betula pubescens*), Scot's Pine (*Pinus sylvestris*) and Rowan (*Sorbus aucuparia*). The understorey often contains Hawthorn (*Crataegus monogyna*), Bilberry (*Vaccinium myrtillus*) and Bramble (*Rubus fruticosus* agg.), amongst others. There are areas of grassland with species such as Soft Rush (*Juncus effusus*), Nettle (*Urtica dioica*), Creeping Buttercup (*Ranunculus repens*) and Meadowsweet (*Filipendula ulmaria*).

At the western end of the site there is a flooded area with species-rich marsh vegetation. Plants recorded here include rushes (*Juncus* spp.), Bogbean (*Menyanthes trifoliata*), Marsh Marigold (*Caltha palustris*), Wild Angelica (*Angelica sylvestris*), and Water Mint (*Mentha aquatica*). There are also some plants here which are indicative of fen conditions, namely Great Fen-sedge (*Cladium mariscus*) and Bog-myrtle (*Myrica gale*). At the eastern edge of the site there are areas of woodland, the easternmost being a satellite of the main Screggan Bog site. These woodlands consist of commercial conifer plantations surrounded by an area of scrub woodland containing several plant species of high scientific interest, notably two Red Data Book species, Alder Buckthorn (*Frangula alnus*) and Bird Cherry (*Prunus padus*). There is also an excellent diversity of other native trees and shrubs occurring including Pedunculate Oak (*Quercus robur*), Irish Whitebeam (*Sorbus hibernica*), willows (*Salix* spp.), Yew (*Taxus baccata*), Alder (*Alnus glutinosa*), Blackthorn (*Prunus spinosa*), Hazel (*Corylus avellana*) and Gorse (*Ulex europaeus*).

Current landuse on the site consists of peat-cutting around much of the eastern edge of the high bog, and the drainage associated with this. Large portions of the bog have been severely burnt in the past. Significant areas of cutover bog have been drained, cleared and reclaimed for agricultural purposes. There are also considerable amounts of coniferous forestry on the cutover at the north-east of the site. These activities have resulted in loss of habitat and damage to the hydrological status of the site, and pose a continuing threat to its viability.

Screggan Bog NHA is a site of considerable conservation significance comprising as it does a raised bog, a rare habitat in the E.U. and one that is becoming increasingly scarce and under threat in Ireland. Ireland has a high proportion of the total E.U. resource of raised bog (over 50%) and so has a special responsibility for its conservation at an international level.

SITE NAME: GRAND CANAL pNHA

SITE CODE: 002104

The Grand Canal is a man-made waterway linking the River Liffey at Dublin with the Shannon at Shannon Harbour and the Barrow at Athy. The Grand Canal Natural Heritage Area (NHA) comprises the canal channel and the banks on either side of it. The canal system is made up of a number of branches - the Main Line from Dublin to the Shannon, the Barrow Line from Lowtown to Athy, the Edenderry Branch, the Naas and Corbally Branch and the Milltown Feeder. The Kilbeggan Branch is dry at present, but it is hoped to restore it in the near future. Water is fed into the summit level of the canal at Lowtown from Pollardstown Fen, itself an NHA.

A number of different habitats are found within the canal boundaries - hedgerow, tall herbs, calcareous grassland, reed fringe, open water, scrub and woodland.

The hedgerow, although diverse, is dominated by Hawthorn (*Crataegus monogyna*). On the limestone soils of the midlands Spindle (*Euonymus europaeus*) and Guelder-rose (*Viburnum opulus*) are present.

The vegetation of the towpath is usually dominated by grass species. Where the canal was built through a bog, soil (usually calcareous) was brought in to make the banks. The contrast between the calcicolous species of the towpath and the calcifuge species of the bog is very striking. The diversity of the water channel is particularly high in the eastern section of the Main Line - between the Summit level at Lowtown and Inchicore. Arrowhead (*Sagittaria sagittifolia*) and Watercress (*Nasturtium officinale*) are more common in this stretch than on the rest of the system. All sites for Hemlock Water-dropwort (*Oenanthe crocata*) on the Grand Canal system are within this stretch.

The aquatic flora of the Corbally Extension of the Naas Branch of the canal is also very diverse, with a similar range of species to the eastern Main Line.

Otter spraints are found along the towpath, particularly where the canal passes over a river or stream.

The Common Newt breeds in the ponds on the bank at Gollierstown in Co. Dublin.

The Rare and legally protected Opposite-leaved Pondweed (*Groenlandia densa*) (Flora Protection Order 1987) is present at a number of sites in the eastern section of the Main Line, between Lowtown and Ringsend Basin in Dublin.

The ecological value of the canal lies more in the diversity of species it supports along its linear habitats than in the presence of rare species. It crosses through agricultural land and therefore provides a refuge for species threatened by modern farming methods.

SITE NAME: PALLAS LOUGH

SITE CODE: 000916

Pallas Lough lies about 7km southwest of Tullamore, in limestone rich gravel drift over Lower limestone. As a result the lakewater is rich in calcium, a chief component of limestone. Marl precipitates out of the water to coat stone, and especially vegetation surfaces, thus the lake could be said to be a 'marl lake'. The eastern shore runs into peaty soils.

The aquatic component of the lake vegetation is reputed to be rich, with the Charophytes (*Chara* spp. and *Nitella* spp.) and pondweeds (*Potamogeton* spp.).

Lowering of the water level has resulted in the exposure of sediments which have been colonised by communities of swamp, marsh and wet grassland plant associations, particularly along the southern and eastern shores. Reedswamp, mainly dominated by Common reed (*Phragmites australis*), colonising shallow water, has divided the open water surface into two. In places the reedswamp is dry enough to become colonised by Birch (*Betula pubescens*).

The area to the north of Clonterlough Wood contains Saw-sedge, also known as Great fen-sedge (*Cladium mariscus*) a species very much indicative of wet, calcium rich, peaty substrates. It grows with Bogbean (*Menyanthes trifoliata*) and peatland species such as Bog myrtle (*Myrica gale*).

Marshland and wet grassland on the southern side of the lake, grazed by cattle and sheep, has large areas of Creeping bent (*Agrostis stolonifera*), Soft rush (*Juncus effusus*) and Yellow flag (*Iris pseudacorus*) along with a variety of wetland herbs, and Common reeds which spread back from the swamps. These are botanically rich areas - one small area was inhabited by 79 plant species, 12 of which were sedges (*Carex* spp.).

Within the boundary of the proposed Natural Heritage Area there are also two small woods, wet and dominated by Birch (*Betula pubescens*) one of which is recovering from partial clearance about twenty years ago. There is also an area of limestone grassland which yields such species as Field gentian (*Gentianella campestris*) and Centaury (*Centaurium erythraea*).

Significant numbers of wildfowl and waders use the lake. The reedswamp fringes and centre, provide cover and make ideal nesting areas for ducks such as Mallard, Teal and Widgeon. The peripheral wet grassland is grazed in the winter by geese. The rare Marsh harrier has recently been seen hunting in the area.

This area is of botanical interest due to the diversity of plant habitats and the species richness of those habitats. To a large degree these features are promoted by the calcium richness of the site.

SITE NAME: ANNAGHMORE LOUGH FEN (OFFALY)

SITE CODE: 000413

Situated about 10km south of Tullamore, on the border of Laois and Offaly below the Slieve Blooms, Annaghmore Lough Fen is a Natural Heritage Area (NHA).

All that remains of Annaghmore Lough itself is a small remnant pool, barely 2ha and only a couple of centimetres deep. It is not clear whether the lake shrinkage has been purely the result of the natural process of sediment accumulation, or whether this has been accelerated by drainage. However, the area once occupied by the lake, is now a peat accumulating, calcareous fen. In general sedges (*Carex* spp.) dominate, although other species such as Common Cottongrass (*Eriophorum angustifolium*), Water Horsetail (*Equisetum fluviatile*) and Common Reed are locally prominent. The presence of sedges such as *Carex flacca* and *C. lepidocarpa* and other species such as Black bog-rush (*Schoenus nigricans*), Grass-of-parnassus (*Parnassia palustris*) and Marsh Helleborine (*Epipactis palustris*) one indicative of high levels of calcium in the soil.

To the south of the old lake site, Willows (*Salix*) and Downy Birch (*Betula pubescens*) are colonising the fen area which becomes increasingly acidic with species such as Purple Moor-grass (*Molinia caerulea*) and Bog Myrtle (*Myrica gale*), before rising into the dome of a small raised bog dominated by Ling-heather (*Calluna vulgaris*) and Hare's-tail Cottongrass (*Eriophorum vaginatum*) with Bog mosses (*Sphagnum* spp.). To the west of the bog the NHA area continues, to include much of a belt of land reclaimed across the periphery of what was once a more extensive bog. Management of this area is important as it will affect the remaining bog itself. In addition, there are sections of pasture here that have not been heavily fertilised, but allowed to develop a more natural, and species-rich cover.

A scrub cover of Birch (*Betula pubescens*) has developed to the north of the old lake site.

The system is vulnerable to drainage and reclamation, and indeed in some areas this has already occurred causing sizeable intrusions into the site. Nutrient runoff from fertilisers applied to this area would damage the vegetation of the low-lying and wet fen areas through the process called eutrophication, which would allow plant species adapted to high nutrient conditions to outcompete the current fen species. Further reclamation or drainage work of any kind should not be undertaken.

Peat is being machine cut from the southwest of the bog area. Although this is a low volume operation, on such a small area of raised bog it has a very seriously adverse effect. The loss of Monettia Bog 3km to the east of this site underlines the vulnerability of peatlands in Ireland, and although the area of raised bog dome is small (about 35ha) the transition through to the fen area occupying the site of Annaghmore Lough is remarkable and may represent one of the only intact raised bog laggs in the country.

SITE NAME: BALLYDUFF WOOD pNHA

SITE CODE: 001777

This is a small area of beech woodland on glacial drift to the east of the Tullamore-Clara road 4 miles north of Tullamore. Younger beech trees, approximately 20 feet in height, are located around the south-western end together with some ash, hawthorn, blackthorn and hazel. Inside the marginal belt is the older woodland primarily completed of beech and hazel. Some hazel trees reach a height of 30 feet.

The undergrowth is fairly dense with such species as *Urtica dioica* (Nettle) and *Rubus fruticosus* (Blackberry) in the more open parts, and *Hedera helix* (Ivy) and a moss carpet under the tree canopy.

The woodland is situated on an esker ridge and patches of typical grassland communities can be seen alongside the road. The main grasses are *Festuca rubra* (Red Fescue), *Briza media* (Quaking Grass) and *Helictotrichon pubescens* (Hairy Oat Grass).

Although unnatural in origin, this woodland is regaining a more natural composition through regeneration. The abundance of spindle (*Euonymus europaea*) is of particular note. The site is further enhanced by areas of herb rich grassland.

SITE NAME: RIVER BARROW AND RIVER NORE SAC

SITE CODE: 002162

This site consists of the freshwater stretches of the Barrow/Nore River catchments as far upstream as the Slieve Bloom Mountains and it also includes the tidal elements and estuary as far downstream as Creadun Head in Waterford. The site passes through eight counties – Offaly, Kildare, Laois, Carlow, Kilkenny, Tipperary, Wexford and Waterford. Major towns along the edge of the site include Mountmellick, Portarlington, Monasterevin, Stradbally, Athy, Carlow, Leighlinbridge, Graiguenamanagh, New Ross, Inistioge, Thomastown, Callan, Bennettsbridge, Kilkenny and Durrow. The larger of the many tributaries include the Lerr, Fushoge, Mountain, Aughavaud, Owenass, Boherbaun and Stradbally Rivers of the Barrow and the Delour, Dinin, Erkina, Owveg, Munster, Arrigle and King's Rivers on the Nore. Both rivers rise in the Old Red Sandstone of the Slieve Bloom Mountains before passing through a band of Carboniferous shales and sandstones. The Nore, for a large part of its course, traverses limestone plains and then Old Red Sandstone for a short stretch below Thomastown. Before joining the Barrow it runs over intrusive rocks poor in silica. The upper reaches of the Barrow also runs through limestone. The middle reaches and many of the eastern tributaries, sourced in the Blackstairs Mountains, run through Leinster Granite. The southern end, like the Nore runs over intrusive rocks poor in silica. Waterford Harbour is a deep valley excavated by glacial floodwaters when the sea level was lower than today. The coast shelves quite rapidly along much of the shore.

The site is a candidate SAC selected for alluvial wet woodlands and petrifying springs, priority habitats on Annex I of the E.U. Habitats Directive. The site is also selected as a candidate SAC for old oak woodlands, floating river vegetation, estuary, tidal mudflats, *Salicornia* mudflats, Atlantic salt meadows, Mediterranean salt

meadows, dry heath and eutrophic tall herbs, all habitats listed on Annex I of the E.U. Habitats Directive. The site is also selected for the following species listed on Annex II of the same directive - Sea Lamprey, River Lamprey, Brook Lamprey, Freshwater Pearl Mussel, Nore Freshwater Pearl Mussel, Crayfish, Twaite Shad, Atlantic Salmon, Otter, Desmoulin's Whorl Snail *Vertigo moulinsiana* and the Killarney Fern.

Good examples of Alluvial Forest are seen at Rathsnagadan, Murphy's of the River, in Abbeyleix estate and along other shorter stretches of both the tidal and freshwater elements of the site. Typical species seen include Almond Willow (*Salix triandra*), White Willow (*S. alba*), Grey Willow (*S. cinerea*), Crack Willow (*S. fragilis*), Osier (*S. viminalis*), with Iris (*Iris pseudacorus*), Hemlock Water-dropwort (*Oenanthe crocata*), Angelica (*Angelica sylvestris*), Thin-spiked Wood-sedge (*Carex strigosa*), Pendulous Sedge (*C. pendula*), Meadowsweet (*Filipendula ulmaria*), Valerian (*Valeriana officinalis*) and the Red Data Book species Nettle-leaved Bellflower (*Campanula trachelium*). Three rare invertebrates have been recorded in this habitat at Murphy's of the River. These are: *Neoascia obliqua* (Diptera: Syrphidae), *Tetanocera freyi* (Diptera: Sciomyzidae) and *Dictya umbrarum* (Diptera: Sciomyzidae).

A good example of petrifying springs with tufa formations occurs at Dysart Wood along the Nore. This is a rare habitat in Ireland and one listed with priority status on Annex I of the EU Habitats Directive. These hard water springs are characterised by lime encrustations, often associated with small waterfalls. A rich bryophyte flora is typical of the habitat and two diagnostic species, *Cratoneuron commutatum* var. *commutatum* and *Eucladium verticillatum*, have been recorded.

The best examples of old Oak woodlands are seen in the ancient Park Hill woodland in the estate at Abbeyleix; at Kyleadohir, on the Delour, Forest Wood House, Kylecorragh and Brownstown Woods on the Nore; and at Cloghristic Wood, Drummond Wood and Borris Demesne on the Barrow, though other patches occur throughout the site. Abbeyleix Woods is a large tract of mixed deciduous woodland which is one of the only remaining true ancient woodlands in Ireland. Historical records show that Park Hill has been continuously wooded since the sixteenth century and has the most complete written record of any woodland in the country. It supports a variety of woodland habitats and an exceptional diversity of species including 22 native trees, 44 bryophytes and 92 lichens. It also contains eight indicator species of ancient woodlands. Park Hill is also the site of two rare plants, Nettle-leaved Bellflower and the moss *Leucodon sciuroides.* It has a typical bird fauna including Jay, Long-eared Owl and Raven. A rare invertebrate, *Mitostoma chrysomelas,* occurs in Abbeyleix and only two other sites in the country. Two flies *Chrysogaster virescens* and *Hybomitra muhlfeldi* also occur. The rare Myxomycete fungus, *Licea minima* has been recorded from woodland at Abbeyleix.

Oak woodland covers parts of the valley side south of Woodstock and is well developed at Brownsford where the Nore takes several sharp bends. The steep valley side is covered by Oak (*Quercus* spp.), Holly (*Ilex aquifolium*), Hazel (*Corylus avellana*) and Birch (*Betula pubescens*) with some Beech (*Fagus sylvatica*) and Ash (*Fraxinus excelsior*). All the trees are regenerating through a cover of Bramble (*Rubus fruticosus* agg.), Foxglove (*Digitalis purpurea*) Wood Rush (*Luzula sylvatica*) and Broad Buckler-fern (*Dryopteris dilatata*).

On the steeply sloping banks of the River Nore about 5 km west of New Ross, in County Kilkenny, Kylecorragh Woods form a prominent feature in the landscape. This is an excellent example of a relatively undisturbed, relict Oak woodland with a very good tree canopy. The wood is quite damp and there is a rich and varied ground flora. At Brownstown a small, mature Oak-dominant woodland occurs on a

steep slope. There is younger woodland to the north and east of it. Regeneration throughout is evident. The understorey is similar to the woods at Brownsford. The ground flora of this woodland is developed on acidic, brown earth type soil and comprises a thick carpet of Bilberry (*Vaccinium myrtillus*), Heather (*Calluna vulgaris*), Hard Fern (*Blechnum spicant*), Cow-wheat (*Melampyrum* spp.) and Bracken (*Pteridium aquilinum*).

Borris Demesne contains a very good example of a semi-natural broad-leaved woodland in very good condition. There is quite a high degree of natural re-generation of Oak and Ash through the woodland. At the northern end of the estate Oak species predominate. Drummond Wood, also on the Barrow, consists of three blocks of deciduous woods situated on steep slopes above the river. The deciduous trees are mostly Oak species. The woods have a well established understorey of Holly (*Ilex aquifolium*), and the herb layer is varied, with Brambles abundant. Whitebeam (*Sorbus devoniensis*) has also been recorded.

Eutrophic tall herb vegetation occurs in association with the various areas of alluvial forest and elsewhere where the flood-plain of the river is intact. Characteristic species of the habitat include meadowsweet (*filipendula ulmaria*), purple loosestrife (*lythrum salicaria*), marsh ragwort (*senecio aquaticus*), ground ivy (*glechoma hederacea*) and hedge bindweed (*calystegia sepium*). Indian balsam (*impatiens glandulifera*), an introduced and invasive species, is abundant in places.

Floating River Vegetation is well represented in the Barrow and in the many tributaries of the site. In the Barrow the species found include Water Starworts (*Callitriche* spp.), Canadian Pondweed (*Elodea canadensis*), Bulbous Rush (*Juncus bulbosus*), Milfoil (*Myriophyllum* spp.), *Potamogeton* x *nitens,* Broad-leaved Pondweed (*P. natans*), Fennel Pondweed (*P. pectinatus*), Perfoliated Pondweed (*P. perfoliatus*) and Crowfoots (*Ranunculus* spp.). The water quality of the Barrow has improved since the vegetation survey was carried out (EPA, 1996).

Dry Heath at the site occurs in pockets along the steep valley sides of the rivers especially in the Barrow Valley and along the Barrow tributaries where they occur in the foothills of the Blackstairs Mountains. The dry heath vegetation along the slopes of the river bank consists of Bracken (*Pteridium aquilinum*) and Gorse (*Ulex europaeus*) species with patches of acidic grassland vegetation. Additional typical species include Heath Bedstraw (*Galium saxatile*), Foxglove (*Digitalis purpurea*), Common Sorrel (*Rumex acetosa*) and Bent Grass (*Agrostis stolonifera*). On the steep slopes above New Ross the Red Data Book species Greater Broomrape (*Orobanche rapum-genistae*) has been recorded. Where rocky outcrops are shown on the maps Bilberry (*Vaccinium myrtillus*) and Wood Rush (*Luzula sylvatica*) are present. At Ballyhack a small area of dry heath is interspersed with patches of lowland dry grassland. These support a number of Clover species including the legally protected Clustered Clover (*Trifolium glomeratum*) - a species known from only one other site in Ireland. This grassland community is especially well developed on the west side of the mud-capped walls by the road. On the east of the cliffs a group of rock-dwelling species occur, i.e. English Stonecrop (*Sedum anglicum*), Sheep's-bit (*Jasione montana*) and Wild Madder (*Rubia peregrina*). These rocks also support good lichen and moss assemblages with *Ramalina subfarinacea* and *Hedwigia ciliata*.

Dry Heath at the site generally grades into wet woodland or wet swamp vegetation lower down the slopes on the river bank. Close to the Blackstairs Mountains, in the foothills associated with the Aughnabrisky, Aughavaud and Mountain Rivers there

are small patches of wet heath dominated by Purple Moor-grass (*Molinia caerulea*) with Heather (*Calluna vulgaris*), Tormentil (*Potentilla erecta*), Carnation Sedge (*Carex panicea*) and Bell Heather (*Erica cinerea*).

Saltmeadows occur at the southern section of the site in old meadows where the embankment has been breached, along the tidal stretches of in-flowing rivers below Stokestown House, in a narrow band on the channel side of Common Reed (*Phragmites*) beds and in narrow fragmented strips along the open shoreline. In the larger areas of salt meadow, notably at Carrickcloney, Ballinlaw Ferry and Rochestown on the west bank; Fisherstown, Alderton and Great Island to Dunbrody on the east bank, the Atlantic and Mediterranean sub types are generally intermixed. At the upper edge of the salt meadow in the narrow ecotonal areas bordering the grasslands where there is significant percolation of salt water, the legally protected species Borrer's Saltmarsh-grass (*Puccinellia fasciculata*) and Meadow Barley (*Hordeum secalinum*) (Flora Protection Order, 1987) are found. The very rare Divided Sedge (*Carex divisa*) is also found. Sea Rush (*Juncus maritimus*) is also present. Other plants recorded and associated with salt meadows include Sea Aster (*Aster tripolium*), Sea Thrift (*Armeria maritima*), Sea Couch (*Elymus pycnanthus*), Spear-leaved Orache (*Atriplex prostrata*), Lesser Sea-spurrey (*Spergularia marina*), Sea Arrowgrass (*Triglochin maritima*) and Sea Plantain (*Plantago maritima*).

Salicornia and other annuals colonising mud and sand are found in the creeks of the saltmarshes and at the seaward edges of them. The habitat also occurs in small amounts on some stretches of the shore free of stones.

The estuary and the other Habitats Directive Annex I habitats within it form a large component of the site. Extensive areas of intertidal flats, comprised of substrates ranging from fine, silty mud to coarse sand with pebbles/stones are present. Good quality intertidal sand and mudflats have developed on a linear shelf on the western side of Waterford Harbour, extending for over 6 km from north to south between Passage East and Creadaun Head, and in places are over 1 km wide. The sediments are mostly firm sands, though grade into muddy sands towards the upper shore. They have a typical macro-invertebrate fauna, characterised by polychaetes and bivalves. Common species include *Arenicola marina*, *Nephtys hombergii*, *Scoloplos armiger*, *Lanice conchilega* and *Cerastoderma edule*.

The western shore of the harbour is generally stony and backed by low cliffs of glacial drift. At Woodstown there is a sandy beach, now much influenced by recreation pressure and erosion. Behind it a lagoonal marsh has been impounded which runs westwards from Gaultiere Lodge along the course of a slow stream. An extensive reedbed occurs here. At the edges is a tall fen dominated by sedges (*Carex* spp.), Meadowsweet, Willowherb (*Epilobium* spp.) and rushes (*Juncus* spp.). Wet woodland also occurs. This area supports populations of typical waterbirds including Mallard, Snipe, Sedge Warbler and Water Rail.

The dunes which fringe the strand at Duncannon are dominated by Marram grass (*Ammophila arenaria*) towards the sea. Other species present include Wild Sage (*Salvia verbenaca*), a rare Red Data Book species. The rocks around Duncannon ford have a rich flora of seaweeds typical of a moderately exposed shore and the cliffs themselves support a number of coastal species on ledges, including Thrift (*Armeria maritima*), Rock Samphire (*Crithmum maritimum*) and Buck's-horn Plantain (*Plantago coronopus*).

Other habitats which occur throughout the site include wet grassland, marsh, reed swamp, improved grassland, arable land, quarries, coniferous plantations, deciduous woodland, scrub and ponds.

Seventeen Red Data Book plant species have been recorded within the site, most in the recent past. These are Killarney Fern (*Trichomanes speciosum*), Divided Sedge (*Carex divisa*), Clustered Clover (*Trifolium glomeratum*), Basil Thyme (*Acinos arvensis*), Hemp nettle (*Galeopsis angustifolia*), Borrer's Saltmarsh Grass (*Puccinellia fasiculata*), Meadow Barley (*Hordeum secalinum*), Opposite-leaved Pondweed (*Groenlandia densa*), Autumn Crocus (*Colchicum autumnale*), Wild Sage (*Salvia verbenaca*), Nettle-leaved Bellflower (*Campanula trachelium*), Saw-wort (*Serratula tinctoria*), Bird Cherry (*Prunus padus*), Blue Fleabane (*Erigeron acer*), Fly Orchid (*Ophrys insectifera*), Broomrape (*Orobanche hederae*) and Greater Broomrape (*Orobanche rapum-genistae*). Of these the first nine are protected under the Flora Protection Order 1999. Divided Sedge (*Carex divisa*) was thought to be extinct but has been found in a few locations in the site since 1990. In addition plants which do not have a very wide distribution in the country are found in the site including Thin-spiked Wood-sedge (*Carex strigosa*), Field Garlic (*Allium oleraceum*) and Summer Snowflake (*Leucojum aestivum*). Six rare lichens, indicators of ancient woodland, are found including *Lobaria laetevirens* and *L. pulmonaria.* The rare moss *Leucodon sciuroides* also occurs.

The site is very important for the presence of a number of EU Habitats Directive Annex II animal species including Freshwater Pearl Mussel (*Margaritifera margaritifera* and *M. m. durrovensis*), Freshwater Crayfish (*Austropotamobius pallipes*), Salmon (*Salmo salar*), Twaite Shad (*Alosa fallax fallax*), three Lamprey species - Sea (*Petromyzon marinus*), Brook (*Lampetra planeri*) and River (*Lampetra fluviatilis*), the marsh snail *Vertigo moulinsiana* and Otter (*Lutra lutra*). This is the only site in the world for the hard water form of the Pearl Mussel *M. m. durrovensis* and one of only a handful of spawning grounds in the country for Twaite Shad. The freshwater stretches of the River Nore main channel is a designated salmonid river. The Barrow/Nore is mainly a grilse fishery though spring salmon fishing is good in the vicinity of Thomastown and Inistioge on the Nore. The upper stretches of the Barrow and Nore, particularly the Owenass River, are very important for spawning.

The site supports many other important animal species. Those which are listed in the Irish Red Data Book include Daubenton's Bat (*Myotis daubentoni*), Badger (*Meles meles*), Irish Hare (*Lepus timidus hibernicus*) and Frog (*Rana temporaria*). The rare Red Data Book fish species Smelt (*Osmerus eperlanus*) occurs in estuarine stretches of the site. In addition to the Freshwater Pearl Mussel, the site also supports two other freshwater Mussel species, *Anodonta anatina* and *A. cygnea*.

The site is of ornithological importance for a number of E.U. Birds Directive Annex I species including Greenland White-fronted Goose, Whooper Swan, Bewick's Swan, Bar-tailed Godwit, Peregrine and Kingfisher. Nationally important numbers of Golden Plover and Bar-tailed Godwit are found during the winter. Wintering flocks of migratory birds are seen in Shanahoe Marsh and the Curragh and Goul Marsh, both in Co. Laois and also along the Barrow Estuary in Waterford Harbour. There is also an extensive autumnal roosting site in the reedbeds of the Barrow Estuary used by Swallows before they leave the country.

Landuse at the site consists mainly of agricultural activities – many intensive, principally grazing and silage production. Slurry is spread over much of this area. Arable crops are also grown. The spreading of slurry and fertiliser poses a threat to the water quality of the salmonid river and to the populations of Habitats Directive

Annex II animal species within the site. Many of the woodlands along the rivers belong to old estates and support many non-native species. Little active woodland management occurs. Fishing is a main tourist attraction along stretches of the main rivers and their tributaries and there are a number of Angler Associations, some with a number of beats. Fishing stands and styles have been erected in places. Both commercial and leisure fishing takes place on the rivers. There is net fishing in the estuary and a mussel bed also. Other recreational activities such as boating, golfing and walking, particularly along the Barrow towpath are also popular. There is a golf course on the banks of the Nore at Mount Juliet and GAA pitches on the banks at Inistioge and Thomastown. There are active and disused sand and gravel pits throughout the site. Several industrial developments, which discharge into the river, border the site. New Ross is an important shipping port. Shipping to and from Waterford and Belview ports also passes through the estuary.

The main threats to the site and current damaging activities include high inputs of nutrients into the river system from agricultural run-off and several sewage plants, overgrazing within the woodland areas, and invasion by non-native species, for example Cherry Laurel and Rhododendron (*Rhododendron ponticum*). The water quality of the site remains vulnerable. Good quality water is necessary to maintain the populations of the Annex II animal species listed above. Good quality is dependent on controlling fertilisation of the grasslands, particularly along the Nore. It also requires that sewage be properly treated before discharge. Drainage activities in the catchment can lead to flash floods which can damage the many Annex II species present. Capital and maintenance dredging within the lower reaches of the system pose a threat to migrating fish species such as lamprey and shad. Land reclamation also poses a threat to the salt meadows and the populations of legally protected species therein.

Overall, the site is of considerable conservation significance for the occurrence of good examples of habitats and of populations of plant and animal species that are listed on Annexes I and II of the E.U. Habitats Directive respectively. Furthermore it is of high conservation value for the populations of bird species that use it. The occurrence of several Red Data Book plant species including three rare plants in the salt meadows and the population of the hard water form of the Pearl Mussel which is limited to a 10 km stretch of the Nore, add further interest to this site.

SITE NAME: KILCORMAC ESKER pNHA

SITE CODE: 000906

Eskers are long ridges of glacial till which were deposited at the end of the last ice age. As geomorphological features these relicts of the retreating ice are of great importance. However, the well drained, calcium-rich soils of eskers often support an interesting and species rich vegetation. An esker chain runs from the Shannon, past Birr to Screggan, about 10km southwest of Tullamore. Parts of the stretch from Idle corner to Screggan, constitutes the Kilcormac esker proposed Natural Heritage Area (NHA).

Pockets of Hazel (*Corylus avellana*), with Oak (*Quercus* sp.), Ash (*Fraxinus excelsior*), Whitebeam (*Sorbus aria* agg.) Hawthorn (*Crateagus monogyna*), Beech (*Fagus sylvatica*), Birch (*Betula* sp.) and Holly (*Ilex aquifolium*) are scattered along this area and give some insight into the pre-existing woodland communities developed here. Often they are unfenced and trampling by cattle resulting in an impoverished ground flora. But where a ground flora has been allowed to develop,

for example in the eastern blocks, it features abundant Bluebell (*Hyacinthoides non-scriptus*) with Primrose (*Primula vulgaris*) and Early-purple orchid (*Orchis mascula*). The latter species also remain in better quality open grassland.

Some areas have recently been invaded by Gorse (*Ulex europaeus*).

The gravel from which the esker is composed, is calcium rich, and when left grazed but not intensively fertilised, this results in a short species-rich Fescue (*Festuca* spp.) turf. Some rather degraded grassland has been included, as it retains some elements of the esker grassland flora.

The grazing of stock is an important part of managing the grassland areas, but remaining pockets of woodland would benefit from the exclusion of stock.

SITE NAME: BALLYDUFF ESKER pNHA

SITE CODE: 000885

Ballyduff esker runs from north of Rahan to south of Tyrellspass. As a feature of glacial deposition, the whole structure is of interest, but around Trumpet Hill a Natural Heritage Area has been proposed for designation because the area is also of considerable ecological interest. Here the eastern end comprises three high ridges with two steep sided and deep depressions. West of the road there are two main ridges with several short side branches which reflect the path of meltwater channels within the retreating ice at the end of the last ice age. The result is a well drained glacial till.

The vegetation of the Natural Heritage Area is a complex of Hazel woodland, scrub, and grassland in various stages of agricultural 'improvement'.

Although many eskers have been severely damaged if not destroyed by gravel extraction in the past, this part of Ballyduff esker has remained virtually intact. Mature scrub of Blackthorn (*Prunus spinosa*), Hawthorn (*Crateagus monogyna*), Hazel (*Corylus avellana*) and Willows (*Salix* spp.) is still frequent around Trumpet Hill itself. Elsewhere there is Gorse (*Ulex europaeus*) scrub, and Bracken (*Pteridium aquilinum*) which requires cyclical clearance. The open grassland areas which have not been intensively fertilised, especially at the east end and on the Trumpet Hill, support diverse and interesting grassland communities that reflect the calcareous nature of the underlying till. The railway cuttings provide an additional habitat of loose open gravel where the protected Red Hemp Nettle (*Galeophsis angustifolici*) is found.

Heavy use of fertilisers has reduced the interest of other grassland areas, and mechanical damage due to overstocking has also occurred. However fertilisers will wash out of this well drained grassland, and with the reservoir of grassland species in the nearby unimproved areas, the potential for recovery is great. Even in its current condition this site is of great interest for its mosaic of habitats. Developed on a geomorphological feature typical of the midlands but becoming increasingly rare, this is one of the best known remaining eskers which still supports an open and relatively natural flora.

SITE NAME: MURPHY'S BRIDGE ESKER pNHA

SITE CODE: 001775

This elongated gravel ridge is a feature of glaciation. It was formed under the ice mass which covered the Irish Midlands during the last "Ice Age". The ridge runs in a northeast/southwest direction, and is bissected by the Grand Canal approximately 7km northeast of Tullamore. The site is contiguous with Rahugh Esker (Site No.).

The land cuts through the esker, just north of Murphy's Bridge. In this area, exposed gravel slopes support patches of dry calcareous grassland vegetation which is remarkably species-rich. Yellow-wort (*Blackstonia perfoliata*), Carline Thistle (*Carlina vulgaris*), Burnet-saxifrage (*Pimpinella saxifraga*), Weld (*Reseda luteola*), Golden Rod (*Solidago virgaurea*), Field Scabious (*Knautia arvensis*) and Crested Hair-grass (*Koeleria macrantha*) are among the plants which occur here. Two aromatic herbs also occur, wild i.e. Marjoram (*Origanum vulgare*) and Wild Thyme (*Thymus praecox*). Irish Whitebeam (*Sorbus hibernica*) bushes are scattered on the open slopes. This species occurs only occasionally throughout the country but mostly in the Midlands.

Elsewhere, the esker supports broadleaved woodland, while in some places this has been cleared for pasture. These habitats require further examination/survey.

The rare and legally protected Hemp Nettle (*Galeopsis angustifolia*) (Flora Protection Order, 1987) has recently been recorded in this site. This species grows on eskers in arable fields and in waste places. It has been recorded at only 7 sites in 4 counties in the Republic since 1970. Another rare plant, Blue Fleabane (*Erigeron acer*) grows on this site with Hemp Nettle. This plant favours calcium-rich substrates and is found on eskers, dry grassland, sandy pastures and walls. It is listed in the Red Data Book and is considered threatened in Ireland.

The majority of Irish eskers are exploited for their sand and gravel deposits. Quarrying results in the removal or destruction of esker habitats and threatens the survival of the plants which grow there. Application of fertilizer and/or herbicide to improve esker grasslands for agricultural use is a common practice. This activity leads to removal of the semi-natural vegetation and has been deemed a major factor in the decline of a range of plant species now rare in Ireland. Removal of timber leads to the depletion of esker woodlands, while over-grazing by sheep/cattle can prevent tree regeneration and cause damage to grassland vegetation. Just east of the canal at this stage, the gravel slopes are used for motorbike scrambling. This maintains the open, loose-gravel slopes which seem to be attractive to many plants, although over-use of the slopes could cause damage. This particular area is owned by OPW and there is the potential for developing a management strategy which is compatible with the conservation of the habitat.

Intact eskers are increasingly rare in Ireland. This site remains a good example of its type and has a range of habitats present. Of particular interest is its rich calcicole flora on exposed gravel slopes, which includes two rare species, one of which is protected by law.

SITE NAME: SLIEVE BLOOM MOUNTAINS SPA

SITE CODE: 004160

The Slieve Bloom Mountains SPA is situated on the border between Counties Offaly and Laois, and runs along a north-east/south-west aligned ridge for approximately 25 km. Much of the site is over 200 m in altitude, rising to a maximum height of 527 m at Arderin. The mountains are of Old Red Sandstone, flanked by Silurian rocks. Several important rivers rise within the site, including the Barrow, Delour and Silver.

The site has a near continuous ridge of mountain blanket bog, with wet and dry heaths also well represented. Species present in these habitats include Ling Heather (*Calluna vulgaris*), Crowberry (*Empetrum nigrum*), Bilberry (*Vaccinium myrtillus*), Cottongrasses (*Eriophorum* spp.), Deergrass (*Scirpus cespitosus*) and Bog Asphodel (*Narthecium ossifragum*). Much of the slopes are afforested, and overall conifereous plantations account for *c*. 60% of the site. The forests include first and second rotation plantations, with both pre-thicket and post-thicket stands present. Substantial areas of clear-fell are also present at any one time. The principal tree species present are Sitka Spruce (*Picea sitchensis*) and Lodgepole Pine (*Pinus contorta*). The remainder of the site is mostly rough grassland that is used for hill farming. This varies in composition and includes some wet areas with rushes (*Juncus* spp.) and some areas subject to scrub encroachment. Some stands of deciduous woodland also occur, especially within the river valleys.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for Hen Harrier.

This SPA is one of the strongholds for Hen Harrier in the country and, indeed, is the most easterly regular population. A survey in 2005 resulted in five confirmed and three possible breeding pairs, whereas ten confirmed pairs and one possible pair had been recorded in the 1998-2000 period. These numbers represent *c*. 5% of the national total. The mix of forestry and open areas provides optimum habitat conditions for this rare bird, which is listed on Annex I of the E.U. Birds Directive. The early stages of new and second-rotation conifer plantations are the most frequently used nesting sites, though some pairs may still nest in tall heather of unplanted bogs and heath. Hen Harriers will forage up to *c*. 5 km from the nest site, utilising open bog and moorland, young conifer plantations and hill farmland that is not too rank. Birds will often forage in openings and gaps within forests. In Ireland, small birds and small mammals appear to be the most frequently taken prey.

The site is also a traditional site for a breeding pair of Peregrine. Several pairs of Merlin are known to breed within the site but further survey is required to determine the exact status of this small falcon. Both of these species are also listed on Annex I of the E.U. Birds Directive. Red Grouse is found on many of the unplanted areas of bog and heath – this is a species that has declined in Ireland and is now Red-listed.

The main threat to the long-term survival of Hen Harriers within the site is further afforestation, which would reduce and fragment the area of foraging habitat, resulting in possible reductions in breeding density and productivity. The observed decline between the 1998-2000 and 2005 surveys may be real and due to habitat change as a result of maturation of conifer plantations. Much of the unplanted blanket bog is a Statutory Nature Reserve.

Overall, the site provides excellent nesting and foraging habitat for breeding Hen Harrier and is among the top five sites in the country for the species. It is also likely to be of national importance for breeding Merlin.

Appendix 7

List of protected species recorded within 10 km of Derryclure

Common Name	Scientific Name	10km Grid Square	Legislation
Fallow Deer	*Dama dama*	N31, N32	WA
Stoat	*Mustela erminea*	N31	WA
Otter	*Lutra lutra*	N32	HD, WA
Opposite-leaved Pondweed	*Groenlandia densa*	N32	FPO, IUCN V

HD = Habitats Directive
WA = Wildlife Act
FPO = Flora Protection Order
IUCN = International Union for the Conservation of Nature and Natural Resources Threat Category [EX=Extinct; E= Endangered; V=Vulnerable; R= Rare; I= Indeterminate.