Planning and Environmental Consultants

Environmental Impact Assessment Report

Derrybrien Wind Farm Development Decommissioning Project – Prospective Development

Volume 2a: EIAR Appendices 2-1 to 8-1

APPENDIX 2-1

SCOPING RESPONSES

From: Environmental Co-ordination (Inbox)
Sent: Monday 4 November 2024 09:45
To: Morgan Valvik
Cc: Thomas Blackwell
Subject: FW: Scoping Request: 220437 & 240450 Derrybrien Windfarm Decommissioning Project
Attachments: Derrybrien Windfarm Decommissioning Project.pdf

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Good morning

Please see comments/observations attached.

Regards,

Environmental Co-ordination Unit

From: Morgan Valvik <mvalvik@mkoireland.ie>
Sent: Tuesday, September 24, 2024 3:55 PM
To: Environmental_Co-ordination@agriculture.gov.ie>
Cc: Thomas Blackwell <tblackwell@mkoireland.ie>
Subject: Scoping Request: 220437 & 240450 Derrybrien Windfarm Decommissioning Project

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Dear Sir/Madam,

Please find attached to this email a cover letter, Environmental Impact Assessment (EIA) Scoping Document, and a remedial Environmental Impact Assessment (rEIA) Scoping Document for the "Derrybrien Windfarm Decommissioning Project."

The existing Derrybrien wind farm site is located in the northern part of the Slieve Aughty Mountains, Co. Galway and encompasses seventy (70 no.) Vestas V52-850kW wind turbines, an onsite wind farm substation (Derrybrien Substation), two met masts, a grid connection comprising of a 110kV Overhead line (approximately 7.8km long) and an 110kV substation at Agannygal connecting the wind farm to the National Grid.

Gort Windfarms Ltd intends to apply for planning permission for the "Derrybrien Windfarm Decommissioning Project" which comprises two elements:

1. the carrying out of physical works to decommission specific features of the existing Derrybrien Wind Farm (the Prospective Development); and
2. the proposed 'retention' in situ of other specific features of the existing development (i.e. the Retained Development).

A planning application will be submitted to An Bord Pleanála for consent for the Prospective Development under Section 37L of the Planning and Development Act, 2000 (as amended). The planning application will be accompanied by an Environmental Impact Assessment Report (EIAR) and Natura Impact Statement (NIS) as required by the Board, in relation to the Prospective Development. Furthermore, a subsequent application will be made to An Bord Pleanála for substitute consent for the Retained Development under Section 177E of the Planning and Development Act, 2000 (as amended). The substitute consent application will be accompanied by a Remedial EIAR and Remedial NIS.

As part of the scoping exercise for the Derrybrien Windfarm Decommissioning Project, we would welcome any comments in relation to the Prospective Development and Retained Development.

If you have any queries, please do not hesitate to come back to me. Thank you for your time and attention.

Kind regards,
Morgan.

Morgan Valvik
Graduate Environmental Scientist
MKO
9c Beckett Way, Park West Business Park,
Dublin 12, D12 XN9W

Offices in Galway and Dublin
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Department of Agriculture, Food and the Marine

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An Roinn Talmhaíochta, Bia agus Mara

Tá an t-eolas sa ríomhphost seo, agus in aon cheangaltáin leis, faoi rún agus tá sé dírithe ar an bhfaighteoir/na faighteoirí beartaithe amháin agus níor cheart ach dóibh siúd é a úsáid. D'fhéadfadh an t-eolas seo a bheith faoi réir pribhléid dhlíthiúil agus ghairmiúil. Mura tusa faighteoir beartaithe an ríomhphoist seo, níor

cheart duit an teachtaireacht seo, nó aon chuid di, a úsáid, a nochtadh, a chóipeáil, a dháileadh nó a choinneáil. Má fuair tú an ríomhphost seo go hearráideach, cuir an seoltóir ar an eolas láithreach agus scrios gach cóip den ríomhphost seo ó chóra(i)s do ríomhaire, le do thoil.

An Roinn Talmhaíochta,
Bia agus Mara
Department of Agriculture,
Food and the Marine

MKO
Tuam Road
Galway
H91VW84

01st November 2024

Re: Derrybrien Windfarm Decommissioning Project located in the northern part of the Slieve Aughty Mountains, Co. Galway.

Dear Sir/Madam,

The following are the comments from this Division in relation to the proposed development:

If the proposed development will involve the felling or removal of any trees, the developer must obtain a Felling License from this Department before trees are felled or removed. A Felling Licence application form can be obtained from the Department's website link here: gov.ie - Tree Felling Licences (www.gov.ie)

A Felling Licence granted by the Minister for Agriculture, Food and the Marine provides authority under the Forestry Act 2014 to fell or otherwise remove a tree or trees and/or to thin a forest for silvicultural reasons. The Act prescribes the functions of the Minister and details the requirements, rights and obligations in relation to felling licences. The principal set of regulations giving further effect to the Forestry Act 2014 are the Forestry Regulations 2017 (S.I. No. 191 of 2017).

The developer should take note of the contents of **Felling and Reforestation Policy** document which provide a consolidated source of information on the legal and regulatory framework relating to tree felling; gov.ie - Tree Felling Licences (www.gov.ie) As this development is within forest lands, particular attention should be paid to deforestation, turbulence felling and the requirement to afforest alternative lands.

In order to ensure regulated forestry operations in Ireland accord with the principles of sustainable forest management (SFM), as well fulfilling the requirements of other relevant environmental protection laws, the Department (acting through its Forest Service division) must undertake particular consultations, and give certain matters full consideration during the assessment of individual Felling Licence applications. This includes consultation with relevant bodies, the application of various protocols and procedures (e.g. Forest Service Appropriate Assessment Procedure), and the requirement for applicants on occasion to provide further information (e.g. a Natura Impact Statement).

Consequently, when the Forest Service is considering an application to fell trees, the following applies:

1. The interaction of these proposed works with the environment locally and more widely, in addition to potential direct and indirect impacts on designated sites and water, is assessed. Consultation with relevant environmental and planning authorities may be required where specific sensitivities arise (e.g. local authorities, National Parks & Wildlife Service, Inland Fisheries Ireland, and the National Monuments Service);

2. Where a tree Felling Licence application is received, the Department will publish a notice of the application before making a decision on the matter. The notice shall state that any person may make a submission to the Department within 30 days from the date of the notice. The notices are published online at: gov.ie - Felling Licence Applications (www.gov.ie)

3. Third parties that make a submission or observation will be informed of the decision to grant or refuse the licence, and on request, details of the conditions attached to the licence, the main reasons and considerations on which the decision to grant or refuse the licence was based, and where conditions are attached to any licence, the reasons for the conditions. Both third parties and applicants will be also informed of their right to appeal any decision within 14 days to the Forestry Appeals Committee. Felling Licence decision are published on the Departments Forestry Licence Viewer 9FLV) link here: Forestry Licence Viewer (agriculture.gov.ie)

It is important to note that when applying to **a Local Authority**, or **An Bord Pleanàla**, for planning permission where developments are:

a) subject to an EIA procedure (including screening in the case of a sub-threshold development) and any resulting requirement to produce an EIAR; and/or

b) subject to an Appropriate Assessment procedure (including screening) and any resulting requirement to a Natura Impact Statement (NIS); and

c) the proposed development in its construction or operational phases, or any works ancillary thereto, would directly or indirectly involve the felling and replanting of trees, deforestation for the purposes of conversion to another type of land use, or replacement of broadleaf high forest by conifer species,

1. that there is a requirement inter alia under the EIA Directive for an overall assessment of the effects of the project or the alteration thereof on the environment to be undertaken, including the direct and indirect environmental impact of the project;

and

2. pursuant to Article 2(3) of the EIA Directive, the Department of Agriculture, Food and the Marine strongly recommends that, notwithstanding the fact that a parallel consent in the form of felling licence may also have to be applied for, any EIAR and/or NIS produced in connection with the application for planning permission to the Local Planning Authority or An Bord Pleanàla, should include an assessment of the impact of and measures, as appropriate, to prevent, mitigate or compensate for any significant adverse effects direct or indirect identified on the environment arising from such felling and replanting of trees, deforestation for the purposes of conversion to another type of land use, or replacement of broadleaf high forest by conifer species.

3. Please note that there must be absolute spatial consistency between the felling licence areas submitted to DAFM (second authority) and all related planning documents submitted to the first authority in respect of the felling area(s)

_____

Neil O'Brien
Higher Executive Officer
Felling Section

From: Housing Manager DAU
Sent: Wednesday 6 November 2024 08:08
To: Morgan Valvik
Cc: Simon Dolan (Housing)
Subject: G Pre00318/2024 Gort Windfarms Ltd. Application for "Derrybrien Windfarm Decommissioning Project"
Attachments: Derrybrien Wind Farm Decommissioning Pre Planning Response.pdf

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G Pre00318/2024

Good morning Morgan,

Please find attached Heritage related observations/recommendations for the above mentioned planning application.

Kind regards,
Colette

Colette McCormack
Executive Officer

An Roinn Tithíochta, Rialtais Áitiúil agus Oidhreachta
Department of Housing, Local Government and Heritage

Aonad na nIarratas ar Fhorbairt
Development Applications Unit

Oifigí an Rialtais, Bóthar an Bhaile Nua, Loch Garman, Contae Loch Garman, Y35 AP90
Government Offices, Newtown Road, Wexford, Co Wexford, Y35 AP90
Telephone: 053 9117434

An Roinn Tithíochta,
Rialtais Áitiúil agus Oidhreachta
Department of Housing,
Local Government and Heritage

Our Ref: G Pre00318/2024
(Please quote in all related correspondence)

6 November 2024

MKO
Tuam Road
Galway
H91 VW84

Via email: mvalvik@mkoireland.ie

Re: The "Derrybrien Windfarm Decommissioning Project" at Derrybrien, County Galway.

A chara

I refer to correspondence received in connection with the above. Outlined below are heritage-related observations/recommendations of the Department co-ordinated by the Development Applications Unit under the stated headings.

Archaeology

The Department of Housing, Local Government and Heritage has reviewed the 'Environmental Impact Assessment Scoping Document' for the proposed Derrybrien Wind Farm Development Decommissioning Project, County Galway.

The information provided was not sufficiently detailed to allow for a full assessment of the archaeological implications of this proposal, however this Department notes that an Archaeological Impact Assessment (AIA) is scoped into the proposed Environmental Impact Assessment (EIA) process as part of the overall Cultural Heritage Impact Assessment of the proposed development and will be carried out by John Cronin & Associates. The supplied methodology indicates that this will incorporate a detailed desktop study and field inspection. In this regard, this Department awaits the results of the Cultural Heritage Impact Assessment (CHIA) and full Environmental Impact Assessment Report (EIAR) for the scheme before commenting further.

Further to the above, and by way of general archaeological advice, please note that, whilst the proposed development site (PDS) may or may not contain within it known or subsurface

Recorded Monuments and/or Archaeological sites that may require assessment as part of the overall CHIA, the PDS itself is located within a wider area of known archaeological settlement and activity (the Department's initial review of the Record of Monuments and Places, www.archaeology.ie and cartographic sources). All of these Recorded Monuments, both within and outside the PDS, are subject to statutory protection in the Record of Monuments and Places, established under section 12 of the National Monuments Act 1930-2014. Therefore the CHIA should include an assessment of the possible effects of the proposal on the wider archaeological landscape. It is of importance that the study area for the CHIA should be of sufficient size and extent to support this.

The Department further advises that the following are also carried out (as appropriate) as part of the overall CHIA to ensure a comprehensive assessment of the proposed development:

- The desk-study and field inspection regime should inform:
    - Targeted non-intrusive advance geophysical survey or prospection (such as Ground Penetrating Radar Surveys).
    - Targeted advance archaeological test excavation.

- Any and all intrusive advance investigations (such as, but not limited to, ground investigations for soils/geology/hydrogeology) carried out as part of the EIA or design process should be subject to a programme of archaeological monitoring by a suitably qualified archaeologist.

The results of these investigations should inform the EIA process and be incorporated within the EIA Report. This Department is happy to provide further advice and clarification as and if required in relation to the preparation of suitably comprehensive assessments as outlined above, with particular regard to the scope and locations for any advance non-intrusive prospection or advance test excavation that might be appropriate to inform the assessment of this proposed scheme.

Notwithstanding the above, this Department awaits the submission of this assessment before commenting further.

Nature Conservation

The following observations are made by the Department in its role as the authority with overarching responsibility for nature conservation and the nature Directives (i.e. the EU Birds and Habitats Directives) and as an environmental authority under SEA legislation. The observations are not exhaustive and are offered to assist the applicant in meeting its

obligations in relation to nature conservation, European sites, biodiversity and environmental protection in the preparation of the EIAR and the remedial EIAR for the proposed Derrybrien Wind Farm Development Decommissioning Project.
These comments are made to assist the applicant in determining the scope of the ecological data and the nature of the assessment that should be undertaken.

Introduction:
It is noted that the proposed applications will relate to the removal of specific elements of the existing wind energy which will be the subject of an application under Section 37L of the Planning and Development Act, 2000 as amended. This will then be followed by an application for substitute consent for retention of other aspects of the existing development under Section 177E of the Planning and Development Act, 2000 as amended.

It is noted in the rEIA Scoping Report that:
"*"For the purpose of assessments undertaken for the remedial EIAR, the baseline environment against which impacts have been assessed has been taken as that which existed prior to the original planning process. The baseline date for assessment of environmental effects in the rEIAR is the date when the environmental impact assessment should originally have been carried out and taken into account by the decision-maker.*
The planning consents were granted in the period 1998-2001. Therefore, for the purposes of the rEIAR, the baseline environment against which assessment of environmental effects is made is that which existed in 1998."

The rEIAR should clearly state the sources of information that are used to establish the baseline environment at that time and how this and other data is used to determine the impact of the development since it was commenced. The impact of the peat slide in 2003 and any impacts of measures that were constructed to mitigate the effects of the slide on biodiversity should be considered part of the effects of the elements of the development to be retained.

Specific comments are as follows:

- Natural recolonization of bare areas is preferred as opposed to replanting or reseeding. Seeding of any bare areas should only be considered where there are overriding slope stability issues and these should be identified in the application. It is recommended that monitoring of natural recolonization is included as a commitment in the application.

- The date of ecological surveys data should be recent so that the impact predictions are robust and relevant. Reference to the Chartered Institute of Ecology and Environmental Management (CIEEM) Advice Note on the Lifespan of Ecological

Reports & Surveys (https://cieem.net/wp-content/uploads/2019/04/Advice-Note.pdf) is helpful in this respect.

- In the event that this Department may be invited to comment on environmental management plans, method statements or similar documents after consent has been granted, it is advised that any agreements should only be made between the applicant and the competent authority. There is no statutory basis for which this Department can "agree" such plans or similar details after consent has been granted. This Department notes the advice in the Department's *Development Management: Guidelines for Planning Authorities* (Section 7.9), which states that
"*Conditions requiring matters to be the subject of consultation with, or to be agreed with, a named officer of the planning authority, or with a particular department or branch of the local authority, or with another public authority, should not be attached to a permission."*

- The applications should be cognisant of policies and objectives contained within the current Galway County Development Plan and of any emergent County Biodiversity Plan that may be drafted during the application process. The applicant is also noted to be aware of obligations placed on local authorities in the National Biodiversity Action plans and to ensure that they are addressed in the application.

You are requested to send any further communications to this Department's Development Applications Unit (DAU) at manager.dau@npws.gov.ie, or to the following address:

The Manager
Development Applications Unit (DAU)
Government Offices
Newtown Road
Wexford
Y35 AP90

Is mise, le meas

Colette McCormack

Colette McCormack
Development Applications Unit
Administration

From: Transport GCU
Sent: Thursday 24 October 2024 16:43
To: Morgan Valvik; Transport GCU
Cc: Thomas Blackwell
Subject: RE: Scoping Request: 220437 & 240450 Derrybrien Windfarm Decommissioning Project

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Good afternoon,

Thank you for contacting Department of Transport in relation to the Derrybrien Windfarm Decommissioning Project.

The Department consider it important that the examination of the proposal should include consideration of the following:

- When considering Waste and Turbine Removal all abnormal loads associated with the project should be kept to minimal dimensions and weights to minimise the impact on the public road network.

Kind regards
Jacqui

Jacqui Traynor
Central Policy, Coordination and Reform
An Roinn Iompair
Department of Transport
Lána Líosain, Baile Átha Cliath, D02 TR60
Leeson Lane, Dublin, D02 TR60
T +353 (0)1 604 1177
gcu@transport.gov.ie www.gov.ie/transport

From: Morgan Valvik <mvalvik@mkoireland.ie>
Sent: Tuesday, September 24, 2024 4:06 PM
To: Transport GCU <GeneralCo-OrdinationUnit@transport.gov.ie>
Cc: Thomas Blackwell <tblackwell@mkoireland.ie>
Subject: Scoping Request: 220437 & 240450 Derrybrien Windfarm Decommissioning Project

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As part of the scoping exercise for the Derrybrien Windfarm Decommissioning Project, we would welcome any comments in relation to the Prospective Development and Retained Development.

If you have any queries, please do not hesitate to come back to me. Thank you for your time and attention.

Kind regards,
Morgan.

Morgan Valvik
Graduate Environmental Scientist
MKO
9c Beckett Way, Park West Business Park,
Dublin 12, D12 XN9W

Offices in Galway and Dublin
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Tá eolas sa teachtaireacht leictreonach seo a d'fhéadfadh bheith príobháideach nó faoi rún agus b'fhéidir go mbeadh ábhar rúnda nó pribhléideach ann. Is le h-aghaidh an duine/na ndaoine nó le h-aghaidh an aonáin atá ainmnithe thuas agus le haghaidh an duine/na ndaoine sin amháin atá an t-eolas. Tá cosc ar rochtain don teachtaireacht leictreonach seo do aon duine eile. Murab ionann tusa agus an té a bhfuil an teachtaireacht ceaptha dó bíodh a fhios agat nach gceadaítear nochtadh, cóipeáil, scaipeadh nó úsáid an eolais agus/nó an chomhaid seo agus b'fhéidir d'fhéadfadh bheith mídhleathach.

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From: planning applications
Sent: Tuesday 15 October 2024 12:25
To: Morgan Valvik
Cc: Thomas Blackwell
Subject: FW: Scoping Request: 220437 & 240450 Derrybrien Windfarm Decommissioning Project
Attachments: Fáilte Ireland EIAR Guidelines 2023.pdf

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Hello Morgan,

Thank you for your email, cover letter and documents regarding the "Derrybrien Windfarm Decommissioning Project."

Please see attached a copy of Fáilte Ireland's Guidelines for the Treatment of Tourism in an EIA, which you may find informative for the preparation of the Environmental Impact Assessment for the proposed project. The purpose of this report is to provide guidance for those conducting Environmental Impact Assessment and compiling an Environmental Impact Assessment Reports (EIAR), or those assessing EIARs, where the project involves tourism or may have an impact upon tourism. These guidelines are non-statutory and act as supplementary advice to the EPA EIAR Guidelines outlined in section 2.

Regards,

Yvonne

Yvonne Jackson
Product Development-Environment & Planning Support | Fáilte Ireland

88-95 Amiens Street, Dublin 1, D01 WR86
M +353 (0)86 0357590

Fáilte Ireland

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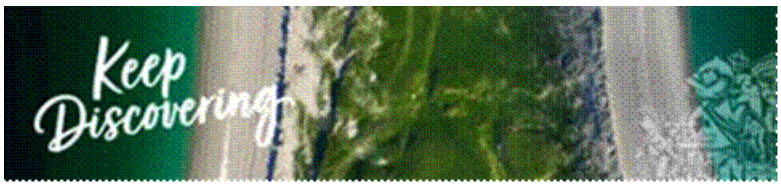

From: Morgan Valvik <mvalvik@mkoireland.ie>
Sent: Tuesday 24 September 2024 16:21
To: planning applications <planning.applications@failteireland.ie>

Cc: Thomas Blackwell <tblackwell@mkoireland.ie>
Subject: Scoping Request: 220437 & 240450 Derrybrien Windfarm Decommissioning Project

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If you have any queries, please do not hesitate to come back to me. Thank you for your time and attention.

Kind regards,
Morgan.

Morgan Valvik
Graduate Environmental Scientist
MKO
9c Beckett Way, Park West Business Park,
Dublin 12, D12 XN9W

Offices in Galway and Dublin
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Fáilte Ireland
Turasóireacht Náisúnta
An tÚdara Eorbartha
National Tourism
Development Authority

EIAR Guidelines for the Consideration of Tourism and Tourism Related Projects

July 2023

An tÚdarás Náisiúnta Forbartha Turasóireachta
Áras Fáilte, 88–95 Sráid Amiens
Baile Átha Cliath 1
D01 WR86
Éire

National Tourism Development Authority
Áras Fáilte, 88 - 95 Amiens Street
Dublin 1
D01 WR86
Ireland

Phone 1890 525 525
or +353 1 884 7700
Email info@failteireland.ie
www.failteireland.ie

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1. Introduction

Tourism is a growing sector and substantial part of the Irish Economy. It contributes to both urban and rural economies in every part of the country. The impact and interaction of tourism with the environment is complex and the assessment of environmental impacts is of utmost importance to creating a sustainable tourism economy and protecting the natural resources that are so often a tourism attraction.

The purpose of this report is to provide guidance for those conducting Environmental Impact Assessment and compiling an Environmental Impact Assessment Reports (EIAR), or those assessing EIARs, where the project involves tourism or may have an impact upon tourism. These guidelines are non-statutory and act as supplementary advice to the EPA EIAR Guidelines outlined in section 2.

This guidance document has been prepared by Fáilte Ireland to update their EIA guidelines in line with changes in legislative and guidance requirements.

2. Background to this Document

Tourism is one of the largest and most important sectors of the economy, providing employment for approximately **260,000 people**, an economic contribution of **€9.5 billion**, and exchequer revenue of **€1.8 billion** in 2019, which helps fund other key public services.

In 2019 Ireland welcomed **9.7 million overseas visitors.**

Fáilte Ireland is the National Tourism Development Authority established by the Irish Government in May 2003. Fáilte Irelands role is to support the tourism industry and work to sustain Ireland as a high-quality and competitive tourism destination. They provide a range of practical business supports to help tourism businesses better manage and market their products and services.

Fáilte Ireland also work with other state agencies and representative bodies, at local and national levels, to implement and champion positive and practical strategies that will benefit Irish tourism and the Irish economy.

Fáilte Ireland promotes Ireland as a holiday destination through a domestic marketing campaign (DiscoverIreland.ie) and manage a network of nationwide tourist information centres that provide help and advice for visitors to Ireland.

Tourism related projects cover a broad range of plans, programmes and developments, from the Wild Atlantic Way to a single hotel conversion. These guidelines apply to projects involving or impacting upon tourism. A tourism plan, strategy or programme where it is part of the statutory plan making process under the Planning and Development Acts (as amended), may be more appropriately assessed by a Strategic Environmental Assessment (SEA) as discussed in the next section.

It should be borne in mind that EIA is required where there is anticipated to be a significant impact on the environment, where tourism projects are of a prescribed type or meet thresholds identified below.

Where Natura 2000 Designated Sites are potentially affected by tourism development Appropriate Assessment must be carried out by the appropriate authority in accordance with Article 6(3) of the EU Habitats Directive.

3. Legislation and Statutory Guidance

Environmental Impact Assessment is a procedure that ensures that the environmental implications of decisions are taken into account before planning based decisions are made. The assessment results in a report, called an Environmental Impact Assessment Report (EIAR).

Legislation

These guidelines are produced under current EIAR legislative requirements, having regard to Directive 2011/92/EU (known as 'Environmental Impact Assessment' – EIA Directive), as amended by Directive EU 2014/52 which came into effect in May of 2017. These requirements were transposed into Irish Law on 1 September 2018 as most of the provisions of the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018) came into effect. The principle of both Directives is to ensure that plans, programmes and projects likely to have significant effects on the environment are made subject to an environmental assessment, prior to their approval or authorisation.

Statutory Guidance

In response to the changes to the EIAR requirements under Directive EU 2014/52, the Environmental Protection Agency (EPA) developed Guidelines on the information to be contained in Environmental Impact Assessment Reports in May 2022. The Guidelines are a statutory document to be regarded by those preparing EIARs and the decision makers considering the EIARs.

Some of the key changes to the EIA Directive introduced by Directive 2014/52/EU are as follows:

- Additional information to be provided in the project description to describe the location of the project, the technologies and substances used, the construction of the project and required demolition;
- The requirement for consideration of alternatives has changed from a requirement to provide ‘An outline of the main alternatives studied by the developer and an indication of the main reasons for this choice, taking into account the environmental effects’ to ‘a description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment’;
- A refinement of the environmental factors to be considered in the assessment with an increased focus on resource efficiency, climate change, biodiversity and disaster prevention;
- Changes to Prescribed Environmental Factors with ‘Land’ being added, ‘Human Beings’ replaced by ‘Population & Human Health’ and ‘Flora & Fauna’ replaced by ‘Biodiversity’;

- The developer is required to have competent experts to prepare the EIAR and the Board is required to have access to sufficient expertise to assess the EIAR;
- Requirement for the incorporation of mitigation and monitoring measures in consents and ensuring that developers deliver these measures;
- The requirements for the assessment of cumulative effects with existing and/or approved projects, taking into account existing environmental issues to be considered; and
- Reasoned decisions made with regard to the EIA outcomes must be provided.

In addition to the EPA statutory guidance, the Department of Housing has produced Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment in August 2018.

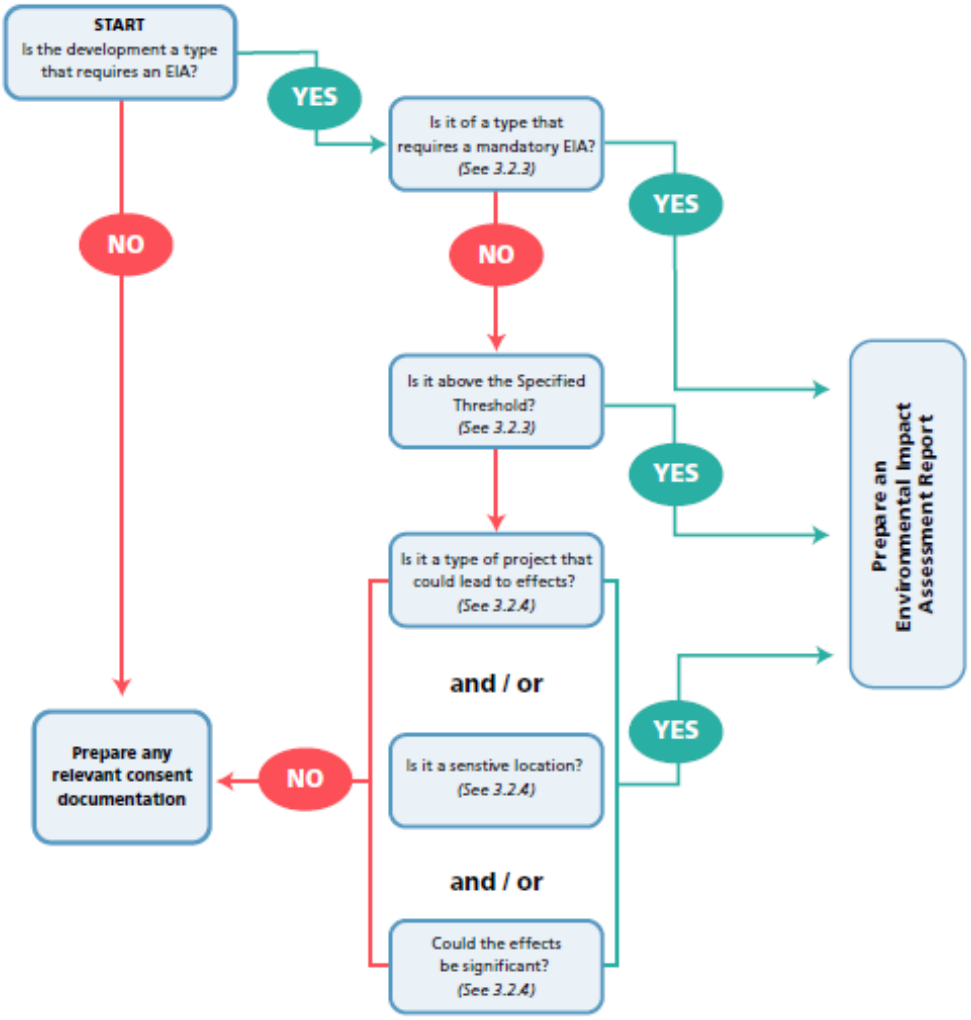
The process of EIA is set out in the EPA EIAR Guidelines, this document should be read in conjunction with and used as supplementary guidance to the EPA EIAR Guidelines. The process for ascertaining whether an EIAR is required is known as 'screening' and the process to determine the breath and scope of an EIAR is known as 'scoping'. Guidance on this can be found in Section 3.2 of the EPA Guidelines.

Screening

Through EIA Screening, developments are either considered as requiring an EIAR due to the project type or because they exceed a threshold level. The screening process begins by establishing whether the proposal is a 'project' as understood by the Directive (as amended).

The prescribed development types and thresholds are set out in Annex I and II of the EIA Directive as transposed into Schedule 5 of the Planning and Development Regulations 2010-2018 (as amended). Development which does not exceed these thresholds but may require an EIAR are called sub threshold. Sub-Threshold considerations are outlined in Schedule 7 of European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018) as transposed from Annex III of the Directive. The Guidelines on Environmental Impact Assessment Reports note that projects at first glance may not appear to come under the Schedule but on closer examination when the process is further examined, they may do so because of the sensitivity or significance of the receiving environment etc. Sub threshold developments require an EIAR if they are likely to have significant environmental impacts and must undergo assessment for likely significant impacts through an EIAR screening report. The contents of a screening report for subthreshold development are contained in Annex III of the EIA Directive.

Figure 1: EIAR Screening Process



(Taken from Fig 3.2 of the EPA Guidelines)

Tourism locations should be identified as sensitive receptors in screening assessments for particular impacts, depending on scale and sensitivity, as they would in a full EIAR. Section 6 below can act as guidance for Screening Reports as well as for full EIAR.

The screening process for considering where an EIAR is necessary, is summarised above in Figure 1 (excerpted from Figure 3.2 of the EPA Guidelines).

Strategic Environmental Assessment (SEA) is a more strategic level of environmental assessment that examines plans, policies, objectives and programmes specifically rather than projects. For some tourism developments it may be more appropriate that they be examined through SEA, while individual projects or specific proposals are likely to be more assessed through EIAR. If a project is part of a plan, programme or policy/objective assessed by SEA there may still be a requirement for an EIAR for that development (subject to EIA Screening assessment).

EIAR Scoping

Scoping an EIAR is an opportunity to look at the breadth of issues and ensure that any areas of possible significant impact are assessed. Identifying sensitivities and stakeholders should take account of tourism facilities and consider Fáilte Ireland in scoping requests where necessary.

4. Assessing Tourism

There is no legal definition of 'tourism' in Irish legislation. The UNWTO definition of sustainable tourism is *"Tourism that takes full account of its current and future economic, social and environmental impacts, addressing the needs of visitors, the industry, the environment and host communities"*. This is widely accepted as a key definition of tourism as we move to a more sustainable future.

Tourism assessments are frequently carried out by economic consultants and by specific tourism consultants. It is always advisable, particular for tourism projects, that suitably qualified and experienced personnel are used to determine the impact of tourism related projects or to assess the impact of more general proposals on a tourism asset identified in a particular location. There is a requirement for EIAR under current legislation to contain a statement of competency within all EIAR documents, including screening and scoping reports.

Projects which involve a tourism element

Tourism projects are wide ranging and diverse. While there are some projects which cater to tourism and are easily identified as such - Hotels, Museums, etc. there are other projects where tourism is a key service or element, but which may not be immediately obvious – walking/cycling/forest trails, greenways, blueways, community facilities and others. EIAR conducted for developments containing tourist elements should be completed in accordance with the current guidance from the EPA.

Projects which include a tourism element can have potential for particular environmental effects which differ from a non-tourism development. These impacts can be intermittent, event related, inconsistent, dependent on weather, temporal, temporary or seasonal. This is considered within the prescribed environmental topics for EIAR outlined in Section 7 below.

Projects which may have an impact upon tourism

While tourism projects may be diverse, the projects which can impact tourism are considerably more wide ranging, from large infrastructural developments to local energy developments. Disruption to or suppression of a tourist resource or amenity can have very local or more strategic impacts, directly or indirectly- for example energy projects in a rural area can have both a negative and positive impact in different regards. There can be temporary, periodic or even seasonal impacts occurring during construction or operational periods.

According to the Fáilte Ireland Tourism Facts 2019 Report, the most important factors in determining the attractiveness of tourism destinations for visitors to Ireland are;

- Beautiful Scenery and Unspoiled Environment
- Hospitality
- Safety
- Nature, Wildlife and Natural Attractions
- History and Culture

- Pace of Life

These factors used for the promotion of tourism in Ireland are also barometers of sensitivity to change in tourism sensitive or dominant locations where development may have an impact upon the tourism asset. The potential for development to impact these sensitivities, and the environmental criteria under which they can be considered, are identified in section 7 of the guidelines.

5. Guiding Principles of EIAR

As outlined in the EPA EIAR Guidelines, the fundamental principles to be followed when preparing an EIAR, including screening and scoping, are:

- Anticipating, avoiding and reducing significant effects
- Assessing and mitigating effects
- Maintaining objectivity
- Ensuring clarity and quality
- Providing relevant information to decision makers
- Facilitating better consultation.

Environmental assessment should be undertaken in accordance with the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018.

6. Consideration of Competency and Qualifications

As per Section 2.5 of the EPA Guidelines, EIAR is required to be completed by '*competent experts*'.

Contributors to the preparation of environmental impact assessment reports, including screening and scoping assessments, should be qualified and competent. Sufficient expertise, in the relevant field of the project concerned, is required for the purpose of its examination by the competent authorities in order to ensure that the information provided by the developer is complete and of a high level of quality so that a full and proper assessment can be undertaken.

For tourism related projects, or projects likely to affect tourism assets, competent experts in the area of tourism should be utilised in the environmental assessment.

The competency of all involved in the production of an EIAR or any related report (e.g. Screening and scoping) is required to be stated at the beginning of the EIAR report with further details as necessary in each following chapter.

Where tourism projects involve for example heritage or cultural components, input from heritage consultants, conservation architects, or historians may be required.

7. EIAR Requirements

The following are the key requirements for an EIAR under the current guidance. This is not a definitive list and should be read in conjunction with regulations.

- project description;
- assessment of alternatives considered;
- baseline assessment;
- assessment of effects;
- cumulative impact;
- interaction of impacts;
- mitigation & monitoring; and
- residual impacts

Project Description

Project descriptions are required to describe the whole project including site, scale, design and key factors. It is important that the EIAR and design team have a consistent understanding of the development description in full. The key requirements are outlined in section 3.5 of the EPA Guidelines however they identify the following;

- the location of the project
- the physical characteristics of the whole project
- the main characteristics of the operational phase of the project
- an estimate, by type and quantity, of the expected residues and emissions

The location of the project should include identifying key sensitive receptors (including tourism receptors). In the operational phase of the project any tourism based, or potentially tourism related activity, should be identified.

Assessment of Alternatives

The assessment of the various reasonable alternatives is an important requirement of the EIA process.

Where tourism projects are location dependent the assessment of reasonable alternatives should consider alternative methods, layouts, technologies and mitigations, detail the key considerations culminating in the selection of the option/design, the reasoning for these and the environmental effect of these decisions. This is particularly important for tourism projects which are often location tied. The EPA EIAR Guidelines indicate that it is generally sufficient to provide a broad description of each main alternatives and the key issues associated with each, showing how environmental considerations were taken into account in deciding on the selected option.

Baseline Assessment

Baseline descriptions are evidence based, current descriptions of environmental characteristics with consideration of likely changes to the baseline environment evidenced in planning histories, unimplemented permissions, and applications pending determination. Baseline assessments should identify any tourism sensitivities in the zone of influence of a development. This zone of influence of a development is highly dependent on its **Context, Character, Significance,** and **Sensitivity**, as outlined in the EPA EIAR Guidelines. These characteristics apply to both the development and the environment.

For example, in a tourism context;

The location of sensitive tourism resources that are likely to be directly affected should be highlighted, and other premises which although located elsewhere, may be the subject of in combination impacts such as alteration of traffic flows or increased urban development.

The character of an area from a tourism perspective should be described and the principal types of tourism in the area. Where relevant, the specific environmental resources or attributes in the existing environment which each group uses or values should be stated and where relevant, indicate the time, duration or seasonality of any of those activities.

The significance of the tourism assets or activities likely to be affected should be highlighted. Reference to any existing formal or published designation or recognition of such significance should be included. Where possible the value of the contribution of such tourism assets and activities to the local economy should also be provided.

If there are any significant concerns or opposition to the development known to exist among tourism stakeholders and interest groups, this should be highlighted. Identify, where possible, the particular aspect of the development which is of concern, together with the part of the existing tourism resource which may be threatened or impacted.

In addition, the baseline should include any methodologies employed in the study to obtain information, if particular databases are used to locate sensitive receptors they should be acknowledged. In relation to tourism information, the suggested information sources at the end of this document are a non-exhaustive list which may be of assistance in identifying tourism receptors.

Impact Assessment

The topics for consideration of impact are prescribed in the EIA Directive and transcribed into Irish law by the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018). Impact assessment should contain the likely significant effects of a development arising from both construction and operation of a development. Advice on describing the effects is contained within the EPA EIAR Guidelines and includes the **quality, significance, extent, probability, type** and **duration** of the effect, with particular descriptors for each. In describing effects upon tourism receptors these descriptors should take account of the particular aspects and sensitivities of tourism, for example a temporary annual effect from a development may have different impacts upon tourism if it falls at peak season rather than off-peak.

Impact assessment should be carried out as per EPA guidelines and the best practice for that prescribed topic. It may be considered appropriate to consider impact on tourism under the 'Population and Human Health' and / or 'Landscape' topics as suggested below.

Population and Human Health

The consideration of tourism projects within the Population and Human Health is extensive, with impacts ranging from rural employment population impacts of seasonal tourism, to the health impact of air pollution from increased traffic in urban areas.

The impact upon tourism can be considered within this section through the sensitivities of Hospitality, Safety and Pace of Life. Changes in population can impact the perception of pace of life or safety in a particular location. Impacts upon these issues in areas which rely heavily on tourism or have a particular sensitive tourism generator should be considered in this section. The EPA guidelines makes reference to amenity *"..which may be relevant under 'Population and Human Health' and 'Landscape'"*.

Biodiversity

Particular tourist activities can have a significant impact upon biodiversity. Landscapes which are 'unspoiled' can be attractors of tourism. However, the disturbance to ecology must be managed to minimise impacts.

Biodiversity is also a tourism asset and should be protected as such from other development and should be provided for in proposals where possible.

The assessment should also consider current Government policy on nature conservation as outlined in the National Biodiversity Action Plan 2017-2021 (NBAP) (and subsequent iterations (Including draft NBAP recently open for public consultation, to cover 2023 to 2027) which also includes Ireland's vision for biodiversity below.

'That biodiversity and ecosystems in Ireland are conserved and restored, delivering benefits essential for all sectors of society and that Ireland contributes to efforts to halt the loss of biodiversity and the degradation of ecosystems in the EU and globally.'

Land, Soils and Geology

A link between tourism and this prescribed environmental factor, beyond the normal development impacts, is rare, however particular activities or facilities which use geological features may have an impact upon soils and geology, such as mountain biking trails, recreational uses of old quarries etc.

The impact upon Geotourism related to geoheritage within the natural environment, e.g., any impacts on UNESCO Global Geoparks, of which we currently have three on the island of Ireland; Copper Coast in Co. Waterford, Burren and Cliffs of Moher in Co. Clare, and Cuilcagh Lakelands in Cavan and Fermanagh should be considered (where applicable) in this section.

Indirect impacts such as material use for extensive landscaping and public realm should also be considered.

Water

Tourism uses can be water intense, depending on development type. Recreational use of a surface water feature, water-based leisure centres etc have different impacts to standard development.

Air Quality and Climate

Tourism impact upon air quality is dependent on the activity proposed and sensitivity of the location. If the tourism project includes a large increase in transportation services, collection of baseline air emission data is advised. Transportation emissions affect not only air quality, but also greenhouse gases. Changing climatic patterns due to climate change should be factored into this analysis.

Noise and Vibration

A link between tourism and this prescribed environmental factor, beyond the normal development impacts, is rare, however the impact upon tourism of issues of noise and vibration can be significant. Construction adjoining hotels for example should consider the sensitivity of the development and ensure mitigation is in place.

Material Assets; Traffic and Transport

The different transport patterns associated with tourism activities is a key impact of tourism and should be considered especially for tourism projects. These produce temporal and seasonal changes on the norm and specialist consideration and interpretation should be given. Tourism proposals should, where possible, be well served by public transport and should be accessible by modes other than the car. The impact of traffic on tourism assets can be substantial and can vary in severity according to season, the weather, etc. The impact of construction traffic can be a particular concern in tourism sensitive areas in terms of noise pollution and visual impact. The construction programme of developments should work to

avoid peak tourism periods in tourism areas and should consider planned or anticipated tourism events and festivals.

Cultural Heritage

Cultural heritage can be a key component of tourism projects and the impact of tourism on the maintenance of cultural heritage should be given the utmost consideration, whether positive or negative. As a tourism attraction, cultural heritage should be strongly considered in non-tourism developments and the impact upon tourism considered as a potential impact.

Archaeology

Archaeology can be of tourism interest and can be an attractive or key component of tourism projects. Archaeology can be a tourism attractor and given that national policy emphasis on the non-renewable nature of the archaeology and archaeological heritage, focus should be a presumption in favour of its preservation in-situ or where preservation in-situ is not the option chosen, there must be preservation by record (i.e. archaeological excavation and recording must take place) in line with statutory requirements.

Material Assets; Waste Management

Tourism is a resource heavy activity and can impact waste streams and waste segregation. Impacts here should be considered strongly and with knowledge of the variation that arises from the particular tourist activity. Waste and Waste disposal issues can also impact the perception of an unspoiled environment, effecting tourism, which should be considered.

Material Assets

Material assets outside of the material assets already referenced that should be considered are built services (utilities) and infrastructure. Tourism development should include impact assessment on built services (utilities) and infrastructure while non tourism related development should consider the effect on tourism, which should be considered.

Landscape

The visual impact of a tourism development, especially in locations which are visually sensitive or renowned for their scenic or landscape beauty, should be considered carefully. A development intended to utilise or enjoy a particular vista or environment should minimise impact upon that environment.

Major Accident and Natural Disaster

There is a requirement for tourist developments to describe expected significant effects on the environment of the proposed development's vulnerability to major accidents and/or natural disasters relevant to it. Where appropriate measures should be identified to prevent or mitigate the significant adverse effects of such accidents or disasters, including resulting from climate change, on the environment and detail the preparedness for the proposed response.

Interaction of Impacts

Where two or more environmental impacts combine or interact they should be considered under the prescribed topics. It is best practice to provide a table of interactions within an EIAR or EIA Screening Report.

Cumulative Impact

The cumulative impact is that of the project combined with any known likely project which will interact or compound an environmental impact.

Transboundary Impact

Transboundary impacts should be included in EIAR. In the case of tourism, especially international travel, the transboundary impacts may not be proximate to the EIAR site.

Mitigation & Monitoring

Mitigation should follow the hierarchy of minimisation in descending order of preference- Avoid, Reduce, Remedy.

Avoid sensitive tourism resources- such as views, access and amenity areas including habitats as well as historical or cultural sites and structures.

Reduce the exposure of sensitive resources to excessive environmental impact.

Reduce the adverse effects to tourism land uses and patterns of activities, especially through interactions arising from significant changes in the intensity of use or contrasts of character or appearance.

Remedy any unavoidable significant residual adverse effects on tourism resources or activities.

Mitigation measures must be measurable and achievable within the bounds of the project.

With regard to Monitoring, Article 8a of the EIA Directive requires that:

1. 'The decision to grant development consent shall incorporate at least the following information …
(b) any environmental conditions attached to the decision, a description of any features of the project and/or measures envisaged to avoid, prevent or reduce and, if possible, offset significant adverse effects on the environment as well as, where appropriate, monitoring measures. … 4 Member States shall ensure that the features of the project and/or measures envisaged to avoid, prevent or reduce and, if possible, offset significant adverse effects on the environment are implemented by the developer, and shall determine the procedures regarding the monitoring of significant adverse effects on the environment. The type of parameters to be monitored and the duration of the monitoring shall be proportionate to the nature, location and size of the project and the significance of its effects on the environment. Existing monitoring arrangements resulting from Union legislation other than this Directive and from national legislation may be used if appropriate, with a view to avoiding duplication of monitoring.'

Residual Impacts

The residual impacts are the final predicted or intended impacts which occur after the proposed mitigation measures have been implemented.

8. Sources of information on Tourism

Information available online

Fáilte Ireland

Fáilte Ireland offers detailed research analysis and insights into the Irish Tourism Industry. The National Tourism Development Authority has a portfolio of research across a number of areas including facts and figures, Environmental Surveying and Monitoring, briefing papers and reports and visitor feedback. The Fáilte Ireland website has a dedicated research library which can be accessed here

Fáilte Ireland also manages an environmental surveying and monitoring database as part of the Wild Atlantic Way Operational Programme which can be accessed here. The purpose of this is to work with and demonstrate to our stakeholders and partners that we are committed to the sustainable development of the Wild Atlantic Way, and to be able to pre-empt and avoid environmental effects in the future should they occur.

Discover Ireland:

Operated by Fáilte Ireland, the Discover Ireland website includes comprehensive information on tourist attractions in destinations all around Ireland, including listings for activities, accommodation, events and experiences for every county, major town and region in Ireland. The website features elements from the four destination brands – Wild Atlantic Way, Ireland's Ancient East, Ireland's Hidden Heartlands and Visit Dublin and can be accessed here.

Tourism Ireland

Tourism Ireland is responsible for marketing the island of Ireland overseas as a holiday and business tourism destination. Tourism Ireland publishes a range of research documents including; visitor facts and figures, seasonal updates and industry insights which are accessible here

Local Authorities

Local Authorities are an invaluable source of information. They produce tourism strategies and audits of tourism assets within their jurisdiction. Local authorities will also produce landscape and seascape studies. Protected views and prospects as well as the record of protected structures and other designated protected buildings are contained within the Statutory Development Plans.

Regional Assemblies

Regional Assemblies can also be consulted on high level strategic tourism and potential Regional Spatial and Economic Strategies (RSESs) should be consulted.

Central Statistics Office

The Central Statistics Office (CSO) is Ireland's national statistical office and their purpose is to impartially collect, analyse and make available statistics about Ireland's people, society and economy. The Tourism and Travel Section of the Central Statistics Office is the major source for tourism statistics in Ireland and is updated regularly.

From: DECC Planning Notifications
Sent: Friday 11 October 2024 10:53
To: Morgan Valvik
Subject: RE: EIS 24/345 - Derrybrien Windfarm Decommissioning Project, Co Galway
Attachments: 2024-10-11 GSI Submission.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

Caution: This is an external email and may be malicious. Please take care when clicking links or opening attachments.

Dear Morgan,

Please see attached a submission on behalf of Geological Survey Ireland (a division of the Department of the Environment, Climate and Communications) with regard to the subject entity.

Please send an acknowledgement of receipt to PlanningNotifications@decc.gov.ie at your earliest convenience.

Many thanks,
Luke Thompson

Luke Thompson, Administrative Officer
Planning Advisory Division

An Roinn Comhshaoil, Aeráide agus Cumarsáide
Department of the Environment, Climate and Communications

Teach Tom Johnson, Bóthar Haddington, Baile Átha Cliath, D04 K7X4
Tom Johnson House, Haddington Road, Dublin, D04 K7X4

PlanningNotifications@decc.gov.ie

From: Morgan Valvik <mvalvik@mkoireland.ie>
Sent: Tuesday, September 24, 2024 4:37 PM
To: DECC GSI Planning <GSIPlanning@GSI.ie>
Cc: Thomas Blackwell <tblackwell@mkoireland.ie>; Patricia Smullen (DECC) <Trish.Smullen@gsi.ie>
Subject: Scoping Request: 220437 & 240450 Derrybrien Windfarm Decommissioning Project

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Dear Ms. Smullen,

Please find attached to this email a cover letter, Environmental Impact Assessment (EIA) Scoping Document, and a remedial Environmental Impact Assessment (rEIA) Scoping Document for the "Derrybrien Windfarm Decommissioning Project."

The existing Derrybrien wind farm site is located in the northern part of the Slieve Aughty Mountains, Co. Galway and encompasses seventy (70 no.) Vestas V52-850kW wind turbines, an onsite wind farm substation (Derrybrien Substation), two met masts, a grid connection comprising of a 110kV Overhead line (approximately 7.8km long) and an 110kV substation at Agannygal connecting the wind farm to the National Grid.

Gort Windfarms Ltd intends to apply for planning permission for the "Derrybrien Windfarm Decommissioning Project" which comprises two elements:

1. the carrying out of physical works to decommission specific features of the existing Derrybrien Wind Farm (the Prospective Development); and
2. the proposed 'retention' in situ of other specific features of the existing development (i.e. the Retained Development).

A planning application will be submitted to An Bord Pleanála for consent for the Prospective Development under Section 37L of the Planning and Development Act, 2000 (as amended). The planning application will be accompanied by an Environmental Impact Assessment Report (EIAR) and Natura Impact Statement (NIS) as required by the Board, in relation to the Prospective Development. Furthermore, a subsequent application will be made to An Bord Pleanála for substitute consent for the Retained Development under Section 177E of the Planning and Development Act, 2000 (as amended). The substitute consent application will be accompanied by a Remedial EIAR and Remedial NIS.

As part of the scoping exercise for the Derrybrien Windfarm Decommissioning Project, we would welcome any comments in relation to the Prospective Development and Retained Development.

If you have any queries, please do not hesitate to come back to me. Thank you for your time and attention.

Kind regards,
Morgan.

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An Roinn Comhshaoil, Aeráide agus Cumarsáide
Department of the Environment, Climate and Communications

Geological Survey
Suirbhéireacht Gheolaíochta
Ireland | Éireann

Morgan Valvik
MKO
9c Beckett Way,
Park West Business Park,
Dublin 12, D12 XN9W

08 October 2024

Re: Scoping Document for Derrybrien Windfarm Decommissioning Project, Co. Galway
Your Ref: 220437 & 240450
Our Ref: 24/345

Dear Morgan,

Geological Survey Ireland is the national earth science agency and is a division of the Department of the Environment, Climate and Communications. We provide independent geological information and interpretation and gather various data for that purpose. Please see our website for data availability.

With reference to your email received on the 30 September 2024, concerning the Scoping Document for Derrybrien Windfarm Decommissioning Project, Co. Galway, we recommend using our various data sets when conducting the EIAR, SEA, planning and scoping processes for developments, plans and policies. For more detailed information on how to access this data please access 'Data and Maps' Data & Maps (gsi.ie) on our 'Geoscience for planning' webpage. Use of our data or maps should be attributed correctly (please refer to each individual dataset's metadata for correct attribution).

For specific data available for Environmental Assessment and Planning topics please follow this link [Data by Environmental Assessment and Planning Topic (gsi.ie)], where you will find our data arranged by environmental assessment topic as illustrated below:

Land and soils
Soil • Subsoils (Quaternary Geology) • Tellus Geochemistry • Geotechnical *Geology* • Bedrock • Geophysics • Bedrock & Quaternary 3D

Water
Groundwater • Aquifers GW vulnerability, GWPSs (GWPPs) *Surface water* • Tellus Geochemistry *Estuarine & marine waters* • Marine and coastal *Flooding* • GWClimate • Karst

Climate Change
Carbon accounting / Carbon balance • Geothermal • Carbon capture and storage *Climate change trends* • National coastal change assessment

Cultural Heritage
Archaeology • Cherish *Underwater Archaeology* • Shipwrecks

Material Assets
Built Services • Natural resources (Minerals & Aggregates) • Active quarries

The Landscape
Landscape Appearance & Character • Physiographic units *Historical landscapes* • Historic mines

Other Relevant Data		
Natural (Geo) hazards • Landslide Susceptibility Mapping • Groundwater flooding • Coastal vulnerability • Subsidence • Radon	*Natural heritage* • Geoheritage (County Geological Sites) • Dimension Stone/Stone Built Ireland	

Other Comments

Should development go ahead, all other factors considered, Geological Survey Ireland would much appreciate a copy of reports detailing any site investigations carried out. The data would be redacted for confidentiality and added to Geological Survey Ireland's national database of site investigation boreholes, implemented to provide a better service to the civil engineering sector. Data can be sent to the Geological Mapping Unit, at mailto:GeologicalMappingInfo@gsi.ie.

If we can be of any further help, please do not hesitate to contact me Clare Glanville, or my colleague Trish Smullen at GSIPlanning@gsi.ie.

Yours sincerely,

Dr. Clare Glanville
Senior Geologist
Geoheritage and Planning Programme
Geological Survey Ireland

Trish Smullen
Geologist
Geoheritage and Planning Programme
Geological Survey Ireland

The publicly available data referenced/presented here, should in no way be construed as Geological Survey Ireland support for or objection to the proposed development or plan. The data are made freely available to all and can be used as independent scientific data in assessments, plans or policies. It should be noted that in many cases these data are a baseline or starting point for further site specific assessments.

From: Eve Smith
Sent: Monday 14 October 2024 11:59
To: Morgan Valvik
Cc: Niamh Kelly; Peho Galway
Subject: FW: Scoping Request: 220437 & 240450 Derrybrien Windfarm Decommissioning Project

---

You don't often get email from eve.smith@hse.ie. Learn why this is important

Caution: This is an external email and may be malicious. Please take care when clicking links or opening attachments.

Dear Morgan

I have reviewed the submitted scoping documents for decommissioning and have nothing further to add.

NEHS will assess the EIAR when it comes in in accordance to the protection of public health.

Kind regards
Eve

Eve Smith
Oifigeach Sláinte Comhshaoil | Environmental Health Officer
Environment/Climate Change, Network Support Unit (NSU)

Seirbhís Sláinte Comhshaoil, Ospidéal Pobail an Chloic Liath, Bóthar Ghaoth Dobhair IAn Clochán Liath,Leitir Ceanainn, Co.Dhún Na NGall F94 Y326

Environmental Health Officer, Environmental Health Service, Dungloe Community Hospital, Letterkenny Co. Donegal. F94 Y326

087 2671962 | 074 9561206 | Eve.smith@hse.ie

From: Morgan Valvik <mvalvik@mkoireland.ie>
Sent: Tuesday 24 September 2024 16:45
To: Environmental Health <environmental.health@hse.ie>; Peho Galway <PEHO.Galway@hse.ie>
Cc: Thomas Blackwell <tblackwell@mkoireland.ie>
Subject: Scoping Request: 220437 & 240450 Derrybrien Windfarm Decommissioning Project

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Dear Sir/Madam,

Please find attached to this email a cover letter, Environmental Impact Assessment (EIA) Scoping Document, and a remedial Environmental Impact Assessment (rEIA) Scoping Document for the "Derrybrien Windfarm Decommissioning Project."

The existing Derrybrien wind farm site is located in the northern part of the Slieve Aughty Mountains, Co. Galway and encompasses seventy (70 no.) Vestas V52-850kW wind turbines, an onsite wind farm substation (Derrybrien Substation), two met masts, a grid connection comprising of a 110kV Overhead line (approximately 7.8km long) and an 110kV substation at Agannygal connecting the wind farm to the National Grid.

Gort Windfarms Ltd intends to apply for planning permission for the "Derrybrien Windfarm Decommissioning Project" which comprises two elements:

1. the carrying out of physical works to decommission specific features of the existing Derrybrien Wind Farm (the Prospective Development); and
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As part of the scoping exercise for the Derrybrien Windfarm Decommissioning Project, we would welcome any comments in relation to the Prospective Development and Retained Development.

If you have any queries, please do not hesitate to come back to me. Thank you for your time and attention.

Kind regards,
Morgan.

Morgan Valvik
Graduate Environmental Scientist
MKO
9c Beckett Way, Park West Business Park,
Dublin 12, D12 XN9W

Offices in Galway and Dublin
mkoireland.ie | +353 (0)91 735 611

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"Tá an fhaisnéis sa ríomhphost seo (ceangaltáin san áireamh) faoi rún. Baineann sé leis an té ar seoladh chuige amháin agus tá sé ar intinn go bhfaighfidh siadsan amháin é agus gurb iadsan amháin a dhéanfaidh breithniú air. Más rud é nach tusa an duine ar leis

é, tá cosc iomlán ar aon fhaisnéis atá ann, a úsáid, a chraobhscaoileadh, a scaipeadh, a nochtadh, a fhoilsiú, ná a chóipeáil . Seains gurb iad tuairimí pearsanta an údar atá san ríomhphost agus nach tuairimí FSS iad.

Má fuair tú an ríomhphost seo trí dhearmad, bheadh muid buíoch dá gcuirfeá in iúil don Deasc Seirbhísí ECT ar an nguthán ag +353 818 300300 nó ar an ríomhphost chuig service.desk@hse.ie agus ansin glan an ríomhphost seo ded' chóras."

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If this email has been received by you in error we would be grateful if you could immediately notify the ICT Service Desk by telephone at +353 818 300300 or by email to service.desk@hse.ie and thereafter delete this e-mail from your system"

From: Colin Hedderly
Sent: Wednesday 25 September 2024 12:25
To: Morgan Valvik
Cc: Thomas Blackwell
Subject: RE: Scoping Request: 220437 & 240450 Derrybrien Windfarm Decommissioning Project

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Hi Morgan,
I have reviewed the attached documents. The windfarm is remote from the railway so the proposals have no effect on the railway.

Should there be any movement of abnormal loads in the vicinity of the railway during the decommissioning please make contact with me again.

Regards,

Colin Hedderly
Senior Track & Structures Engineer, Iarnród Éireann/Irish Rail, CCE Dept,
Old Railway Station, Grace Road, Athlone, Co. Westmeath, N37 C573.

Mobile: 087 9681735 E-mail: colin.hedderly@irishrail.ie

From: Morgan Valvik <mvalvik@mkoireland.ie>
Sent: Tuesday, September 24, 2024 4:47 PM
To: Colin Hedderly <Colin.Hedderly@irishrail.ie>
Cc: Thomas Blackwell <tblackwell@mkoireland.ie>
Subject: Scoping Request: 220437 & 240450 Derrybrien Windfarm Decommissioning Project

CAUTION: This email originated from outside of the organisation. Do not click links or open attachments unless you recognise the sender and know the content is safe.

Dear Mr Hedderly,

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As part of the scoping exercise for the Derrybrien Windfarm Decommissioning Project, we would welcome any comments in relation to the Prospective Development and Retained Development.

If you have any queries, please do not hesitate to come back to me. Thank you for your time and attention.

Kind regards,
Morgan.

Morgan Valvik
Graduate Environmental Scientist

MKO
9c Beckett Way, Park West Business Park,
Dublin 12, D12 XN9W

Offices in Galway and Dublin
mkoireland.ie | +353 (0)91 735 611

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From: Christophe O'BRIEN
Sent: Friday 4 October 2024 12:28
To: Morgan Valvik
Cc: Thomas Blackwell; Planning
Subject: RE: Scoping Request: 220437 & 240450 Derrybrien Windfarm Decommissioning Project

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Follow Up Flag: Follow up
Flag Status: Flagged

Some people who received this message don't often get email from christophe.obrien@iaa.ie. Learn why this is important

Caution: This is an external email and may be malicious. Please take care when clicking links or opening attachments.

Good afternoon Morgan,

Thank you for your email in relation to the scoping exercise for the Derrybrien Windfarm Decommissioning Project.

The Authority has no specific requirements for incorporation into the scoping.

When the formal planning application is submitted to ABP, the Authority will provide the general observations in relation to notification with at least 30 days of any proposed cranes for the decommissioning of the wind farm.

When the process of decommissioning is complete, we would request that the developer advise the Authority which will allow for the steps to be taken to remove the decommissioned wind farm from the aeronautical datasets and charts in due course.

Best Regards,

Christophe

Christophe O'Brien
Aerodromes Inspector
M: +353 (0) 86 33 22022|
E: obrienc@iaa.ie | www.iaa.ie
The Times Building, 11-12 D'Olier Street, Dublin 2, D02 T449

IAA ÚDARÁS EITILCHÍOCHTA NA hÉIREANN
IRISH AVIATION AUTHORITY

From: Morgan Valvik <mvalvik@mkoireland.ie>
Sent: Tuesday 24 September 2024 16:50
To: Planning <planning@iaa.ie>
Cc: Thomas Blackwell <tblackwell@mkoireland.ie>; Christophe O'BRIEN <Christophe.OBRIEN@IAA.ie>

Subject: Scoping Request: 220437 & 240450 Derrybrien Windfarm Decommissioning Project

*** This message originated from outside the Irish Aviation Authority. Please treat hyperlinks, attachments and instructions in this email with caution. ***

Dear Mr. O'Brien,

Please find attached to this email a cover letter, Environmental Impact Assessment (EIA) Scoping Document, and a remedial Environmental Impact Assessment (rEIA) Scoping Document for the "Derrybrien Windfarm Decommissioning Project."

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If you have any queries, please do not hesitate to come back to me. Thank you for your time and attention.

Kind regards,
Morgan.

Morgan Valvik
Graduate Environmental Scientist
MKO
9c Beckett Way, Park West Business Park,
Dublin 12, D12 XN9W

Offices in Galway and Dublin
mkoireland.ie | +353 (0)91 735 611

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========== ==========

From: IWT Info
Sent: Tuesday 1 October 2024 09:41
To: Morgan Valvik
Subject: Re: Scoping Request: 220437 & 240450 Derrybrien Windfarm Decommissioning Project

---

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Dear Morgan,

Thank you for contacting us. We do not have the staff capacity to respond to this consultation at the moment but we will endeavour to respond if possible.

Kind regards,
Fabiola Vieira

On Tue, 24 Sept 2024 at 16:58, Morgan Valvik <mvalvik@mkoireland.ie> wrote:

> Dear Ms Vieira,
>
> Please find attached to this email a cover letter, Environmental Impact Assessment (EIA) Scoping Document, and a remedial Environmental Impact Assessment (rEIA) Scoping Document for the “Derrybrien Windfarm Decommissioning Project.”
>
> The existing Derrybrien wind farm site is located in the northern part of the Slieve Aughty Mountains, Co. Galway and encompasses seventy (70 no.) Vestas V52-850kW wind turbines, an onsite wind farm substation (Derrybrien Substation), two met masts, a grid connection comprising of a 110kV Overhead line (approximately 7.8km long) and an 110kV substation at Agannygal connecting the wind farm to the National Grid.
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>
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If you have any queries, please do not hesitate to come back to me. Thank you for your time and attention.

Kind regards,
Morgan.

Morgan Valvik
Graduate Environmental Scientist
MKO
9c Beckett Way, Park West Business Park,
Dublin 12, D12 XN9W

Offices in Galway and Dublin
mkoireland.ie | +353 (0)91 735 611

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Irish Wildlife Trust, 8 Cabra Road, Dublin 7, D07T1W2
Registered Charity (CRA) Number: 20010966
Facebook: IrishWildlifeTrust
Twitter: @irishwildlife
Phone: 01 445 7259 (landline available Wednesday-Thursday 9:30 to 5pm)

From: Datarequests
Sent: Monday 21 October 2024 16:06
To: Morgan Valvik
Subject: RE: Scoping Request: 220437 & 240450 Derrybrien Windfarm Decommissioning Project

---

Caution: This is an external email and may be malicious. Please take care when clicking links or opening attachments.

Hi Morgan,

I am sorry to inform you that we have no water and sewer data in the requested area.

Please note: As we receive our data from the Local Authority, they may have information that we have not received. You should contact them directly for more information.

Kind regards,
Raoni Gouveia

GIS Officer
Asset Intelligence – Data Request Team

Uisce Éireann
Teach Colvill, 24-26 Sráid Thalbóid, Baile Átha Cliath, Éire
Irish Water
Colvill House, 24-26 Talbot Street, Dublin, Ireland

Datarequests@water.ie

From: Morgan Valvik <mvalvik@mkoireland.ie>
Sent: Friday, October 18, 2024 10:26 AM
To: Datarequests <Datarequests@water.ie>
Subject: RE: Scoping Request: 220437 & 240450 Derrybrien Windfarm Decommissioning Project

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Hi,

Apologies, can I just get maps of Water Distribution and Sewer Network in PDF format?

Kind regards,
Morgan.

Morgan Valvik
Environmental Scientist
MKO
9c Beckett Way, Park West Business Park,
Dublin 12, D12 XN9W

Offices in Galway and Dublin

Hi,

I'd like to request Water Distribution **and** Sewer Network in .shp format. I've attached the red line boundary for the project above and the Non-disclosure agreement.

Kind regards,
Morgan.

Morgan Valvik
Environmental Scientist
MKO
9c Beckett Way, Park West Business Park,
Dublin 12, D12 XN9W

Offices in Galway and Dublin
mkoireland.ie | +353 (0)91 735 611

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From: Datarequests <Datarequests@water.ie>
Sent: Thursday 26 September 2024 13:51
To: Morgan Valvik <mvalvik@mkoireland.ie>
Subject: RE: Scoping Request: 220437 & 240450 Derrybrien Windfarm Decommissioning Project

Caution: This is an external email and may be malicious. Please take care when clicking links or opening attachments.

Dear Morgan Valvik,

Thank you for contacting Data Requests.

Data Requests supply records of Uisce Eireann infrastructure in GIS format (i.e. **shp**, .**gdb**, .**tab**, or .**dwg**). If you only need to visualise the network we can also supply **PDF** maps.

Due a large number of new requests every day, we can provide only 1 format of data.

Uisce Eireann have no information on pipes within a private property, it should be shown on the deeds of a property or should have been provided by the purchasers surveyor at time of purchase.

Uisce Eireann have responsibility for the Water Distribution and Sewer Network, the Local Authority have responsibility for the storm water drains (Surface Water), you should check with them if you need this information.

For maps of Water Distribution and/or Sewer Network in **PDF** format please ignore the NDA form and reply stating you only require **PDF** maps for your location.

If you wish to proceed to acquire GIS digital data, we ask that you complete a Non Disclosure Agreement Form (1b - attached). In Appendix (Page 4) Sections a-h of this form can you please ensure that all sections are completed as per the outline shown in the attached guide. If a section is not relevant indicate this. Can you also ensure that you detail the nature of the data that you require, for example Water Distribution **and/or** Sewer Network in .dwg, .tab or .shp format (please refer to the attached guide 1a to assist you).

To speed up the process we ask that you send us a **digital GIS polygon(s) (.dwg - 2013 or lower versions or .shp in ING) that outlines the extent and location of the area(s) that you require data.** This is used to extract the GIS Digital data that you require.

Please Note:

1. Uisce Eireann is responsible for issuing Water & Wastewater **digital** data and will issue the data in **one format only** (.shp, .gdb, .tab, .dwg or .pdf).
2. Local Authorities are responsible for maintaining and issuing Stormwater data. Uisce Eireann does not issue Stormwater data.

Attached **1b. Non-Disclosure Agreement Form** must be **signed by hand.** Please complete all required sections, namely **a to h, Description of Data, and Appendix A**. This is a legally binding document, therefore all sections must be completed, please refer to attached 1a) Guide to completing Non-Disclosure Agreement.

Disclaimers: Any maps produced using Uisce Eireann data require the appropriate disclaimer as outlined in the relevant attachment (1a).

Please Note: The average turnaround time for processing requests is 2 weeks or 10 working days, provided you have adhered to the requirements set out above.

Due to the large volume of data requests received daily, incomplete or inaccurately completed forms will result in delays to issuing data. Consequently, the sole responsibility lies with the requestor to ensure that the above guidelines are adhered to and relevant documentation is submitted.

Should you have any questions in relation to the above please do not hesitate to get in contact.

Kind regards,
Raoni Gouveia

GIS Officer
Asset Intelligence – Data Request Team

Uisce Éireann
Teach Colvill, 24-26 Sráid Thalbóid, Baile Átha Cliath, Éire
Irish Water
Colvill House, 24-26 Talbot Street, Dublin, Ireland

Datarequests@water.ie

From: Morgan Valvik <mvalvik@mkoireland.ie>
Sent: Tuesday, September 24, 2024 5:10 PM
To: Planning <Planning@water.ie>; Datarequests <Datarequests@water.ie>
Cc: Thomas Blackwell <tblackwell@mkoireland.ie>
Subject: Scoping Request: 220437 & 240450 Derrybrien Windfarm Decommissioning Project

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If you have any queries, please do not hesitate to come back to me. Thank you for your time and attention.

Kind regards,
Morgan.

Morgan Valvik
Graduate Environmental Scientist
MKO
9c Beckett Way, Park West Business Park,
Dublin 12, D12 XN9W

Offices in Galway and Dublin
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Thank you for your attention.

From: Sabine Browne
Sent: Friday 27 September 2024 09:27
To: Morgan Valvik
Cc: Thomas Blackwell
Subject: RE: Scoping Request: 220437 & 240450 Derrybrien Windfarm Decommissioning Project

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Caution: This is an external email and may be malicious. Please take care when clicking links or opening attachments.

Good morning Morgan,

This is not within any Zone of Influence of our waterways so we will not be commenting.

Kind regards,

Sabine Browne

From: Morgan Valvik <mvalvik@mkoireland.ie>
Sent: Tuesday, September 24, 2024 5:11 PM
To: Sabine Browne <Sabine.Browne@waterwaysireland.org>
Cc: Thomas Blackwell <tblackwell@mkoireland.ie>
Subject: Scoping Request: 220437 & 240450 Derrybrien Windfarm Decommissioning Project

Dear Sir/Madam,

Please find attached to this email a cover letter, Environmental Impact Assessment (EIA) Scoping Document, and a remedial Environmental Impact Assessment (rEIA) Scoping Document for the "Derrybrien Windfarm Decommissioning Project."

The existing Derrybrien wind farm site is located in the northern part of the Slieve Aughty Mountains, Co. Galway and encompasses seventy (70 no.) Vestas V52-850kW wind turbines, an onsite wind farm substation (Derrybrien Substation), two met masts, a grid connection comprising of a 110kV Overhead line (approximately 7.8km long) and an 110kV substation at Agannygal connecting the wind farm to the National Grid.

Gort Windfarms Ltd intends to apply for planning permission for the "Derrybrien Windfarm Decommissioning Project" which comprises two elements:

1. the carrying out of physical works to decommission specific features of the existing Derrybrien Wind Farm (the Prospective Development); and
2. the proposed 'retention' in situ of other specific features of the existing development (i.e. the Retained Development).

A planning application will be submitted to An Bord Pleanála for consent for the Prospective Development under Section 37L of the Planning and Development Act, 2000 (as amended). The planning application will be accompanied by an Environmental Impact Assessment Report (EIAR) and Natura Impact Statement (NIS) as required by the Board, in relation to the Prospective Development. Furthermore, a subsequent application will be made to An Bord Pleanála for substitute consent for the Retained Development under Section 177E of the Planning and Development Act, 2000 (as amended). The substitute consent application will be accompanied by a Remedial EIAR and Remedial NIS.

As part of the scoping exercise for the Derrybrien Windfarm Decommissioning Project, we would welcome any comments in relation to the Prospective Development and Retained Development.

If you have any queries, please do not hesitate to come back to me. Thank you for your time and attention.

Kind regards,
Morgan.

Morgan Valvik
Graduate Environmental Scientist
MKO
9c Beckett Way, Park West Business Park,
Dublin 12, D12 XN9W

Offices in Galway and Dublin
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APPENDIX 2-2

INFORMATION LEAFLET

Gort Windfarms Limited a wholly owned subsidiary of ESB

Public Information Event:

DECOMMISSIONING OF THE DERRYBRIEN WIND FARM

Gort Windfarms Limited, a wholly owned subsidiary of ESB, plan to decommission the Derrybrien Wind Farm, in consultation with the relevant planning authorities and in accordance with planning laws and regulations.

Gort Windfarms Limited will host a Public Information Event where you can find out more information on the decommissioning plans.

The Public Information Event will be attended by the project developers and environmental experts. Join us to understand the scope and timeline of the decommissioning process, learn about measures to mitigate the environmental impact during and after decommissioning, and engage with project team leads to address any concerns and queries.

Date: 16th September 2024

Time: 3- 8pm

Location: Gort Community Centre

Address: Ennis Rd, Lavally, Gort, Co. Galway, H91 K7YA

We look forward to discussing the project with you.

If you have any questions in advance of the Public Information Event, please contact the project's Community Liaison Officer David Linnane at david.linnane@esb.ie

CONTACT US :
Email: david.linnane@esb.ie
Website: www.derrybrienwindfarm.ie

APPENDIX 2-3

PUBLIC CONSULTATION NOTICE BOARDS

PROJECT HISTORY

Where is the Derrybrien Wind Farm Located?

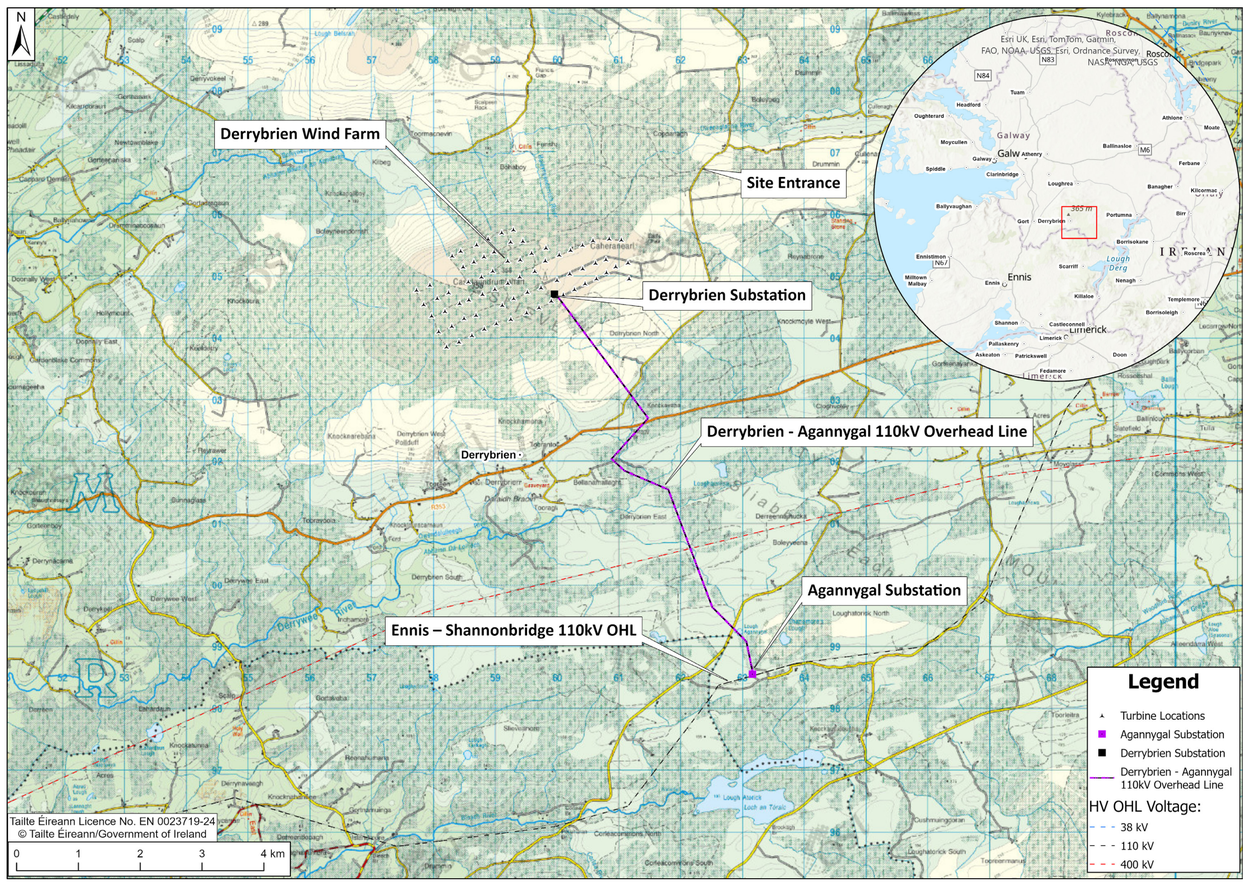
Derrybrien Wind Farm is located in County Galway in the northern part of the Slieve Aughty Mountains Special Protection Area [004168] approximately 11 km due south of Loughrea, 12.7 km north northeast of Gort and 24 km west of Portumna. Galway City lies some 35 km to the northwest of the wind farm site. The wind farm site is in the south of the county approximately 4.6 km from the border with County Clare and 21 km from the border with County Tipperary in the southeast.

What is the Derrybrien Wind Farm?

The Derrybrien Wind Farm, which ceased commercial operation in 2022, consists of 70 turbines and associated infrastructure, including: access roads, hardstands, peat repositories, an on-site substation, an overhead power line, and the Agannygal substation which connects the wind farm to the national electricity transmission system. Derrybrien Wind Farm has three distinct elements.

They are:

- The Derrybrien Wind Farm Site (including the Derrybrien 110kV Substation)
- Derrybrien to Agannygal 110kV Overhead Line (OHL)
- Agannygal Substation.



WHAT IS THE HISTORY OF THE DERRYBRIEN WIND FARM?

1998-2001
Planning Permission was obtained.

June 2003
Construction of the Windfarm commenced.

October 2003
A peatslide event occured. Engineering response implemented. Construction work was halted.

End of 2005
Construction work on the Wind Farm recommenced.

2006-2022
The windfarm was operational and producing renewable energy.

3rd July 2008
1st Ruling: CJEU (European Union court of Justice) found that Ireland failed to comply with the Environmental Impact assessment (EIA) directive.

12th November 2019
2nd Ruling: The CJEU found that Ireland had failed to take all measures to comply with 2008 decision.

23rd July 2020
On foot of the CJEU judgement and the legislative provisions set out under section 177B of the 2000 Act, Galway City Council directed Gort Windfarms Ltd. to seek substitute consent for the development.

21st August 2020
Application for Substitute Consent made to An Bord Pleanála.

4th February 2022
An Bord Pleanála refuses the Substitute Consent Application, meaning that the development is unauthorised. Commercial operation was paused.

March 2022
ESB announced that it was ceasing commercial electricity production at the Derrybrien Wind Farm site.

June 2024
Galway County Council issued ESB with an enforcement notice.

WHAT IS PROPOSED FOR THE DERRYBRIEN WIND FARM NOW?

Decommissioning of the Derrybrien Wind Farm is necessary following the decision by An Bord Pleanála to refuse substitute consent for the wind farm in February 2022, making the wind farm an unauthorised development. The Derrybrien Windfarm Decommissioning Project' comprises two types of "development" which are set out as follows:

- the carrying out of physical works to decommission specific features of the existing Derrybrien Wind Farm Project (the "Prospective Development"); and
- the retention in situ of other specific features of the existing development (the "Retained Development").

What will be removed from the site?

The Prospective Development is summarised as follows:

- Enabling works to facilitate the decommissioning of the Derrybrien Windfarm.
- Decommissioning and removal of the Derrybrien Wind Farm and associated ancillary components. The decommissioning works include the removal of the above-ground structures only leaving certain features in situ.
- Decommissioning and removal of the Derrybrien Wind Farm grid connection comprising Derrybrien-Agannygal 110 kV Overhead Line (7.8 km) and Agannygal Substation connecting into the Ennis-Shannonbridge 110 kV Overhead Line.
- Reinstatement of the Ennis-Shannonbridge 110kV Line.

The decommissioning works will include:

- De-energising of the site, which will involve initial disconnection of turbines, low voltage (LV) components followed by disconnection of high voltage (HV) elements;
- Temporary widening of the Turbary Road and certain sections of turning heads;
- Controlled dismantling of 70 no. turbines (blades, nacelle, and tower) and 2no. anemometer lattice masts;
- Controlled removal of electrical equipment from Derrybrien substation and demolition of substation building.
- Destringing of the overhead line conductor.
- Removal of the overhead line infrastructure (34 no. double wood pole structures and 8 no. masts).
- Controlled removal of Agannygal substation and demolition of control building.
- Controlled removal of standby generator (bunded) and diesel tank, external lighting poles, lightning mast.
- Removal of palisade fencing surrounding the Agannygal substation.
- Reinstatement of the Ennis-Shannonbridge 110kV Line.

What will be retained at the site?

The features of the Retained Development, to remain in situ in perpetuity after the Prospective Development has been completed are listed below:

Derrybrien Windfarm including the Derrybrien 110kV Substation

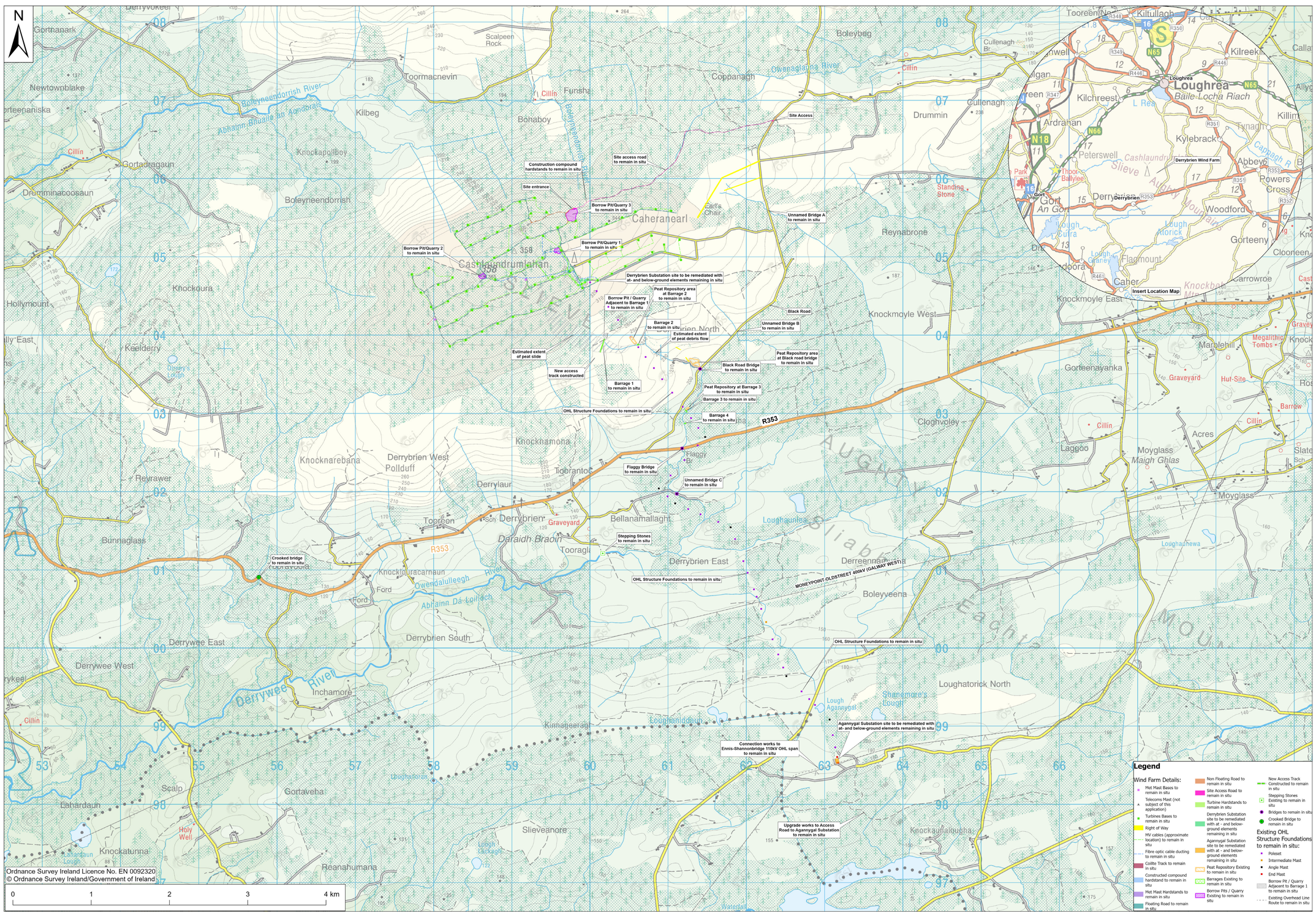
- Reinforced concrete foundations for 70no. wind turbines.
- Reinforced concrete foundations of structures within the Derrybrien Substation compound.
- Reinforced concrete foundations of 2no. Anemometer masts.
- Approx. 17.5km of access tracks and 70no. hardstand areas
- Underground Electrical and communications cabling.
- 3no. Borrow Pits / Quarries
- Naturalised Peat Repository areas
- Onsite Drainage Infrastructure.

Derrybrien to Agannygal 110 kV OHL and Agannygal 110kV Substation

- Concrete foundations for 34no. double wooden pole sets.
- Reinforced concrete foundations for 2no. end masts.
- Reinforced concrete foundations for 5no. angle masts.
- Reinforced concrete foundations for 1no. intermediate mast.
- Reinforced concrete foundations of structures within the Agannygal Substation compound.

Off-site Features constructed in response to the peat slide

- Barrage 1 and Coillte Access Track:
- Barrage 2 and Repository Area:
- Barrage 3 and Repository Area
- Barrage 4
- Repository Area at the Black Road Bridge
- Minor repairs work to instream structures/bridges - at Black Road Bridge, Flaggy Bridge, the Farmer's Track / Culvert, Crooked Bridge and Stepping Stones.
- Minor borrow pits used to source material,
- Drainage works.



WHAT IS INCLUDED IN AN ENVIRONMENTAL IMPACT ASSESSMENT REPORT?

An Environmental Impact Assessment Report (EIAR) will be prepared for this project as part of the prospective application. The EIAR contains an assessment of potential effects on the environment associated with the proposed decommissioning works. The EIAR provides technical information to An Bord Pleanála to support it in carrying out its Environmental Impact Assessment as part of the prospective element of the Derrybrien Windfarm Decommissioning Project.

A Remedial Environmental Impact Assessment Report (rEIAR) will also be prepared to assess effects on the environment that have already taken place as a result of the elements of the wind farm that will be retained. The rEIAR will accompany the application for the Retained Development. The rEIAR is to provide technical information to An Bord Pleanála to support it in carrying out its remedial Environmental Impact Assessment as part of the retained element of the Derrybrien Windfarm Decommissioning Project.

Structure of the EIAR and rEIAR Reports

The EIAR and rEIAR will be publicly accessible and will address the following environmental headings:

1. Introduction
2. Background to the Proposed Development
3. Consideration of Reasonable Alternatives
4. Description of the Proposed Development
5. Population and Human Health
6. Biodiversity (Terrestrial and Avian Ecology)
7. Biodiversity (Aquatic Ecology and Fisheries)
8. Land, Soils and Geology
9. Water (Hydrology and Hydrogeology)
10. Air and Climate
11. Noise and Vibration
12. Cultural Heritage
13. Landscape and Visua l
14. Material Assets (including Traffic and Transport, Telecommunications and Aviation)
15. Risk of Major Accidents and Natural Disasters
16. Resource and Waste Management
17. Interactions of the Foregoing
18. Schedule of Mitigation Measures

WHAT HAPPENS NEXT?

Detailed environmental studies are continuing across the site including ecology, hydrology, noise, and landscape and visual assessments. These studies will be compiled into an Environmental Impact Assessment Report (EIAR) and Remedial Environmental Impact Assessment Report (rEIAR) which will accompany the respective planning applications. The Derrybrien Windfarm Decommissioning Project will also undergo the process of Appropriate Assessment; thus, the respective planning applications will also be accompanied by a Natura Impact Statement (NIS) and remedial NIS.

The results of these studies, along with feedback gathered through consultation with local communities and stakeholders, will be considered as part of the assessment process and in the preparation of the EIAR and rEIAR.

Consultations with An Bord Pleanála as part of pre-planning meetings

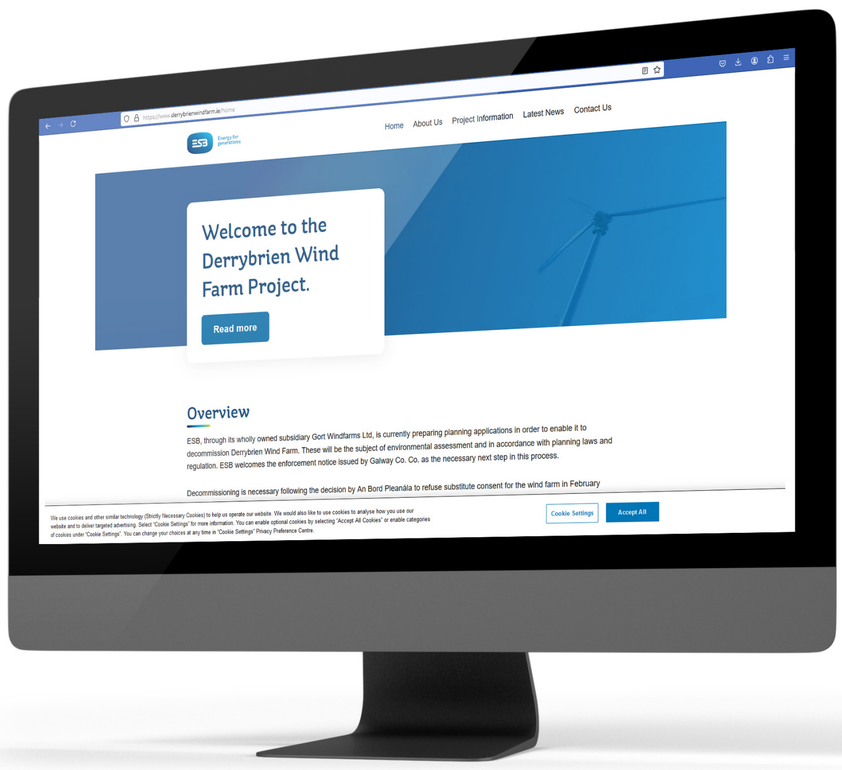
Gort Windfarms Limited plans to submit planning applications for the Derrybrien Windfarm Decommissioning Project.

Contact details:

Please visit our project website which we are keeping updated as the project progresses
www.derrybrienwindfarm.ie

We welcome your feedback on our proposals and encourage you to contact us with any questions, concerns or comments through our dedicated Community Liaison Officer through the details provided below:

Email: david.linnane@esb.ie
Address: Gort Windfarms Ltd,
27 Fitzwilliam Street,
Dublin 2,
D02 KT92
Ireland



APPENDIX 3-1

ASSESSMENT OF ALTERNATIVES SUB-OBJECTIVES

No	Topic	Sub-Objective	Score	Score Description	Example
1A	Population & Human Health	Provide employment for the local community	+3	Very Significant / Profound (+)	Potential for creation of new industry in the locality creating direct and indirect employment opportunities (>500) as a result of the proposed development.
			+2	Significant (+)	Potential for permanent increases in direct and indirect employment opportunities (>100) as a result of the proposed development
			+1	Slight/ Moderate (+)	Potential for temporary increases in employment opportunities
			0	Neutral / Imperceptible	No change in employment opportunities for the local community
			-1	Slight/ Moderate (-)	Potential for short term, disruption, disturbance and nuisance impacts on the local community workforce.
			-2	Significant (-)	Potential for medium to long term reduction in employment opportunities.
			-3	Very Significant / Profound (-)	Potential for permanent loss of industry in the locality.
1B	Population & Human Health	Minimise Risk to human health and risk to life within the local community	+3	Very Significant / Profound (+)	Very Significant Improvement in human health and a reduction of risk to life within the local community
			+2	Significant (+)	Significant Improvement in human health and a reduction of risk to life within the local community
			+1	Slight/ Moderate (+)	Slight / Moderate improvement in the human health and risks to the local community
			0	Neutral / Imperceptible	No change in the human health and risks to life the local community
			-1	Slight/ Moderate (-)	Potential for very temporary disturbance and nuisance impacts to the local community including impacts on human health.
			-2	Significant (-)	Potential for short to medium term disturbance and nuisance impacts to the local community including impacts on human health.
			-3	Very Significant / Profound (-)	Potential for permanent disturbance and nuisance impacts to the local community including impacts on human health. Potential for short, medium or long term increase in risk to life.
2A	Biodiversity (Terrestrial Ecology and Avian)	Preserve, protect, maintain and where possible enhance nature conservation and protected species or	+3	Very Significant / Profound (+)	Potential for very significant / profound increase in the area of and abundance of natural fauna, flora and habitats
			+2	Significant (+)	Potential for significant increase in the area of and abundance of natural fauna, flora and habitats
			+1	Slight/ Moderate (+)	Potential for slight / moderate enhancement of, or restoration of, existing natural fauna, flora and habitats.
			0	Neutral / Imperceptible	No impacts on any natural fauna, flora or habitats at any geographical scale of importance.
			-1	Slight/ Moderate (-)	Potential for impacts to natural fauna, flora and habitats at a site-level geographical scale of importance. Temporary loss of species and habitats that may re-establish in the short term.

No	Topic	Sub-Objective	Score	Score Description	Example
		other known species of conservation concern.	-2	Significant (-)	Potential for impacts to natural fauna, flora and habitats at a site-level geographical scale of importance. Temporary loss of species and habitats that may re-establish in the long term.
			-3	Very Significant / Profound (-)	Potential for impacts to natural fauna, flora and habitats at geographical scale of importance. Permanent loss of species and habitats.
2B	Biodiversity (Aquatic Ecology & Fisheries)	Minimise impacts on the surface water quality/ fisheries.	+3	Very Significant / Profound (+)	Potential for very significant / profound increases to surface water quality and abundance of fisheries in nearby water courses
			+2	Significant (+)	Potential for significant increases to surface water quality and abundance of fisheries in nearby water courses
			+1	Slight/ Moderate (+)	Potential for slight/moderate increases to surface water quality and abundance of fisheries in nearby water courses
			0	Neutral / Imperceptible	No impact to surface water quality/fish populations in nearby watercourse
			-1	Slight/ Moderate (-)	Potential for slight/moderate decreases in surface water quality and abundance of fisheries in nearby water courses. Temporary displacement of species and habitats that may re-establish in the medium term.
			-2	Significant (-)	Potential for significant decreases in surface water quality and abundance of fisheries in nearby water courses.
			-3	Very Significant / Profound (-)	Potential for very significant/profound decreases in surface water quality and abundance of fisheries in nearby water courses.
3A	Land, Soils Geology	Minimise impacts to local land use practices	+3	Very Significant / Profound (+)	Very significant/profound positive improvements on land use and site conditions such as improved access, drainage, public amenity, or site improvement to facilitate new agricultural or commercial activity
			+2	Significant (+)	Significant positive improvements on land use and site conditions such as improved access, drainage, public amenity, or site improvement to facilitate new agricultural or commercial activity.
			+1	Slight/ Moderate (+)	Slight/moderate positive improvements on land use and site conditions.
			0	Neutral / Imperceptible	No change to existing land use or site conditions
			-1	Slight/ Moderate (-)	Slight /moderate negative changes to land use and site conditions.
			-2	Significant (-)	Significant changes to site conditions that restrict land use potential such as restricted access, poor drainage, loss of public amenity, or site degradation to restrict new or existing agricultural or commercial activity.
			-3	Very Significant / Profound (-)	Very significant/profound changes to site conditions that restrict land use potential such as restricted access, poor drainage, loss of public amenity, or site degradation to restrict new or existing agricultural or commercial activity.

No	Topic	Sub-Objective	Score	Score Description	Example
3B	Land, Soils Geology	Minimise impacts to Soils and Geology	+3	Very Significant / Profound (+)	Very Significant / Profound improvements to peat stability such as rockfill barrages or drainage to reduce the risk of a large scale peat slide. Moderate to significant reduction in volume of peat excavation or loss of peat habitat (e.g. by covering or by oxidisation due to exposure or groundwater lowering).
			+2	Significant (+)	Significant improvements to peat stability such as rockfill barrages or drainage to reduce the risk of a large scale peat slide. Moderate to significant reduction in volume of peat excavation or loss of peat habitat (e.g. by covering or by oxidisation due to exposure or groundwater lowering).
			+1	Slight/ Moderate (+)	Slight / Moderate improvements to peat stability to reduce the risk of localised peat failures or slightly reduce the risk of a large-scale peat slide. Slight reduction in volume of peat excavation or loss of peat habitat.
			0	Neutral / Imperceptible	Preserve existing stable ground and groundwater conditions. No reduction or increase in volume of peat excavation or loss of peat habitat.
			-1	Slight/ Moderate (-)	Slight / Moderate impacts that increase the risk of localised peat instability or slightly increase the risk of a large-scale peat slide. Slight / Moderate increase in volume of peat excavation or loss of peat habitat.
			-2	Significant (-)	Significant impacts that increase the risk of a large peat slide – typically involving temporary or permanent surcharge loading on virgin peat or adverse drainage conditions in medium to high risk areas. Significant increase in volume of peat excavation or loss of peat habitat (e.g. by covering or by oxidisation due to exposure or groundwater lowering).
			-3	Very Significant / Profound (-)	Very Significant – Profound significant impacts that increase the risk of a large scale peat slide – typically involving temporary or permanent surcharge loading on virgin peat or adverse drainage conditions in medium to high risk areas. Very significant / profound increase in volume of peat excavation or loss of peat habitat (e.g. by covering or by oxidisation due to exposure or groundwater lowering).
4A	Hydrology and Hydrogeology	No negative impacts on flood risk management activity	+3	Very Significant / Profound (+)	Potential for project to very significantly/ profoundly contribute to regional flood risk management
			+2	Significant (+)	Potential for project to contribute significantly to regional flood risk management.
			+1	Slight/ Moderate (+)	Potential for project to contribute slight to moderately to localised flood risk management.
			0	Neutral / Imperceptible	No change in flood risk.
			-1	Slight/ Moderate (-)	Potential for slight to moderated increased flood risk to localised areas
			-2	Significant (-)	Potential for significant increase in flood risk regionally
			-3	Very Significant / Profound (-)	Potential for very significant / profound increase in flood risk regionally
4B	Hydrology and	No negative impacts on	+3	Very Significant / Profound (+)	Potential for regional improvement of groundwater quality.
			+2	Significant (+)	Potential for localised improvement of groundwater quality.

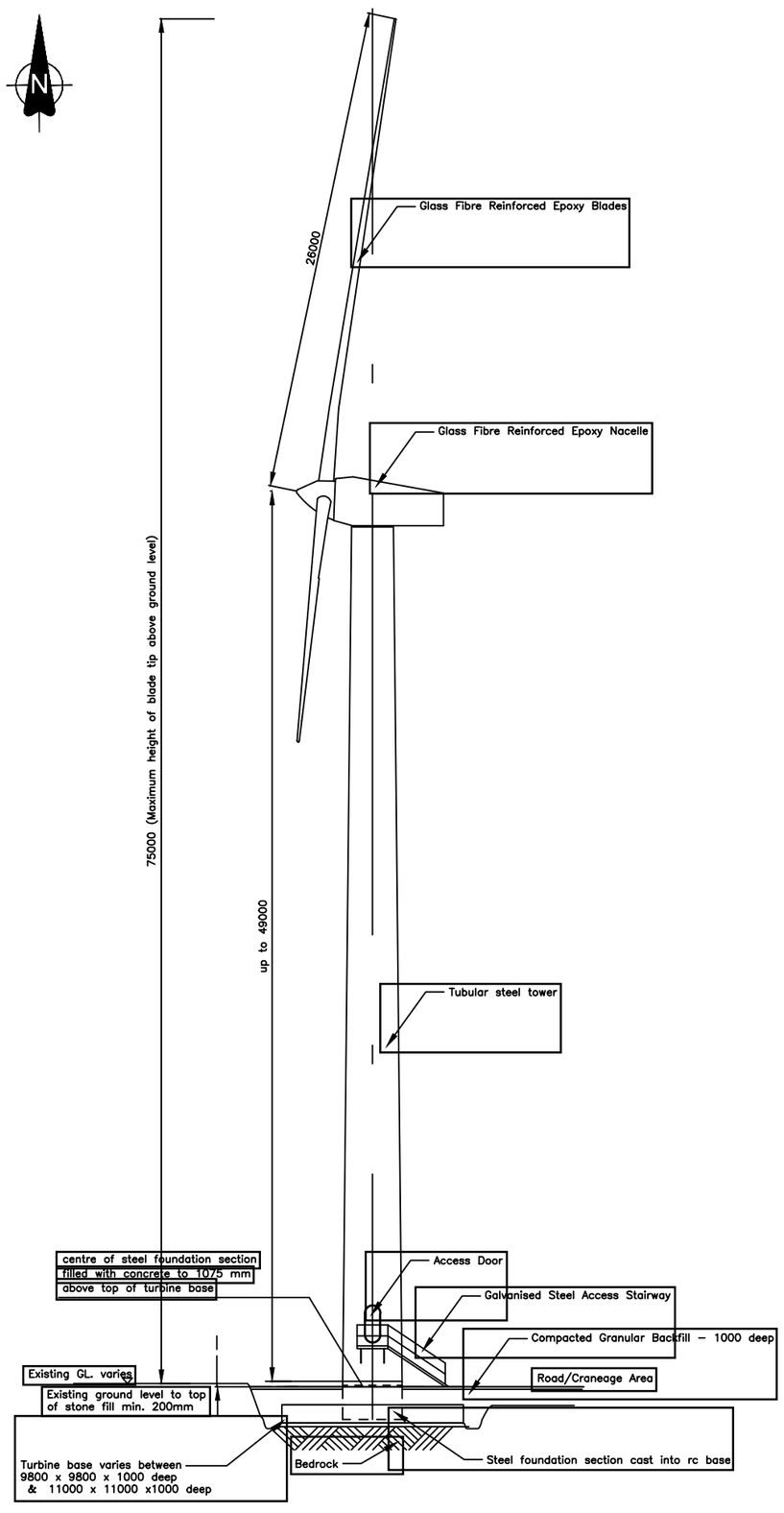
No	Topic	Sub-Objective	Score	Score Description	Example
	Hydrogeology	groundwater.	+1	Slight/ Moderate (+)	Potential for very localised improvement of groundwater quality.
			0	Neutral / Imperceptible	No impacts to groundwater quality
			-1	Slight/ Moderate (-)	Potential for localised, short term or infrequent negative impacts on groundwater quality
			-2	Significant (-)	Increased potential for frequent negative impacts on groundwater quality
			-3	Very Significant / Profound (-)	Increased potential for permanent negative impacts on groundwater quality
5A	Air Quality,	Minimise impact on air quality in the area	+3	Very Significant / Profound (+)	Potential for very significant / profound reduction in the air pollution to the area
			+2	Significant (+)	Potential for significant reduction in the air pollution to the area
			+1	Slight/ Moderate (+)	Potential for slight/moderate reductions to air pollution to the area
			0	Neutral / Imperceptible	No change in air quality in the area
			-1	Slight/ Moderate (-)	Potential for temporary or infrequent breaches of air quality thresholds, not impacting the local community
			-2	Significant (-)	Potential for temporary or infrequent breaches of air quality thresholds, potentially impacting the local community
			-3	Very Significant / Profound (-)	Potential for regular breaches of air quality thresholds, impacting the local community
6A	Noise & Vibration	Minimise noise and vibration impact in the area	+3	Very Significant / Profound (+)	Potential for very significant / profound reductions in noise and vibration impacts to the area.
			+2	Significant (+)	Potential for significant reductions in noise and vibration impacts to the area.
			+1	Slight/ Moderate (+)	Potential for slight/moderate reductions in noise and vibration impacts to the area
			0	Neutral / Imperceptible	No change in noise and vibration impacts in the area
			-1	Slight/ Moderate (-)	Potential for temporary or infrequent breaches of noise and vibration thresholds, not impacting the local community
			-2	Significant (-)	Potential for temporary or infrequent breaches of noise and vibration thresholds, potentially impacting the local community.
			-3	Very Significant / Profound (-)	Potential for regular breaches of noise and vibration thresholds, impacting the local community.
7A	Cultural Heritage	Avoid loss of or damage to heritage features	+3	Very Significant / Profound (+)	Potential for increased protection / preservation of several heritage features.
			+2	Significant (+)	Potential for significant improvement on the setting of several heritage features through the uncovering of heritage features of international or national significance.
			+1	Slight/ Moderate (+)	Potential for slight / moderate improvement on the setting of heritage features through the uncovering of heritage features of regional significance.
			0	Neutral / Imperceptible	No loss or damage to known heritage features.
			-1	Slight/ Moderate (-)	Potential for the loss of or damage to important heritage features of local significance.
			-2	Significant (-)	Potential for the loss of or damage to important heritage features of regional significance.

No	Topic	Sub-Objective	Score	Score Description	Example
			-3	Very Significant / Profound (-)	Potential for the loss of or damage to important heritage features of international or national significance.
8A	Landscape & Visual	Protect, and where possible enhance, the landscape character and visual amenity in the vicinity of the development.	+3	Very Significant / Profound (+)	Potential enhancement of designated landscapes and scenic views, the landscape and visual amenity. Many receptors
			+2	Significant (+)	Potential localised improvement of landscape and visual amenity. Several receptors.
			+1	Slight/ Moderate (+)	Very localised improvement of landscape and visual amenity. Small number of receptors.
			0	Neutral / Imperceptible	No impacts on the landscape quality and visual amenity
			-1	Slight/ Moderate (-)	Potential short term / disturbance impacts on local views and the local landscape. Small number of receptors.
			-2	Significant (-)	Potential localised negative impacts on and deterioration of the landscape and visual amenity. Several receptors
			-3	Very Significant / Profound (-)	Potential negative impacts on and deterioration of the landscape and visual amenity. Many receptors
9A	Material Assets	Protect existing material assets and infrastructure	+3	Very Significant / Profound (+)	Potential for very significant / profound development of new material assets and infrastructure of national importance
			+2	Significant (+)	Potential for significant development of new material assets and infrastructure of regional importance.
			+1	Slight/ Moderate (+)	Potential for minor improvements to existing material assets and infrastructure of local importance
			0	Neutral / Imperceptible	No impacts to existing material assets and infrastructure.
			-1	Slight/ Moderate (-)	Short term disturbance impacts during decommissioning work to existing material assets and infrastructure. Loss of existing material assets and infrastructure of local importance.
			-2	Significant (-)	Loss of existing material assets and infrastructure of regional importance
			-3	Very Significant / Profound (-)	Loss of existing material assets and infrastructure of national importance
9B	Material Assets (Traffic)	Minimise disruption to traffic	+3	Very Significant / Profound (+)	Potential for very significant improvement to traffic movements and a very significant reduction in traffic congestion in the local area
			+2	Significant (+)	Potential for significant improvement to traffic movements and a significant reduction in traffic congestion in the local area
			+1	Slight/ Moderate (+)	Potential for slight improvement to traffic movements and a reduction in traffic congestion in the local area
			0	Neutral / Imperceptible	No change in Traffic movements in the area
			-1	Slight/ Moderate (-)	Potential for temporary or infrequent delays, not likely to impact the local community
			-2	Significant (-)	Potential for temporary or infrequent delays, potentially impacting the local community

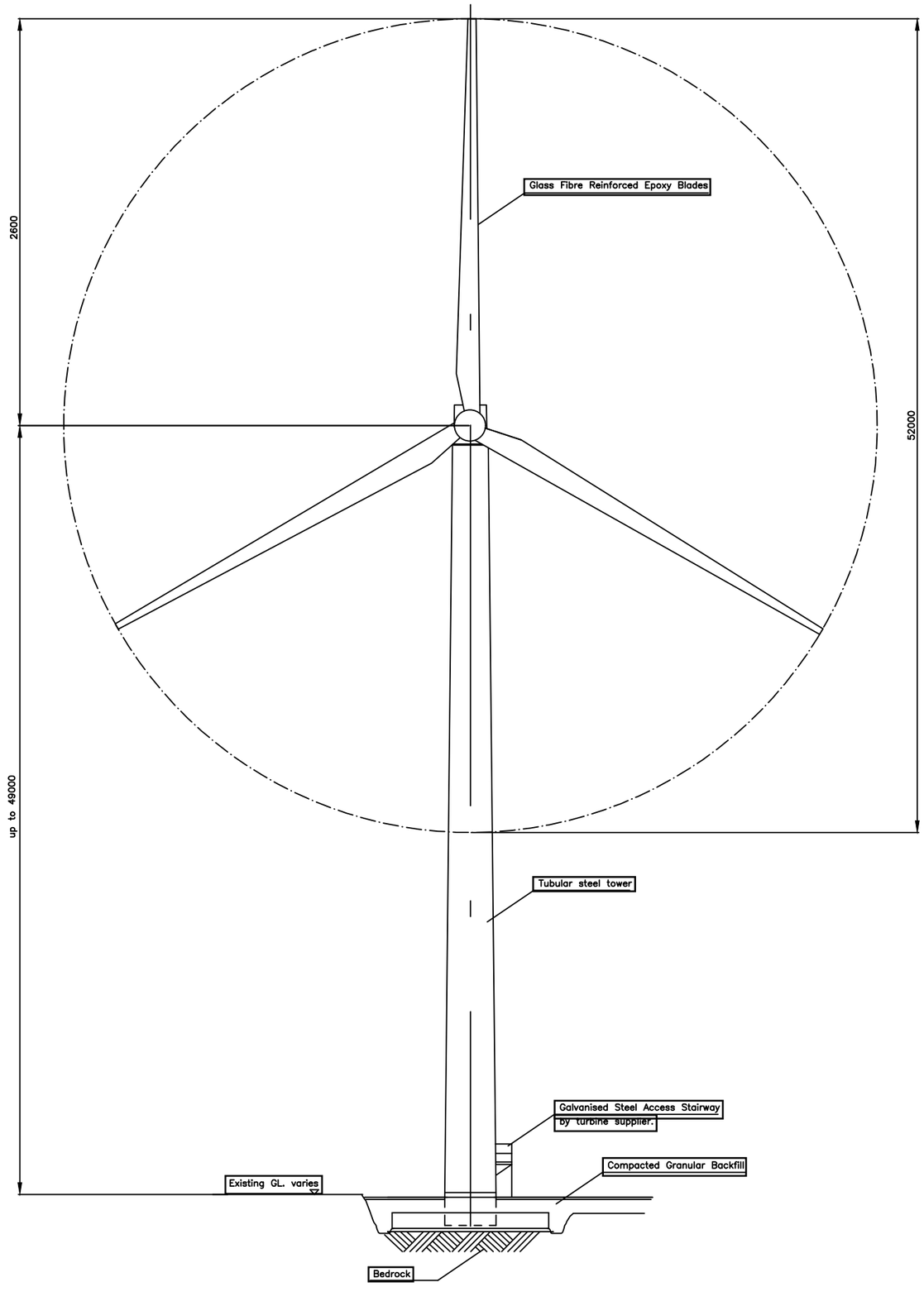
No	Topic	Sub-Objective	Score	Score Description	Example
			-3	Very Significant / Profound (-)	Potential for temporary and frequent delays impacting the local community
10A	Waste & Resource Management	Minimise the generation of waste	+3	Very Significant / Profound (+)	Waste arisings from the project are predominantly reused elsewhere.
			+2	Significant (+)	Waste arisings from the project re predominantly segregated and sent for composting, recycling or for further segregation and sorting at a materials recovery facility.
			+1	Slight/ Moderate (+)	Waste arisings from the project are predominantly reused on site or at an appropriately licensed or registered exempt site elsewhere
			0	Neutral / Imperceptible	No generation of waste. All inert materials reused onsite.
			-1	Slight/ Moderate (-)	Generation of small/ moderated quantities of inert waste which is managed for disposal using methods lower down the Waste Hierarchy (e.g. landfill)
			-2	Significant (-)	Generation of large quantities inert waste which are managed for disposal using methods lower down the waste hierarchy (e.g. landfill)
			-3	Very Significant / Profound (-)	Generation of large quantities of hazardous and inert waste which are managed for disposal using methods lower down the waste hierarchy (e.g. landfill)

APPENDIX 4-1

DRAWINGS ASSOCIATED WITH DERRYBRIEN WIND FARM



Side Sectional Elevation
Scale 1:200



Front Sectional Elevation
Scale 1:200

NOTES:

1. All dimensions are in millimetres - figured dimensions to be taken in preference to scaled dimensions.

REV	DATE	REVISION DESCRIPTION	DRN	PROD	VER	APP
0	04.08.20	Issued for substitute consent	E.O'S	E.O'S	P.K	J.McL

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PURPOSE OF ISSUE - PRELIMINARY UNLESS INDICATED

CLIENT APPROVAL ☐ PLANNING ☒ TENDER ☐ CONSTRUCTION ☐ AS-BUILT ☐

CLIENT: Gort Wind Farms Ltd

PROJECT: Derrybrien Wind Farm Project

CONTRACT:

DRAWING TITLE: Standard Wind Turbine Details for 49m turbines on Deryrbrien Wind Farm Site

PRODUCTION UNIT: Civil & Environmental Engineering

Energy for generations
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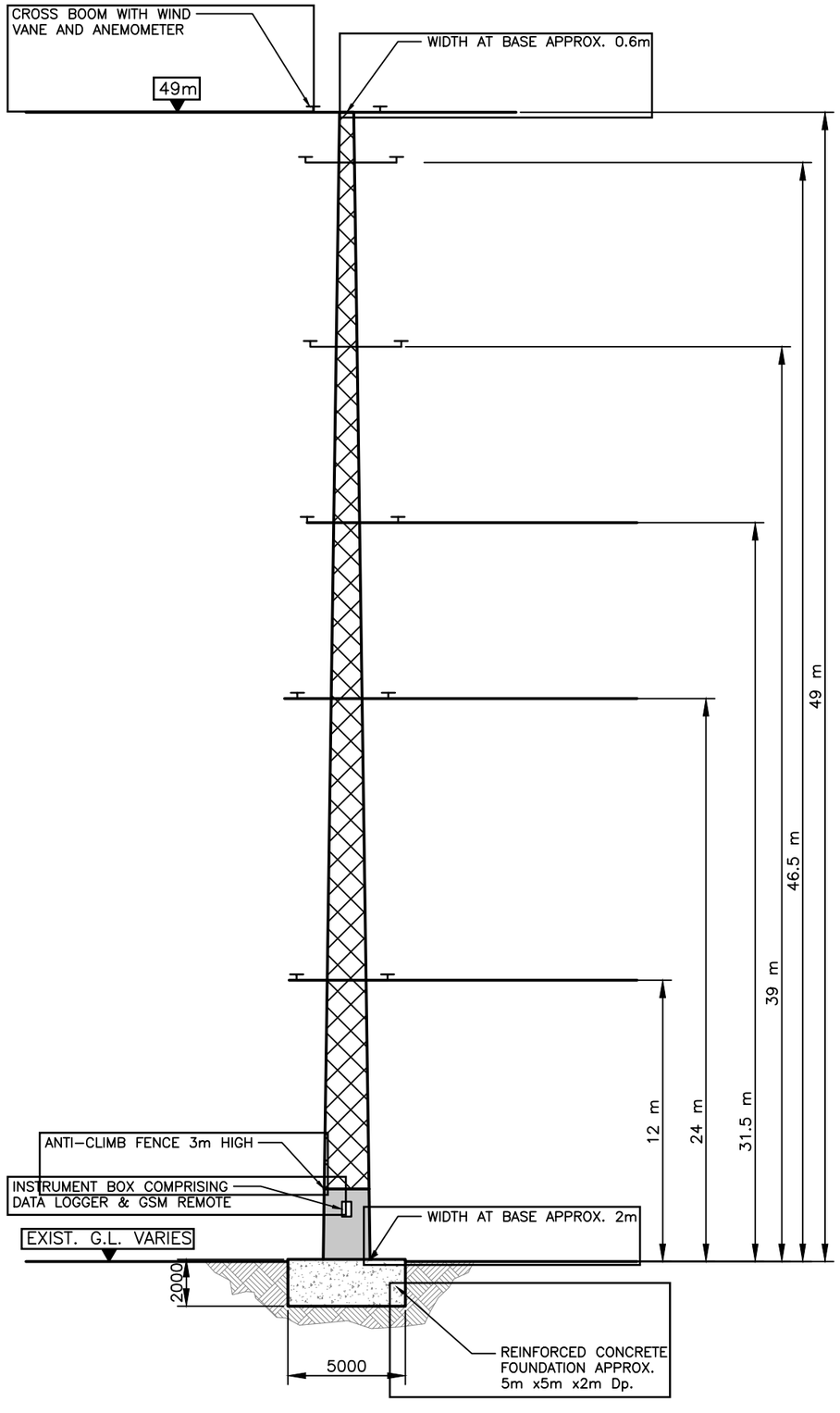
DRAWN	PRODUCED	VERIFIED	APPROVED	APPROVAL DATE
E.O'Shea	E.O'Shea	P.Kavanagh	J.McLoughlin	08.07.2020
CLIENT REF		NO. OF SHTS: 1	SIZE: A1	SCALE: N.T.S

DRAWING NUMBER: QS-000280-01-D460-003-036-000 | SHEET | REV

NOTES:

1. All dimensions are in millimetres - figured dimensions to be taken in preference to scaled dimensions.



ELEVATION OF MET MASTS 1 & 2

Scale 1:150

PLAN VIEW

SCALE 1:200

REV	DATE	REVISION DESCRIPTION	DRN	PROD	VER	APP
0	04.08.20	Issued for substitute consent	E.O'S	E.O'S	P.K	J.McL

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PURPOSE OF ISSUE - PRELIMINARY UNLESS INDICATED

CLIENT APPROVAL ☐ PLANNING [X] TENDER ☐ CONSTRUCTION ☐ AS-BUILT ☐

CLIENT: Gort Wind Farms Ltd

PROJECT: Derrybrien Wind Farm Project

CONTRACT:

DRAWING TITLE: Met Masts1 & 2 Details

PRODUCTION UNIT: Civil & Environmental Engineering

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DRAWN	PRODUCED	VERIFIED	APPROVED	APPROVAL DATE
E.O'Shea	E.O'Shea	P.Kavanagh	J.McLoughlin	08.07.2020
CLIENT REF		NO. OF SHTS: 1	SIZE: A1	SCALE: NTS

DRAWING NUMBER: QS-000280-01-D460-003-037-000 SHEET REV

APPENDIX 4-2

DECOMMISSIONING MANAGEMENT PLAN

Derrybrien Wind Farm Decommissioning Project

Gort Windfarms Ltd.

Project Description
Decommissioning Management Plan

Document No.: QS-000280-01-R105-001-001

Date: 26/02/25

Engineering and Major Projects, One Dublin Airport Central, Dublin Airport, Cloghran, Co. Dublin, K67 XF72, Ireland.

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Project Title:	Derrybrien Wind Farm Decommissioning Project	
Report Title:	Project Description Decommissioning Management Plan	
Report No.:	QS-000280-01-R105-001-001	
Revision No.:	06	
Prepared by:	Kevin Crowley	20.03.2025
Title:	Senior Civil Engineer	
Verified by:	Kevin McCloy	20.03.2025
Title:	Lead Civil Engineer	
Approved by:	Daniel Hogan	20.03.2025
Title:	Environmental Consenting PM	

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Change History of Report

Date	New Revision	Author	Summary of Change
20.03.2025	Final	Kevin Crowley	Table provided below

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1 Introduction

1.1 Project

The Project consists of the decommissioning of the 70 turbine wind farm and a grid connection, comprising c. 7.8km 110kV overhead line (OHL) connecting into the Ennis-Shannonbridge 110kV line, together with Derrybrien and Agannygal substation. Reinstatement of the Ennis-Shannonbridge 110kV overhead line..

1.2 Site Location and Description

Derrybrien Wind Farm is owned and operated by Gort Windfarms Ltd, a wholly owned subsidiary company of ESB.

Derrybrien Wind Farm is in County Galway in the northern part of the Slieve Aughty Mountains approximately 11 km due south of Loughrea, 12.7 km north northeast of Gort and 24 km west of Portumna. Galway City lies some 35 km to the northwest of the wind farm site. The wind farm site is in the south of the county approximately 4.6 km from the border with County Clare and 21 km from the border with County Tipperary in the southeast. See Drawing Strategic Site Location Map - QS-000280-01-D460-025-001-000

The Derrybrien Wind Farm has three distinct elements:

- the development on the Derrybrien Wind Farm Site (including the Derrybrien 110kV Substation),
- the Derrybrien to Agannygal 110 kV Overhead Line (OHL), and
- the Agannygal 110kV Substation, which connects the windfarm to the National Grid.

1.2.1 Existing Derrybrien Wind Farm

The overall area of the wind farm site is approximately 344.5 ha, but the wind farm infrastructure occupies only a small proportion of this area (31.1 ha – approximately 9% of site). The wind farm site is accessed from a Coillte access road via a minor public road known as the Black Road (approximately 3.1 km from the wind farm to the Black Road/Coillte junction). The Black Road generally runs in a north south direction between the R353 at its southern end and Killeenadeema village (south of Loughrea) at its northern end. Access to the Black Road is via the R353 Regional Road, which originates near Portumna, passes over Flaggy Bridge before passing through the village of Derrybrien to join the N66 Loughrea – Gort National Secondary Road near Gort. From Gort the Black Road is accessed via the N66 for a distance of 1.7 km and the R353 for a distance of 14 km. Alternatively, the Black Road /Coillte access road can be accessed via minor public roads from Loughrea a distance of approximately 10 km.

The main wind farm infrastructure comprises turbines, crane hard standings, 17.5 km of access tracks within the site (including 14.6km of floating access tracks), drainage channels, borrow pits/quarries, on site material storage, the Derrybrien110 kV substation, direct buried electric cables and anemometer masts. These infrastructure elements are described below:

Wind Turbines: There are seventy (70) Vestas V52-850 kW turbines on site. The wind turbines have a rotor diameter of 52m, a hub height of 49m and overall height of up to 75m and associated ancillary development typical of a wind farm of this size and scale. A number of turbines foundations were constructed deeper below ground level to give a reduced hub height. It is noted that these turbines are small compared to modern turbines. Each turbine is supported by a turbine foundation and comprises a vertical tower (consisting of two cylindrical sections), a nacelle – housing the machinery, connected at the hub to three rotating blades. The wind turbines are painted light grey with a matt finish.

The approximate spacing between turbines is between 150m to 260m in a west/southwest direction.

The main turbine components comprise:

- no. cylindrical towers sections
- 1 no. nacelle, which encapsulated the mechanical machinery of the wind turbine and was placed on top of the tower sections
- no. blades connecting to the hub of the nacelle

The turbine towers are of tubular steel tapering from about 3.3m diameter at the base to 2.1m diameter at the top where the nacelle is mounted. Access to the tower is via a staircase located outside on the hardstand and a secure hinged door into the tower. The nacelle is accessed from the tower using an internal ladder with landing/rest positions. The tower and nacelle incorporate internal and emergency lighting.

The nacelle contains the generator and control unit, which is designed for computer-controlled monitoring of all major functions of the turbine. The glass-fibre reinforced nacelle cover protects all the components inside the nacelle against the elements.

A three-blade rotor is attached to the nacelle. The blades are made of fiberglass reinforced epoxy material with each blade consisting of two blade shells, bonded to a supporting beam. The wind turbines are geared to ensure the blades rotate in the same direction. Transformers are located internally within the turbine tower. The equipment is protected from lightning strike by deep earthing and from corrosion by multiple coatings. The turbine tower and nacelle are equipped with optical smoke sensors. Aviation lights are provided on nine turbines, specifically T1, T18, T26, T44, T46, T47, T52, T61 and T65.

The basis of wind turbine operation is as follows:

- Sensors are used to monitor wind direction and a yaw mechanism turns the turbines to keep the blades facing into the wind.
- The blades of the turbine, which are bolted onto a hub rotate at a rate of once every 3 – 5 seconds (s), depending on wind conditions.

- Inside the nacelle (housing) located at the turbine hub, the rotor drives a large shaft into a gearbox, which steps up the revolutions per minute to a speed suitable for the electrical generator. The rotor speed range is 14.0 - 31.4 revs per minute (rpm). A separate transformer is located internally within each wind turbine to uprate the generation voltage of the turbines from 380 – 660 V to a higher voltage for connection via underground cables to the Derrybrien Substation. The hermetically sealed wind turbine transformers can be considered as leak free and largely maintenance free. They are dispatched from the factory leak free and can primarily only be damaged during transport or installation. Once in service, they remain closed for their lifetime.

The electricity generated at each turbine is fed via underground cables to electrical transformers in Derrybrien Substation where it is transformed to a higher voltage for supply to the national electricity network. The cables are direct buried in the peat, at some locations like access track crossings, the cables are in ducts.

The windfarm ceased generating electricity in February 2022. Since that time, the turbines have been maintained by the turbine supplier to ensure the site remains safe, while in a prolonged non-operational state.

Derrybrien 110kV Substation: Underground cables from across the site converge at Derrybrien 110kV Substation where the electricity is transformed from 20kV to 110kV and exported to the national grid. The substation comprises a fenced stoned compound containing outdoor electrical equipment and a single storey Control Building accommodating a control room, MV switchgear room, relay room (protection relays) battery room, welfare facilities, workshop and office area. Other features of the Derrybrien 110kV Substation include: monitoring and communications equipment to enable remote monitoring; electrical plant; a standby generator and associated bunded diesel tank; external lighting poles; a lightning mast; a wastewater treatment system and palisade fencing.

The substation is accessed via a 4m wide hardcore surfaced access track with links to the on-site road network. Non-potable water is sourced from a well on-site.

- Compound Size and Construction: The 110kV/20kV Substation consists of a compound (approximately 58.5m x 27.1m) containing outdoor electrical equipment and a Control Building. The foundations for the control building, the electrical equipment steelwork and transformer within the compound comprise reinforced concrete pads or plinths supported on the granular rockfill or the underlying firm or stiff glacial till. The compound hardstand is capped with hardcore surfacing. Other features include a reinforced concrete transformer bund support, external cable trenching, standby generator and bunded diesel tank, external lighting poles, lightning mast, palisade fencing and a well supplying non potable water. There is a 4m wide hardcore surfaced access track around the external perimeter of the substation.
- Control Building: The Control Building is a single storey building (22.86m x 8.83m) with pitched roof, double leaf cavity blockwork walls, pre-cast concrete ceiling slabs with wooden roof trusses overlain with felt and slates. The internal floor is a reinforced concrete slab, cast in-situ. Equipment contained

in the control building includes a Supervisory Control and Data Acquisition (SCADA) system, which allows for off-site monitoring via a telephone connection. The following is located within the control building - control room, MV switchgear room, relay room (protection relays), battery room, toilet, workshop and office area.

- Substation Drainage: The substation site is finished with a 50 mm single size clean compound stone. The permeable compound stone provides a means of attenuation of runoff and allows rainwater to infiltrate to ground. Rainwater from the roof of the control building connects via downpipes away from the compound into the wind farm drainage system. The concrete access road within the compound is cambered to drain to the permeable compound stone.
- Welfare Facilities: The welfare facilities in the control building of Derrybrien Substation consists of one toilet and two sinks. An Envirocare P6 sewage treatment plant unit caters for the wastewater generated in these facilities. It is regularly serviced under a maintenance contract with a private service company.
- Transformer: The grid transformer is located within an impermeable bund capable of oil retention of 110% of oil volume in the event of a leakage from the transformer. There is a proprietary pump that directs transformer bund drainage to an oil separator (Butler Manufacturing Services Ltd. PIF Class 1 Full Retention Oil Separator) where oil can be detected and captured before discharge to the site drainage network.

Anemometer masts: There are two anemometer lattice masts (meteorological masts or met masts) with a height (49m) corresponding to that of the turbines on the site which monitor wind speeds and validate the performance of the wind turbines. Each leg of the mast sits on a concrete plinth of plan dimension 1m x 1m x 1.5m (depth to top of foundation). The base of the masts is triangular in plan 2m x 2m x 2m. The mast is supported on reinforced concrete foundations. The masts are lattice masts, comprising a free-standing galvanised lattice type meteorological tower, being approximately 2m wide at its base x 0.6m wide at its top. Equipment on each mast comprises anemometers, wind direction vanes, a barometric pressure sensor and a data logger. Anti-climb screening (3m high) is provided to masts. A mobile phone network operator has a cell on the wind farm anemometer mast beside turbine T68 to assist with improved phone signal at the site.

Third Party Mast: There is also an existing telecoms mast in the east of the site (beside turbine T25) which is in-situ since the 1980's. This mast is in the ownership of Line Partnership (formerly Cellcom) and includes equipment for broadband, fire service, gardai and ambulance as well as radio transmitter. This mast is unrelated to the Derrybrien Wind Farm and pre-dates the presence of the wind farm by a significant period. The mast is currently supplied electricity through the metered Derrybrien wind farm electricity network.

Access roads: Access to the wind farm site was facilitated by the upgrading of an existing Coillte forestry road which connected to the Black Road to the east of the site. This c.3.1 km road was widened (typically to 4m with 4.5m width at bends), strengthened and re-surfaced to facilitate the development. Lay-bys and drainage

were provided and the bell mouth entrance at the junction with the Black Road was widened. There is a network of wind farm access tracks across the site. These comprise sections of pre-existing forestry tracks, and access tracks specifically developed during the construction of the wind farm. These facilitate on-going access to the wind turbines and anemometer masts for operation and maintenance.

Borrow pits / quarries: Three borrow pits / quarries were excavated on the site – with the extracted material used for the construction of access tracks and hard standing areas. Borrow Pit 1 (BP1) was a source of c. 40,000m^3 of material, primarily rock. Borrow Pit 2 (BP2) was a source of c. 12,000m^3 of material, primarily clay. These pits are estimated to be up to 10m deep. Borrow Pit 3 (BP3) adjacent to Turbine T65 is located at the entrance to the wind farm site. This was the main source of rock fill for the works, with c. 180,000cu.m. of material extracted. Some peat was stored in the vicinity of each of the borrow pits / quarries. The borrow pits have been closed since the end of the construction phase. BP3 is flooded to the natural water table level. Both BP2 and BP3 are fenced off as a safety measure.

Peat excavation and storage: To facilitate the development of the wind farm, peat was excavated from locations including the turbine foundations, hardstanding areas and the footprint of the substation. This material is stored in a number of peat repositories located across the site. Recent surveys (2019 / 2020) show the majority of these areas have naturally re-vegetated with blanket bog vegetation. In many locations these features are difficult to discern.

On-site storage/Drainage and Signage: Spare turbine parts are stored in a number of modular storage containers located on the wind farm site.

Across the site there is a network of drainage channels. These comprise a mixture of pre-existing and constructed channels and they facilitate the discharge of surface waters to watercourses. There are information and directional signs on the site – including panel signs at the wind farm entrance indicating the presence of the wind farm; signage on each turbine indicating the turbine number, potential hazards and an emergency contact telephone number; and operational signage as required e.g. buried HV cable, warning signs. etc.

1.2.2 Existing Derrybrien to Agannygal 110 kV OHL

The Derrybrien to Agannygal 110 kV Overhead OHL is the grid connection constructed for exporting the electricity generated at the wind farm to the national grid. It begins at the Derrybrien Substation (located within the Derrybrien wind farm site, ITM 559916E, 704736N) and ends at the Agannygal Substation (located to the south-east of the windfarm site, ITM 563118E, 698593N).

The grid connection comprises of c. 7.8 km 110 kV conductor, 34 no. double wood pole structures, 2 no. end masts, 5no. angle masts and 1 no. intermediate mast. The OHL connects into the Ennis – Shannonbridge line at the Agannygal 110kV Substation. The Agannygal 110kV substation splits this line into two circuits: Agannygal - Shannonbridge (Galway West) and Agannygal - Ennis (Galway West).

Periodic access to the overhead line structures for inspection is from nearby roads and forestry tracks – see DMP 01 & DMP 02.

The 7.8km Derrybrien –Agannygal 110kV overhead line (with earth wires) is supported on double pole sets and mast structures, 43 structures in total. Of these 34 are double wood polesets (PS), 2 are end masts (EM) (1 end mast within Derrybrien Substation), 6 angle masts (AM) and 1 intermediate mast (IM). The location of the overhead line structures is set out in Table 1 and mapped on DMP 03 Derrybrien-Agannygal 110kV Overhead Line Route (Sheet 1 of 2) and DMP 04 Derrybrien-Agannygal 110kV Overhead Line Route (Sheet 2 of 2).

The following mast types were used:

- Type 61 -Structure Nos 1, 14,30, 34, 41
- Type 60-Structure Nos 18, 20, 24
- Type 149E-Structure No 38.

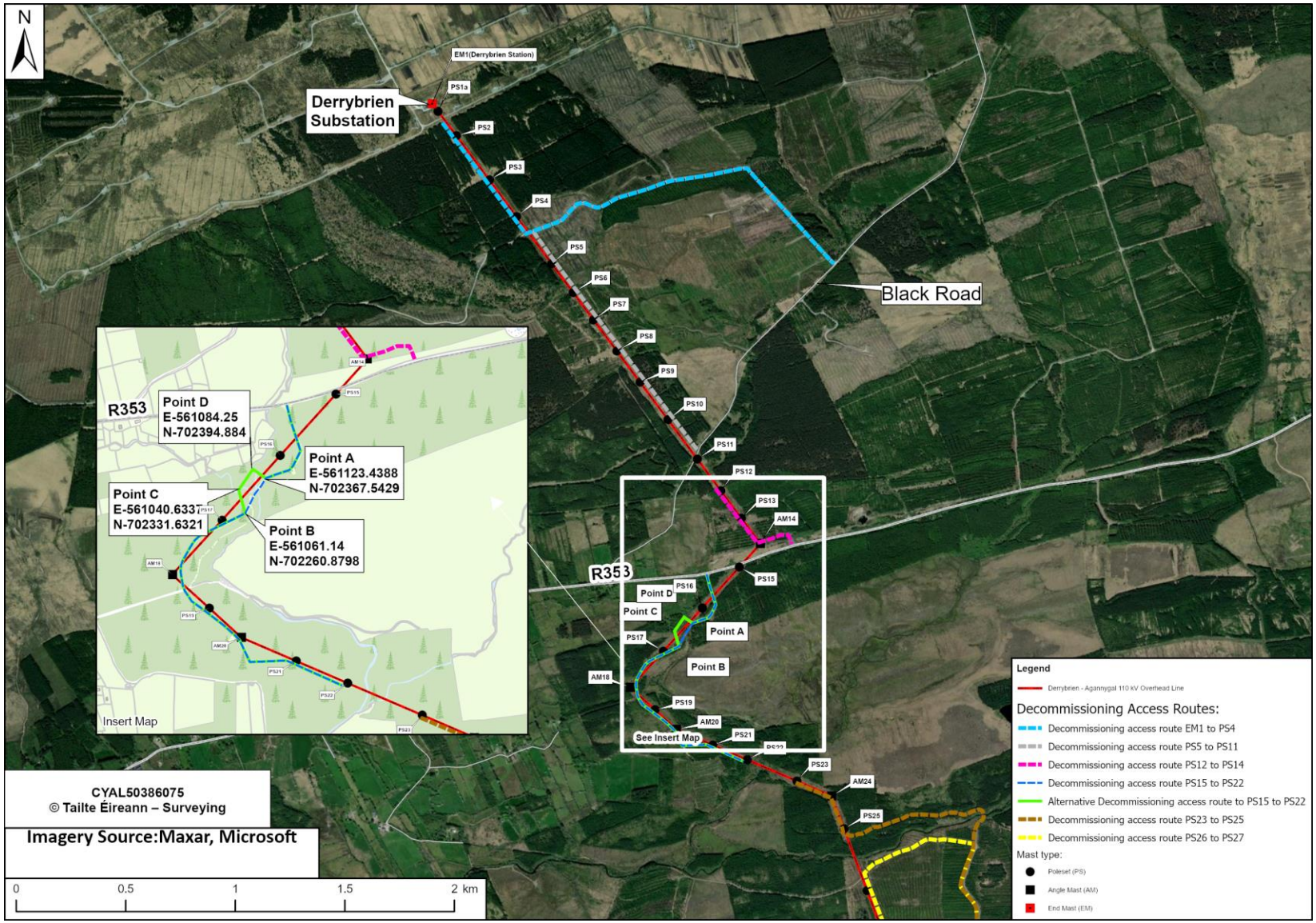
The height of the masts above ground ranges between approximately 13.4 and 20.1m.

The following foundation types were used for the 9 mast structures:

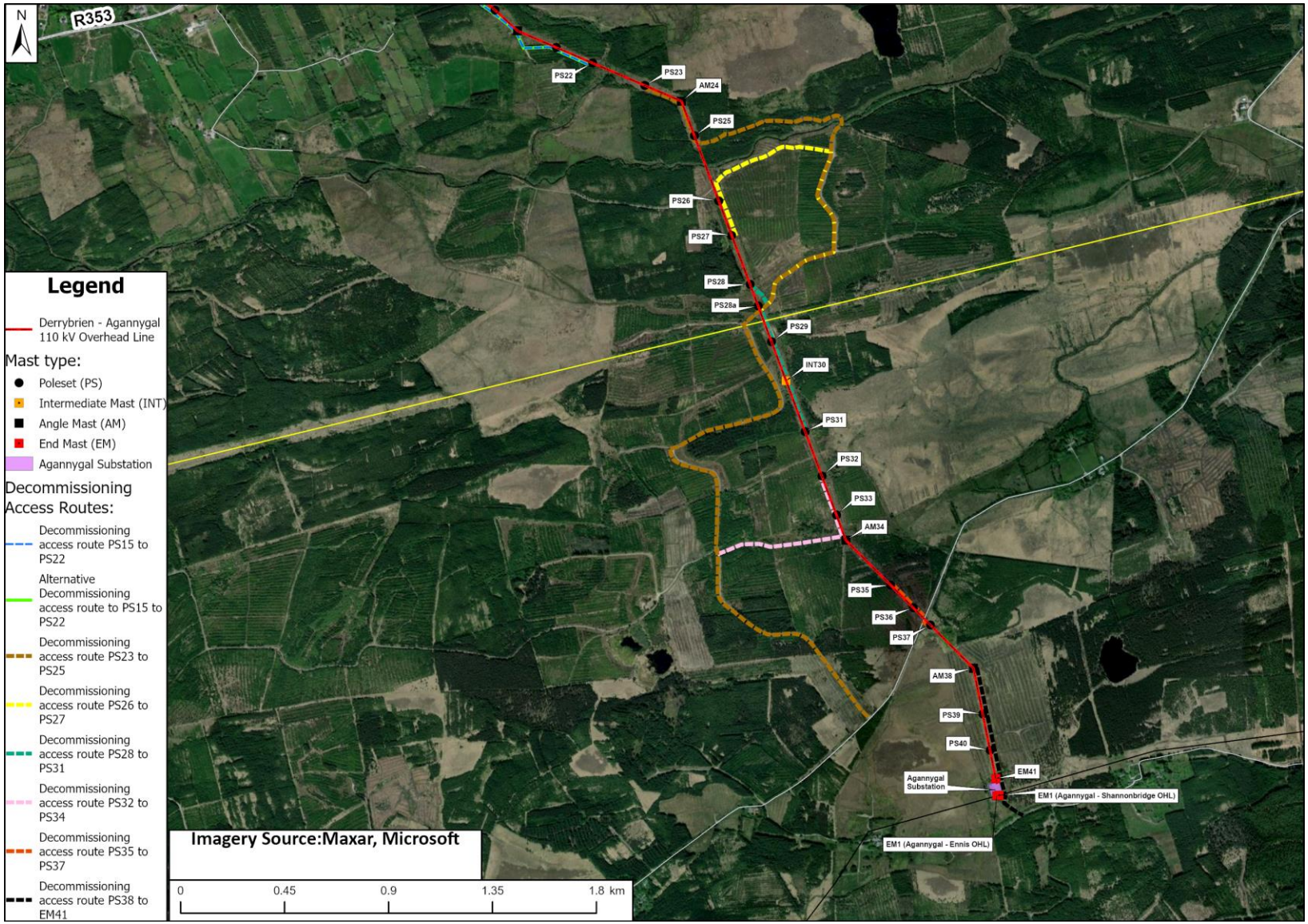
- Type B-Structure Nos 14, 18, 30
- Type C-Structure Nos 1, 20, 24, 34, 41
- Type D-Structure No 38

Table 1 Line Infrastructure locations

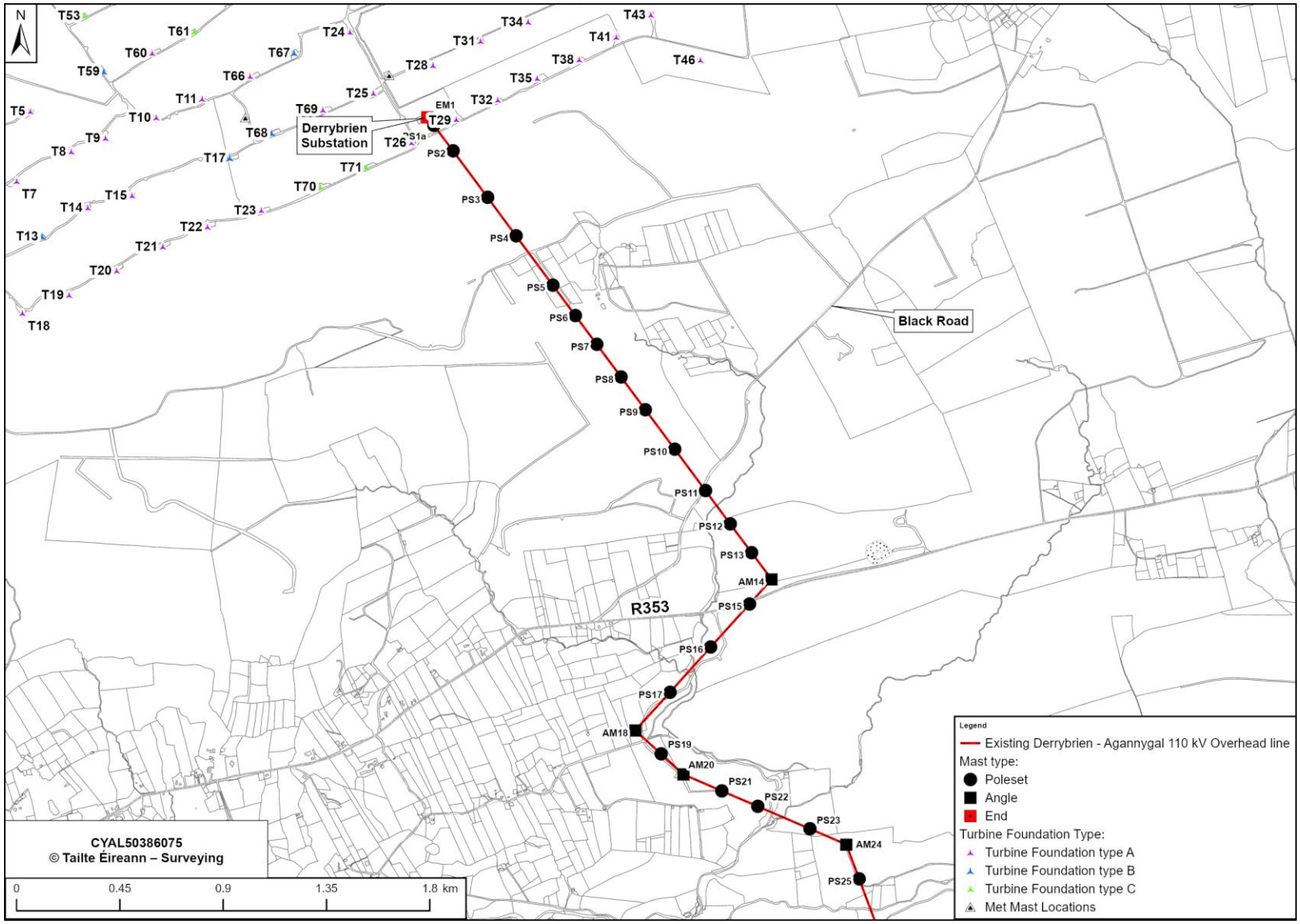
No	Centre Point Easting (ITM)	Centre Point Northing (ITM)	Ground Level (mOD)	Length of pole above ground (m)	No	Centre Point Easting (ITM)	Centre Point Northing (ITM)	Ground Level (mOD)	Length of pole above ground (m)
EM1 Station	559934	704741	330	17.1	PS22	561372	701743	118	19.0
PS1a	559961	704706	328	15.5	PS23	561599	701645	126	19.9
PS2	560045	704595	319	19.5	AM24	561757	701577	129	13.9
PS3	560195	704393	298	16.8	PS25	561814	701427	125	19.2
PS4	560319	704225	277	18.4	PS26	561919	701145	128	19.1
PS5	560479	704011	247	17.9	PS27	561975	700996	122	20.2
PS6	560577	703878	242	16.8	PS28	562055	700783	118	17.0
PS7	560670	703753	236	17.6	PS28a	562089	700690	119.	12.1
PS8	560777	703611	226	19.9	PS29	562148	700535	122	11.9
PS9	560883	703469	224	19.1	IM 30	562211	700366	128	20.1
PS10	561011	703297	205	19.3	PS31	562293	700146	151	19.0
PS11	561144	703117	184	19.8	PS32	562365	699953	155	20.1
PS12	561252	702972	186	15.2	PS33	562429	699785	169	18.4
PS13	561345	702846	175	18.4	AM34	562469	699675	171	19.8
AM14	561432	702731	170	16.9	PS35	562663	699480	188	17.7
PS15	561336	702623	158	19.8	PS36	562761	699382	191	16.3
PS16	561167	702436	146	19.3	PS37	562835	699307	191	18.7
PS17	560989	702239	146	20.2	AM38	563021	699120	199	16.0
AM18	560839	702073	143	15.4	PS39	563062	698922	199	18.3
PS19	560951	701971	138	16.9	PS40	563093	698765	197	15.6
AM20	561048	701882	137	13.4	EM41	563118	698642	193	15.4
PS21	561215	701810	131	19.5					



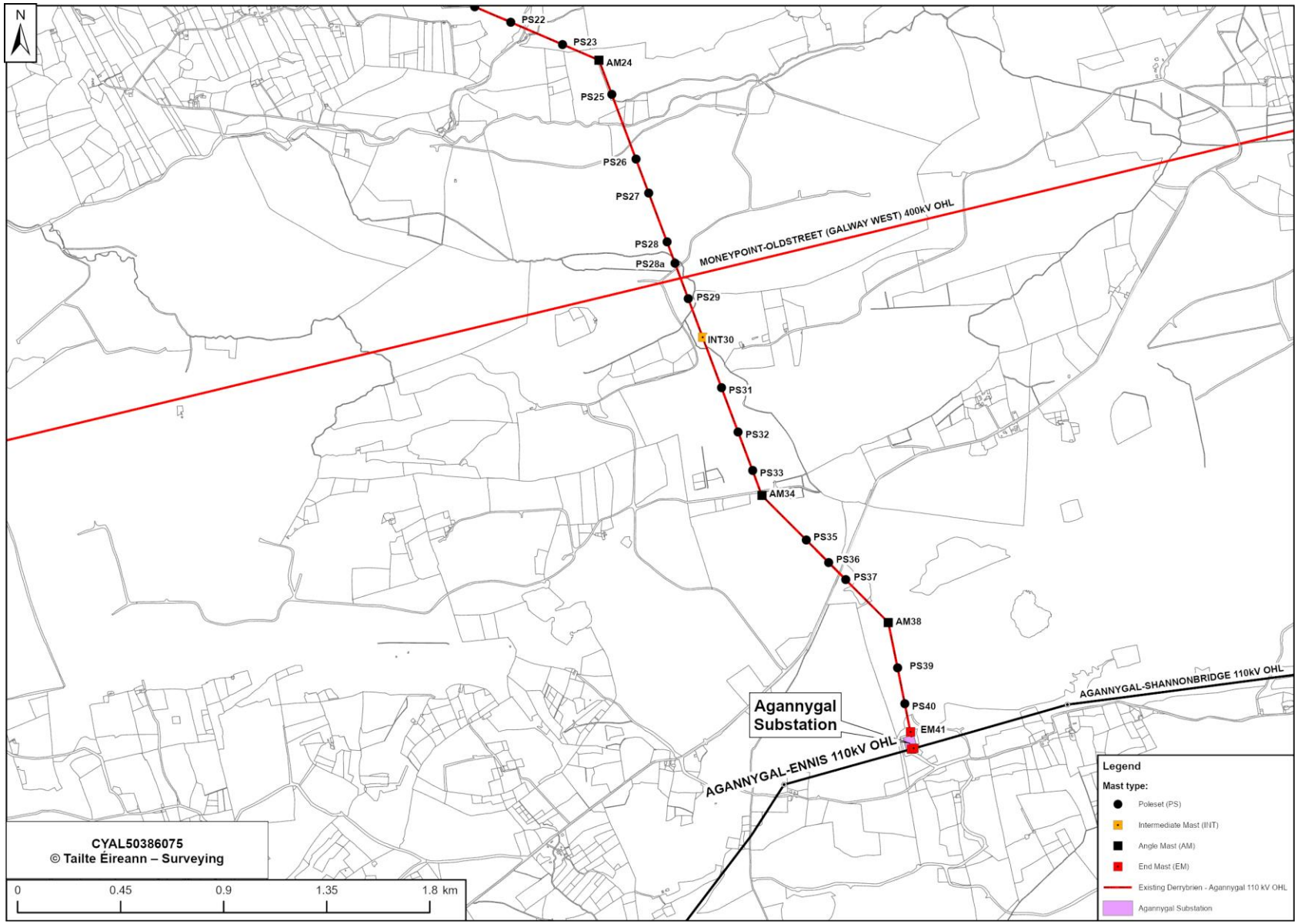
DMP 01 OHL Decommissioning Access Routes 1 of 2



DMP 02 OHL Decommissioning Access Routes 2 of 2



DMP 03 Derrybrien-Agannygal 110kV Overhead Line Route (Sheet 1 of 2)



DMP 04 Derrybrien-Agannygal 110kV Overhead Line Route (Sheet 2 of 2)

1.2.3 Existing Agannygal 110kV Substation

The Agannygal 110kV substation is located within the townland of Loughatorick and the approximate centre point of Agannygal Substation is at ITM co-ordinates 563118E, 698593N. The site is owned by Gort Windfarms Ltd and under the control of ESB Networks.

The nearest villages to Agannygal 110kV substation are the following: Derrybrien – 5 km to the northwest of the site, Ballynakill – 8.7 km to the northeast, Woodford – 10 km to the east and Flagmount – 8.4 km to the southwest.

Access to the Agannygal 110kV substation and overhead line structures is from nearby roads and forestry tracks. The substation site is located within the townland of Loughatorick North

The Agannygal 110kV substation consists of a palisade fenced compound (approximately 63m x 47.5m) containing outdoor electrical equipment and a Control Building. The foundations for the control building and the electrical equipment steelwork within the compound comprise reinforced concrete pads or plinths supported on the granular rockfill or the underlying firm or stiff glacial till. The compound hardstanding is capped with hardcore surfacing. Other features include external cable trenching, standby generator (bunded) and diesel tank, external lighting poles, lightning mast and a well supplying nondrinking water. There is a wide hardcore surfaced access track around the external perimeter of the substation.

- **Compound Size and Construction**: The 110kV Substation consists of a compound (approximately 63m x 47.5m) containing outdoor electrical equipment and a Control Building.The foundations for the control building, the electrical equipment steelwork and transformer within the compound comprise reinforced concrete pads or plinths supported on the granular rockfill or the underlying firm or stiff glacial till. The compound hardstand is capped with hardcore surfacing. Other features include external cable trenching, standby generator (bunded) and diesel tank, external lighting poles, lightning mast, palisade fencing and a well supplying non potable water. There is a wide hardcore surfaced access track around the external perimeter of the substation.
- **Control Building**: The Control Building is a single storey building (14.5m x 8.9m) with pitched roof, double leaf cavity blockwork walls, pre-cast concrete ceiling slabs and wooden roof trusses overlain with felt and slates. The internal floor is a cast insitu reinforced concrete slab. The control building comprises the control room, battery room, store room and toilet.
- **Compound Drainage**: Clean surface water drainage from the control building roof is collected by guttering and downpipes and directed to the substation drainage system. Land drains surrounding the substation compound collect surface water runoff which drains downhill offsite along the edge of the access road constructed to the substation. The wastewater from the control room is treated by a Biocycle wastewater treatment system

1.3 Safety Management

All decommissioning works will be carried out under appropriate supervision. Works will be carried out by experienced contractors using appropriate and established safe methods of construction. All requirements arising from statutory obligations including the Safety, Health and Welfare at Work Act and associated regulations will be met in full.

A detailed Safety Management Plan, including an Emergency Response Procedure, will be developed prior to commencement on site.

1.4 Environmental Protection during Decommissioning

Having regard to the characteristics of the site and the works necessary to decommission the existing wind farm, all works will be undertaken in line with best environmental management practices such as those set out in CIRIA C741 Environmental good practice on site. Compliance with ESB's ISO 14001 accredited Environmental Management System will be enforced at all stages of site operations.

The Derrybrien Wind Farm Decommission Project will be undertaken in compliance with a Construction Environmental Management Plan (CEMP) which will include all measures which have been brought forward from the environmental assessments undertaken during the preparation of this EIAR as well as any additional measures required pursuant to conditions of development consent.

The developer will apply appropriate protocols in relation to all works, including:

- Environmental Induction of all personnel working on site
- Storage and handling of Materials
- Dust Minimisation
- Litter Control and Site Cleaning
- Spill Control
- Accident Prevention
- Emergency Incident Response Plan (including peat slide)
- Bund Management
- Fuelling of Vehicles and Equipment on-site
- Noise
- Access over Normal Ground Conditions
- Access over Peat or Wet Ground Conditions
- Protection of Water Quality
- Protection of Water Crossings
- Spread of Alien Invasive Species
- Environmental Incident Response
- Waste Management
- Working in Ecologically Sensitive Areas (including protection of sensitive habitats and fauna)

- Soils and Geology
- Archaeological Protection
- Vegetation Clearance
- Traffic Management (on-site and off-site).

1.4.1 Noise and Vibration

Measures will be identified and employed to reduce the noise and vibration arising from the decommissioning works.

Only plant conforming to relevant national & international standards, directives and recommendations on noise and vibration emissions will be used.

The EIAR assessment will calculate any increase in the ambient noise and the impact of same. Mitigation measures will be proposed by the technical expert e.g. the impact of noise will be mitigated by the selection of appropriate plant and / or techniques and.

Noise-sensitive locations surrounding the wind farm site are located at varying distances with the closest occupied noise sensitive located approximately 2.1km from the nearest turbine location. There is a derelict, uninhabited building some 1.2km from the nearest turbine location.

The nearest noise- sensitive locations in the vicinity of Agannygal substation is located 0.54km and to the OHL is 0.38km.

1.4.2 Control of Oils & Fuels

Oils will be stored in enclosed containers within the substation compound. The diesel supply tank to the temporary electrical generator supplying the site will be double skinned.

Fuel will be stored in a double skinned diesel bowser which may be stored at the main compound and will be moved around the site to re-fuel plant and machinery at its point of use.

Spill kits will be available and used to deal with minor oil/fuel spills on site. Drip trays will be used during refuelling of machinery.

1.4.3 Fuelling of Vehicles and Equipment on-site:

The plant and equipment used during decommissioned will require refuelling during the works. Appropriate management of fuels will be required to ensure that incidents relating to refuelling are avoided. The following mitigation measures are proposed to avoid release of hydrocarbons at the site:

- Refuelling should only take place on level ground in hardstanding (e.g. crane hardstands or tracks, and under constant supervision while refuelling is in progress.

- Road-going vehicles will be refuelled off site wherever possible
- Only designated trained and competent operatives will be authorised to refuel plant on site. Mobile measures such as drip trays and fuel absorbent mats will be used during all refuelling operations.
- Fuel volumes stored on site should be minimised. Any fuel storage areas will be bunded appropriately
- The plant used will be regularly inspected for leaks and fitness for purpose
- An emergency plan for the decommissioning phase to deal with accidental spillages will be developed. Spill kits will be available to deal with and accidental spillage in and outside the refuelling area.
- A programme for the regular inspection of plant and equipment for leaks and fitness for purpose will be developed at the outset of the decommissioning phase

1.4.4 Dust suppression

The primary source of dust is expected to be from vehicle movements on site along the access tracks and any minor civil works that are required. The extent of dust generation will depend on the type of activity undertaken, the location, the nature of the dust, i.e. soil, wind speed and direction, and periods of dry weather.

Control measures to control dust include

- Dust suppression measures will be implemented on site to minimise the potential nuisance caused by dust at the nearest sensitive receptors and on sensitive eco systems. Water misting shall be used as as required if particularly dusty activities are necessary on site during dry and/or windy conditions
- All site related traffic will have speed restrictions on un-surfaced roads to 30 kph
- Regular inspection of the site to examine dust measures and their effectiveness

Water for dust suppression for the wind farm element of the project may be sourced from borrow pit/quarry at the entrance to the wind farm. It is expected that water extraction from the existing borrow pit, for dust suppression, will be less than 25m3/day.

1.4.5 Access and Transportation

A detailed Traffic Management Plan, TMP, reflective of the road network to and from the site, the local traffic conditions and the predicted decommissioning traffic volumes will be prepared prior to decommissioning.

The detailed TMP will set out the traffic management proposals within the site and along the defined access routes to and from the site.

Proposed access routes are identified in the sections below.

The final defined haul routes for HGV and abnormal loads will be agreed with the local authority prior to decommissioning.

1.4.6 Working hours

Normal working hours will be:

- 07:00 and 19:00 on Monday to Friday
- 08:00 and 13:00 on Saturdays
- There will be no activity on Sundays or Bank Holidays.

Due to the nature of the works, there will be occasions during deconstruction of the project where extended working hours will be required, in particular during the transport or the turbine components.
Where additional or alternative working hours are required, these will be agreed in advance with Galway County Council.

2 Programme

The duration of the decommissioning phase is expected to be approximately 24 months. Restrictions may impact this duration and this duration may be extended appropriately e.g. seasonal, garda escort availability for abnormal loads etc.

The decommissioning of the project is expected to take place in stages, described below. The stages are expected to run concurrently unless , they are prevented from being doing so, due to for example, the seasonality of the works such as the presence of breeding birds or hedge trimming etc, weather conditions, ground conditions or availability of an outage of the grid for the reinstatement of the Ennis-Shannonbridge line etc.

Stage No.	Individual Task Description	Individual Task Duration	Estimation of stage duration
Stage 1: off site enabling works	Off site enabling works e.g., public roads, verge clearing (if required), hedge trimming (public road and site).	2 weeks and might be undertaken in advance due to the seasonal nature of the works	2 weeks
Stage 2: Wind Farm (excl. Derrybrien substation)	Establish site compound - On site enabling works e.g., potholes on private tarred road in addition to potholes on windfarm roads	3 weeks	42-77 weeks
	Dismantle turbines - Remediate windfarm road surface to ensure appropriate running surface for cranes - Clear area to receive rotor assembly & temporary blade storage. - Turning heads (where required) - Widen turbary road (if required) - Dismantle Turbines and haul off site	39-74 weeks duration (see Section	
Stage 3: Grid Connection (incl. Derrybrien substation).	Derrybrien substation	14 weeks	26 weeks
	Decommission the OHL as far as Agannygal	9 weeks	

This stage can only commence once the last turbine radial has been disconnected.	Reinstate Ennis Shannonbridge 110kV line	6 weeks Will need to take down the Agannygal masts before doing anything with the reinstatement and then ensure that appropriate safety clearances are in place while the line is live overhead.	
	Decommission Agannygal substation	14 weeks	

3 Decommissioning Derrybrien Wind Farm (including the Derrybrien 110kV Substation)

3.1 Introduction

The decommissioning works will include the the removal of the above ground structures only leaving the access tracks, hard stands, wind turbine foundations, underground cables, meteorological mast foundations and substation foundations in situ. Any protruding foundations or structures would be cut to below ground level and infilled and levelled to match adjoining areas. These proposed decommissioning works can be confined to areas within the control of Gort Windfarms Ltd and are considered typical of the industry norm in respect of windfarm decommissioning.

No bog rehabilitation or active drain blocking would occur and the existing drainage network would be left to naturally rehabilitate. No replanting of forest would occur although some natural regeneration would be likely. The decommissioning works associated will include the following:

- De-energising of the site which will involve initially disconnection of turbines. low voltage (LV) followed by disconnection of high voltage(HV) elements.(
- Temporary widening of the Turbary Road and certain sections of turning heads.
- Controlled dismantling of 70no. turbines (blades, nacelle, and tower) and 2no. anemometer lattice masts.
- Controlled removal of electrical equipment from Derrybrien substation and demolition of substation building.

3.2 Off site Enabling Works

Hedge trimming to restore c. 4m x 4m road envelope on Black Road and on site roads.

Road verges on Black Road to be scraped clean to expose road running surface. Scraped material will be collected and disposed of to a licenced facility. Roadside drains will not be impacted. If there are any signs of cracking/distress on the road prior to works taking place agreement will be sought from Galway Co. Co. to carry out local repairs.

Localised rebar exposure on the outer face of each parapet at kicker level of bridges #2 (E 561836, N 704082 (Unnamed bridge B)) and #3 (E 561367, N 703601 (Black Road Bridge)) along the Black Road may be required.

3.3 Compound and site facilities

A temporary site compound will be established to the northeast corner of the Derrybrien Windfarm Site, on an existing hardstand area, adjacent to the pre-existing

forestry track. Temporary portacabin accommodation will be located within the construction compound and will consist of offices, welfare facilities, meeting room and toilet facilities for use by construction contractors and owner's representatives. Temporary portacabin structures will be transported to the construction compound complete on flatbed lorries and lifted into position.

Typical temporary accommodation will consist of:

- 8no. office containers
- 2no. canteen containers
- 1no. drying room container
- 2no. toilet block
- 2no. storage containers
- 1no. first aid container
- 1no. Electrical Power Generator + diesel bowser

A low earthen berm shall be constructed around the existing perimeter of the hardstand area on the northern side to prevent any surface run-off flowing directly over the edge from the compound into nearby drains. This environmental protection measure will be regularly maintained and monitored. DMP 05 below shows Temporary Main Compound at Wind Farm

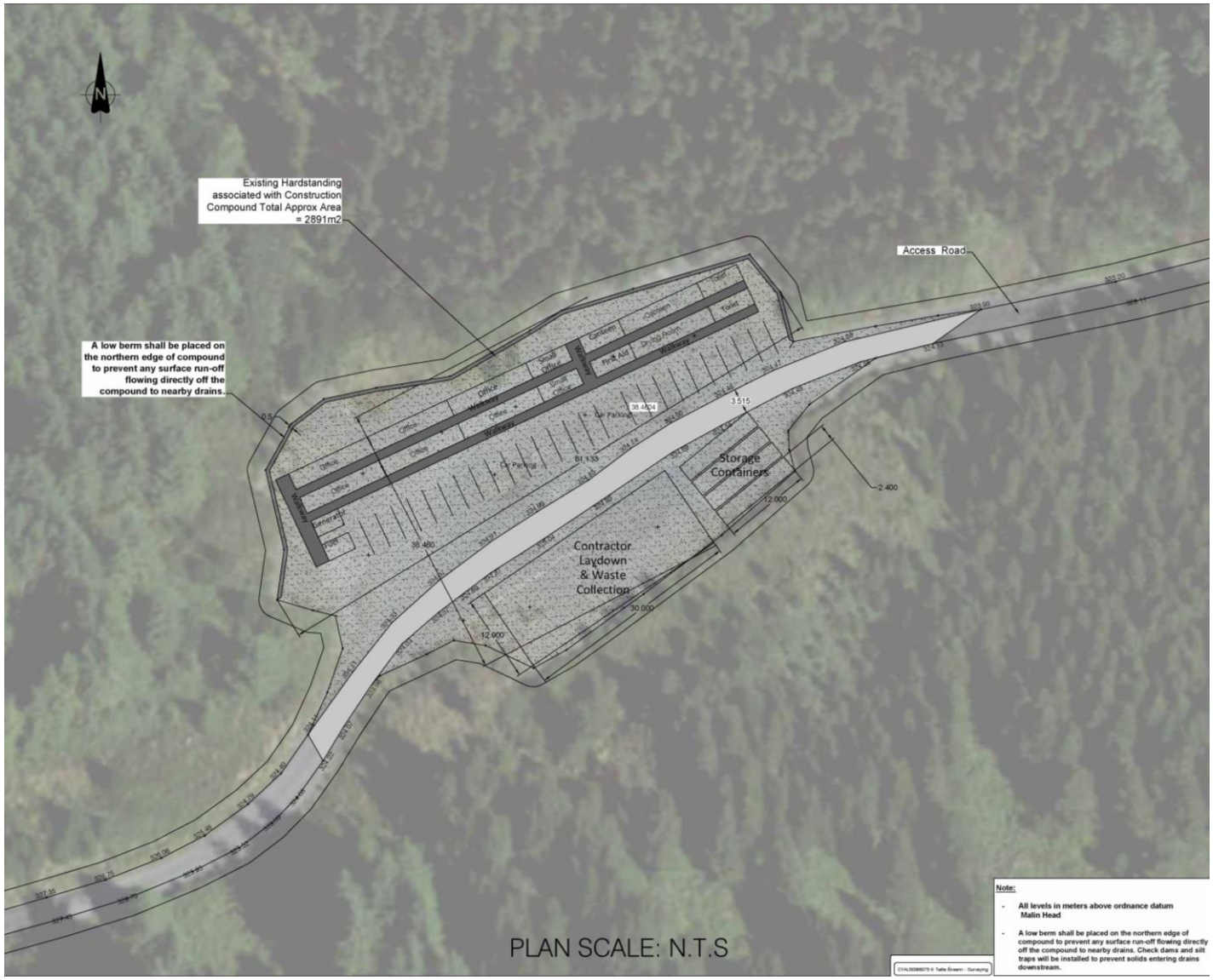
The toilet facilities at the compound will be formed by a self-contained toilet block with a temporary holding tank for managing the sewage and wastewater. These toilet facilities will be removed upon completion of the works.

Container units will be placed in the compound area for the storage of tools and materials during the decommissioning works.

In addition, some of the existing hardstands throughout the site, including at Derrybrien substation, will be used as temporary storage locations during the decommissioning of the project.

Approximately 5 self-contained portaloos/portable welfare units will be provided across the site, including at Derrybrien substation, which will be serviced and maintained on a regular basis during the construction activities.

At Derrybrien substation a drying room and container units will be placed adjacent to the compound for the storage of tools and materials during the works.
All portacabins, containers, portaloos and welfare units will be removed upon completion of the works.



DMP 05 Temporary Main Compound at Wind Farm

3.3.1 Water requirements

Drinking water at the wind farm site compound will be supplied by a proprietary bottled water supplier. Non-potable water supply for toilet blocks etc. may be supplied by 3rd party suppliers or from either an existing well installed at the compound or the water from the on site borrow pit/quarry. There is an existing well which was used during the construction phase which was decommissioned and capped following the completion of the construction phase. It is expected that water extraction from the existing borrow pit, for dust suppression, will be less than 25m3/day. In the event that prolonged hot dry weather periods are encountered, which necessitate larger quantities being required, abstractions shall be registered with the EPA.

3.3.2 Energy Supply

Temporary electrical generators will be used to supply power at the wind farm site construction compound and the compound at Derrybrien substation.

3.4 Site drainage

Drainage installed at each of the turbine bases during construction stage generally consisted of a buried land drain around the perimeter of the turbine base. The outlet of each land drain is to an open drainage channel, which was specifically installed to transfer the water to one of the existing main drains within the site. As required at specific turbine excavation locations, existing drains were re-routed around the excavation area when they were present. This ensured the continuing operation of drainage in the area and non-entry of silt into the existing drains.

Culverts were constructed at various wind farm access road crossings so as to maintain the conveyance path of the pre-existing and constructed drains crossed and thus prevent excessive ponding of water on the uphill sides of these roads.

As the vast majority of roads are floating, they can remain in place without the need in principle to maintain associated drainage because they allow for natural infiltration, interflow and saturated groundwater flow. There will be no requirement for additional drainage associated with the decommissioning of the Derrybrien wind farm. Over time the drains will likely fill in and revegetate naturally and become less effective over time.

Prior to decommissioning all existing culverts will be checked for integrity and remediated if required prior to commencement of decommissioning. 1 no. culvert currently requires remediation adjacent a hardstand in the northern part of the site. Works will not extend outside the stoned area. Upon completion of the decommissioning after the substantial number of vehicle movements have taken place all culverts will be checked before vacating site.

3.5 Wind farm Decommissioning

3.5.1 High level description of decommissioning

Decommissioning of the Derrybrien Wind Farm is expected to be approximately 24 months. The decommissioning works will involve the removal of the above ground elements of the wind farm and will entail:

- De-energising of the turbines
- Controlled dismantling of 70no. turbines (blades, nacelle, and tower) and 2no. anemometer lattice masts.

3.5.2 Personnel

Most decommissioning personnel are expected to arrive at the project site compound, OHL works' locations or Agannygal substation in private/developer vehicles. Table 2 identifies the number of expected personnel during the decommissioning phase of the wind farm.

Table 2 Wind Farm Decommissioning Personnel

Phase & Personnel	Peak Personnel Numbers
Gort Windfarms Ltd. and agents' staff	6
Turbine Dismantling, Crane & Transportation and Civil works	50

3.5.3 Plant and abnormal loads

3.5.3.1 Plant

During the decommissioning a wide range of mechanical plant will be mobilised to the wind farm site when it is required. This plant will be generally kept on the site and not removed from thesite until it had fulfilled its purpose. The amount and type of plant on site will vary in accordance with the level and type ofactivity on site over the period of decommissioning. The type and number of heavy civil works plant on the site during the peak decommissioning works will comprise:

- Excavators (2)
- Dumpers (2)
- Roller (1)
- Tractor and diesel bowser (1)
- Tractor and trailer (1)
- JCB (1)
- 3 & 4 axle lorries (2)
- Personnel 4- wheel drive vehicles (3-40)

- Mobile task lighting generator (2)
- Mobile pumps (1)
- Water bowser (1)
- Mobile Crane (50ton (2)) and ancillary support vehicles (up to 3 trucks)
- Mobile Crane (300ton (2)) and ancillary support vehicles (up to 5 trucks)

3.5.3.2 Abnormal loads

Turbines:

The turbines will be removed from site in a similar manner to how they were transported to the site originally utilising articulated trucks with extendable trailers for some components and articulated trucks with step frame trailers for other components. The destination of the turbines post decommissioning is unclear at this time. Therefore the removal of turbines from site is considered in terms of all turbine components being removed intact. The proposed haul route from the site to the M18 motorway can be seen in the figure DMP 06, below.

The transport of disassembled turbines from the site will be undertaken in accordance with a Transport Management Plan which will be issued to and agreed with Galway County Council as part of a permit application for the transportation of abnormal loads using the local roads under the Road Traffic (Permits for Specialised Vehicles)) Regulations 2009 and Road Traffic (Specialised Vehicle Permits)(Amendment) Regulations 2010. The Transport Management Plan will provide for all necessary safety measures, including a convoy and Garda escort as required.

The number of convoys and the duration of time over which the convoys will run, will be agreed with both the Galway County Council and An Garda Siochana.

The configuration of the transport vehicle carrying the blades is not yet known; they may be transported singly on individual trailer or up to 3 may be transported on one trailer. Therefore, there will be a minimum of 94 and up to 140 abnormal loads leaving the site. The abnormal loads will leave in a convoy of up to 3 vehicles. Empty trailers shall be returning to site on a regular basis.

Possible options and durations of these options are discussed below in Table 3 and Table 4:

Table 3 Turbine abnormal load convoys calculation

Configuration 1		Configuration 2		Configuration 3	
3 blades singly	1	2 blades in one vehicle	0.5	3 blades in one vehicle	0.3
Towers etc	1	Towers etc	1	Towers etc	1
No. of abnormal loads	**140**	**No. of abnormal loads**	**105**	**No. of abnormal loads**	**94**

Table 4 Abnormal loads convoys per week calculation

Configuration 1 Convoys per week	No. of weeks	Configuration 2 Convoys per week	No. of weeks	Configuration 3 Convoys per week	No. of weeks
2 convoys	70	2 convoys	53	2 convoys	47
3 convoys	47	3 convoys	35	3 convoys	32
4 convoys	35	4 convoys	27	4 convoys	24

3.5.3.3 Other movements

In addition to the plant listed above, the estimated numbers of vehicles accessing the site during the main works (durations indicated in the program) are

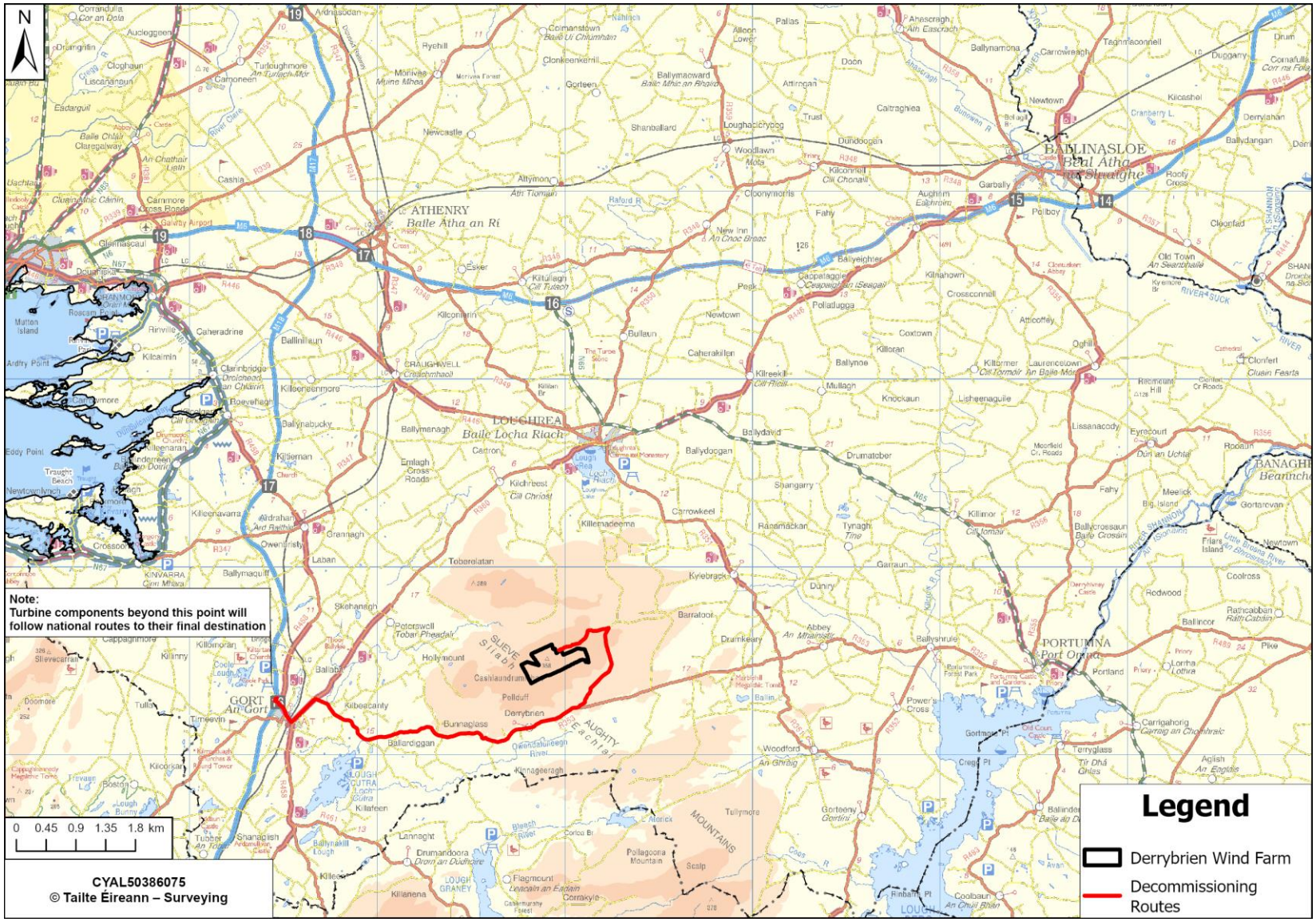
- Personal vehicles – up to 40 per day during the dismantling of the turbines.
- HGV vehicles (excluding stone) – up to 10 per day to take waste, containers, skips, materials etc. This is expected to be reached during establishment and removal of the compound.
- HGV with imported stone for potholes – 10 loads over a week and may continue for a period of 4 months
- HGV with imported stone that may be required to widen the turbary road - 25 trucks per day hauling for 4 weeks

3.5.4 Transport / Haul routes

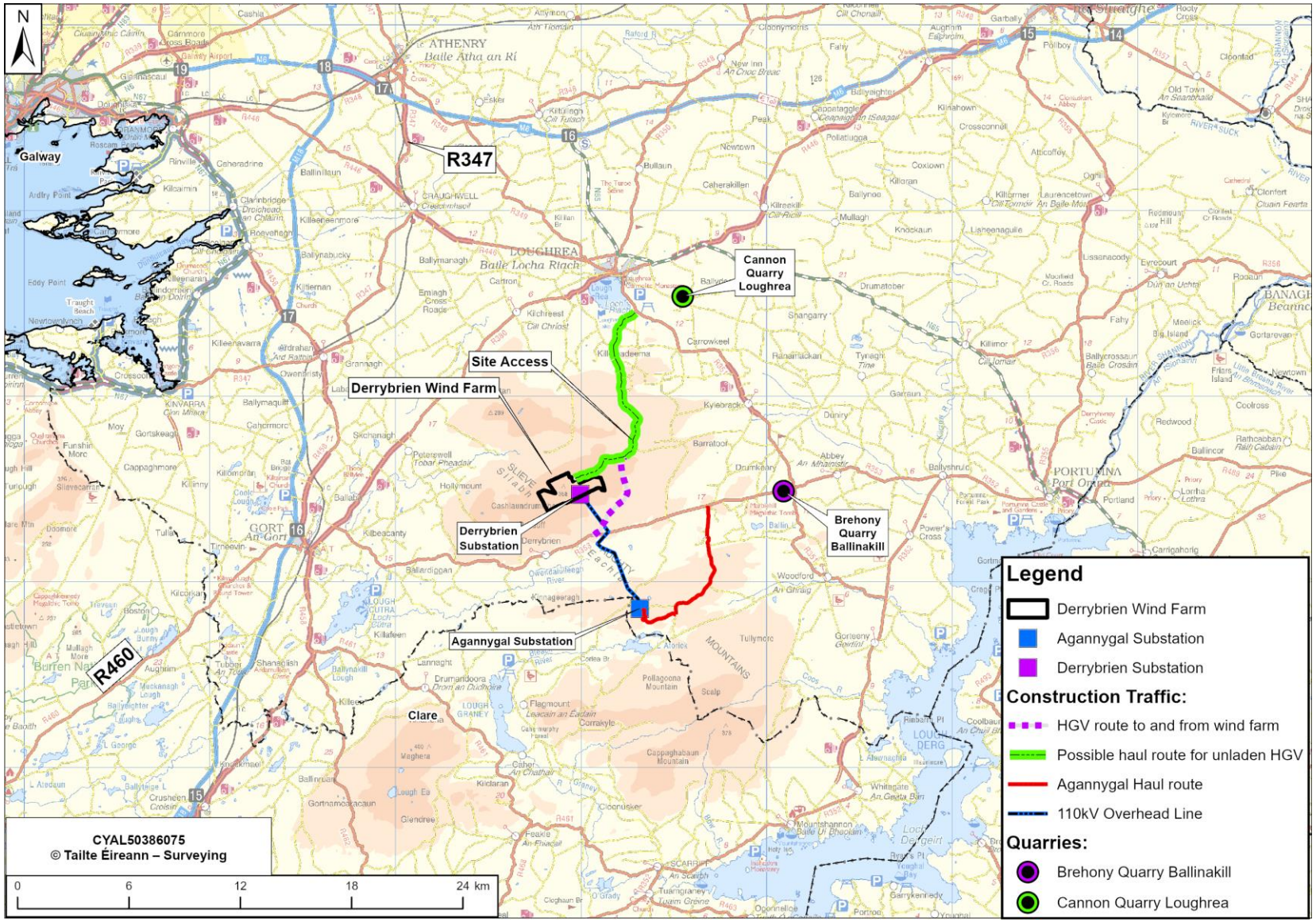
Haul routes for the abnormal loads and HGVs have been identified in Figures DMP 06, DMP 07 & DMP 08

HGVs will access to and egress from the wind farm site entrance via the Black Road from the R353. Empty HGVs will be permitted to travel either south or north of the wind farm site entrance, to avoid congestion.

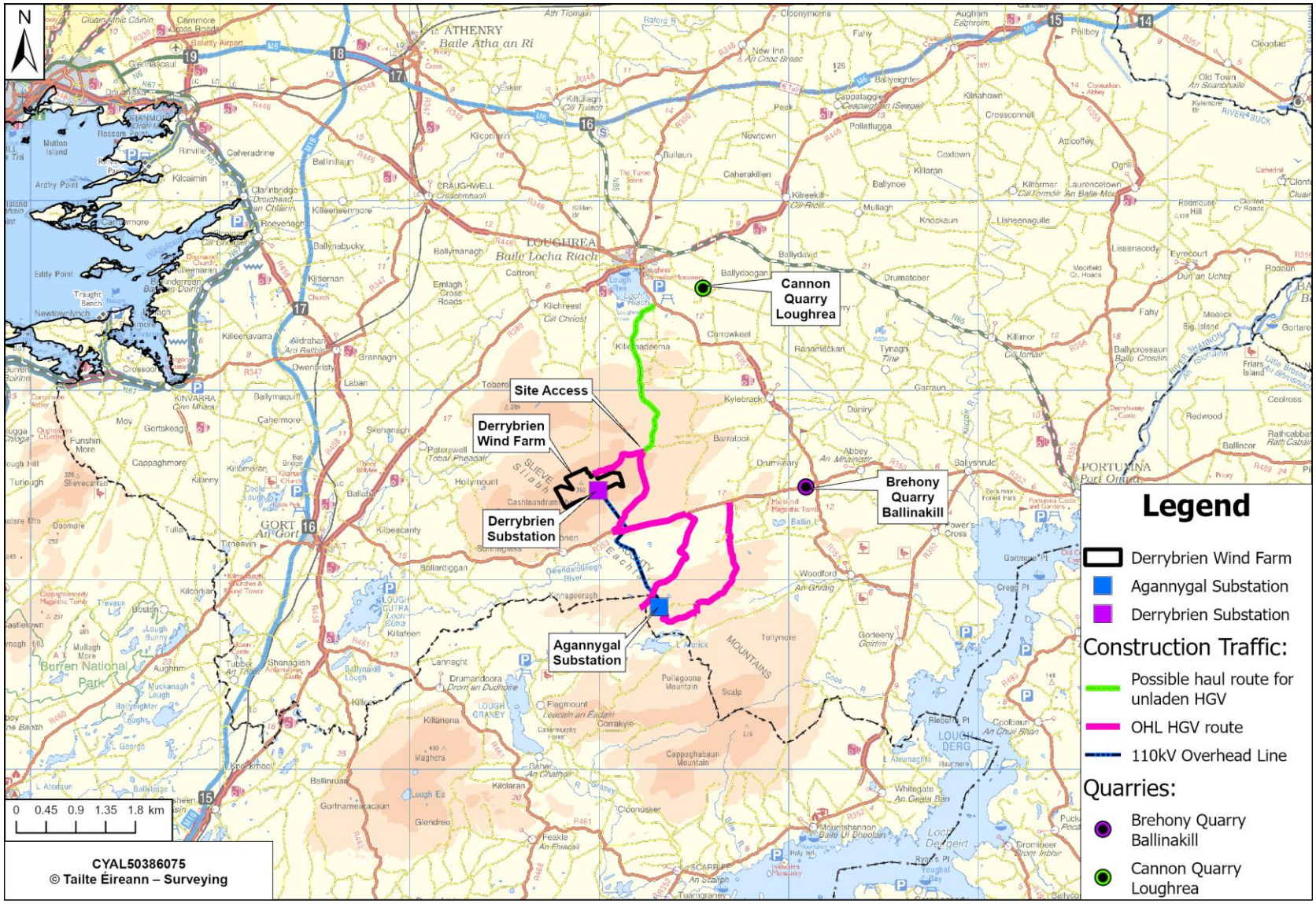
During the construction of the wind farm, a number of road and junction improvements were completed to provide access to the site during turbine delivery. All these accommodation areas remain in place for use during decommissioning and turbine component removal. No additional works are required.



DMP 06 Abnormal Load Haul routes – Turbine Components and Transformer



DMP 07 Wind Farm and Substation HGV Haul Routes



DMP 08 Overhead Line HGV Haul Routes

3.5.5 Widening of turbary road

The turbary road is the circa 1.45km road in the east of the site that runs from the junction east of T25 to turbine T45. The length of the turbary road may be revised to include a shorter length following assessment from the geotechnical consultants/other.

It is not proposed to carry out any remedial works on any of the elements of the windfarm that will be left in place after decommissioning. However, it may be necessary to carry out temporary road widening works along the narrow turbary road to provide safe access to the mobile crane that will be used to dismantle the turbines. If this is required, then the roads will be widened as follows: Where the existing peat is lower than the floating road, a layer of bog mats will be placed on the existing intact peat and covered with varying depths of crushed rock granular fill over a 2 m wide strip along the upslope side of the existing floating road which will then be reinforced with a single layer of geogrid and 150mm on widened section followed by 2 layers of geogrid, 150mm of capping stone and 100mm running surface layer across the full width of the road. Where the existing peat is higher than the floating road turves will be excavated to a level of 300mm lower than the road and stored locally for reuse, and then bog mats and stone will be placed on the exposed ground as noted above. The condition of the turves will be monitored regularly and watering will be implemented if deemed necessary. Existing drains will not be disturbed during temporary storage of turves. This is necessary to provide adequate edge support to the wheels of the crane without significantly increasing the loads on the peat. Measures will be put in place to prevent fines that may wash off the new capping layer entering watercourses by utilizing silt fences and check dams in adjacent drains.

It’s estimated that 4,500 tonnes of stone will be required to achieve this. This stone may be sourced from the existing hardstands, providing that geotechnical consultant confirms that it’s acceptable to do so and confirms that it is suitable for road construction. Otherwise this stone will be sourced from nearby quarries. On completion of the works all stone and bog mats will be removed and turves replaced to return area to existing condition. Stone shall be returned to existing hardstands and levelled. Please see figure DMP 09 below showing details of temporary widening.

3.5.6 Localised repairs on site roads and hardstands

The majority of the roads and hardstands on site are in good condition. They may require some minor filling to potholes in advance of turbine decommissioning commencing. The only exception is the turbary road where temporary widening may be required as noted above.

Small volumes of stone may be imported for filling potholes, alternatively, as hardstands are cleared of all parts, the capping layer on these hardstands should be stockpiled for road repair, elsewhere on site, as required. This will reduce significantly

the volume of imported stone. Stockpiling of materials shall not be permitted within 30M of a watercourse.

Works may be required at the site entrance to facilitate the haulage of abnormal loads off site and will be dependent on transportation vehicles available. These potential works are shown on figure DMP 09 below.

It will be necessary to place steel plates on some of the internal tracks where road widths are narrow to ensure that cranes can travel safely around the site.

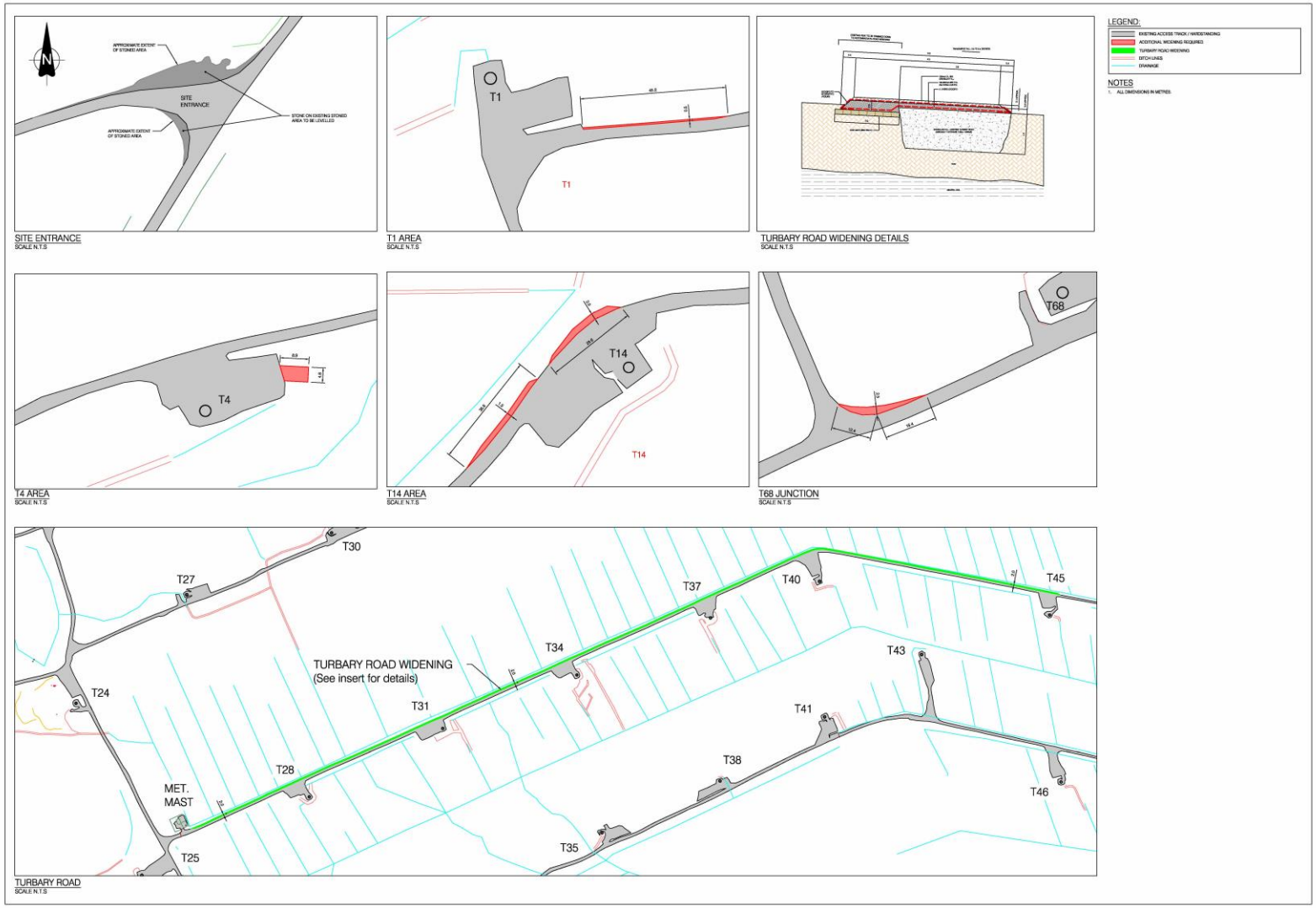
It is also proposed to secure the area between the main entrance road and borrow pit No.3 by placing boulders/ crash barrier along edge of existing road.

In addition provision should be made for the importation of 3 loads of tarmac to repair potholes on the tarred road at the start of the project.

3.5.7 Creation of turning heads

To decrease risk during the movement of the cranes and trucks on certain sections turning heads will be created at T1, T4, T14 and also the junction to west of T68 will be extended. Details can be seen on Figure DMP 09 Works shall be carried out utilising the same methodologies as those stated in Section 3.5.5 except for T4 which would be a new short section of floating road with the standard detail, i.e.:

- Min. 600mm Class 6F2 capping reinforced with 2 layers of geogrid (basal combi-layer with geotextile separator and 2nd layer 450mm up from the base.)
- 150mm of Clause 804 subbase.



DMP 09 Road Widening Areas

3.5.8 Controlled dismantling of 70no. turbines and 2no. anemometer lattice masts

The 70no. turbines and masts will be dismantled by mobile cranes operating on the adjacent granular hardstand areas on glacial till or rock,which are designed to support the crane loads.

The dismantling of turbines and masts will be bound by safety considerations, such as weather conditions, where works will not be undertaken during adverse weather conditions and in particular not during high winds.

Turbines: Specialist trucks and low-loader transporters, extendable trailers & step frame trailers will be required to remove the heavy and oversize components of the turbines from the site. The mass and length of the main turbine components are as follows for the Vestas V52/850 turbine: Nacelle (22 tonnes), Towers (Base tower 29.9 tonnes, Top tower 20.5 tonnes), & 26m Rotor Blades (1.9 tonnes) .

Most of the site is built in loop formation. The transport interface can be multi-directional on these loops. On some spur roads reversing motions will be required.

On the spur roads, unladen [closed] trailers will reverse 150m – 200m; this can only be achieved where the last, and penultimate hardstands, on any given spur road, are sufficiently large enough to allow closed trailers to turn around. The hardstands will require additional works/areas extended to accommodate turning at T1, T4, T14, and the junction west of T68.

If the turbary road is not widened, then this road must be plated prior to dismantling the turbines along this road.

Cranes will not be permitted to reverse on any floated road and will not travel between hardstands carrying any boom accessories. Axle loads will be limited to 12 tonnes. When a heavy class crane leaves a hardstand, it should not return.

The following strategy may be used for dismantling

- Rotor to be dismounted from tower with the 3 blades attached and disassembled when on the hardstand. Some turbines will require the blades to be dismantled singly from the tower. A general arrangement drawing for the Rotor set down area can be seen on figure DMP10
- Blades to be stored on straw bales on land adjacent to the road verge or beside the hardstand, subject to geotechnical and ecological assessment at each location. The locations where blades are to be temporarily stored are shown on figure DMP 11 This details areas on the high side of hardstands.

There will be a necessity to microsite the location on the ground so that blade supports avoid existing drains. The Project Ecologist will undertake a pre-construction verification survey of turbine blade and rotor storage sites and will advise on micro-siting to ensure minimal ecological impacts and will be agreed with the Geotechnical Engineer. The preferred location for the blade set down area is shown on Figure DMP 11. Where constraints indicate there is no suitable location for the blades adjacent to the road, they will be loaded directly on a transport and moved to a temporary storage location on site, such as a nearby hardstand.

- Nacelle to be dismounted, set on transport frame, and loaded straight to trailer, where possible
- Top and bottom tower to be loaded directly to transport
- Tower trailers and nacelle trailer are to leave site as a single convoy. A Garda escort may be required and the convoy may have to wait on site for a short period of time e.g. only travelling outside peak periods, travelling from site only during daylight hours
- Blades to be placed in transport frames and loaded accordingly. It is anticipated that a garda escort will be required for this convoy also.
- MV switchgear, power transformers and ancillary equipment from the turbines will be loaded to a small trailer and brought to an existing hardstand near the site compound for safe keeping until they are loaded on trailers and hauled off site.
- Hubs can be loaded in series with small cranage, up to five per load, and can be self-escorted off site.

In order to allow for the 3 blade rotor to be dismounted and the blades placed on the adjacent road verge, vegetation clearance is expected to take place at some turbine locations. Additional vegetation clearance may take place at some turbine locations to allow for the blade set downs. This vegetation clearance shall be carried out by hand. These locations are listed in Table 5 below.

Once turbine components have been removed from site, works shall be carried out at turbine bases and hardstands to level the area and remove any existing steps. Proposed works are shown on figure DMP 12. At the majority of turbines where the foundation insert will remain in full, minor regrading of hardstands and foundations shall be carried out using a tracked excavator. At some locations as noted on figure DMP 13 foundation inserts will be partially or fully removed to allow grading of whole stoned area to provide an even grade without steps. Stone materials shall be excavated from the perimeter of the foundation insert and temporarily stored on the hardstand. The foundation inserts shall then be cut down to final levels and then area will be backfilled and graded. All works shall take place working off existing stoned areas and no disturbance/impact on existing ground external to the stoned areas will occur.

Table 5 Turbines requiring minor scrub clearance

WTG	Clearance works required
2	Yes
5	Yes
12	Yes
13	Yes
18	Yes
19	Yes
20	Yes
23	Yes
26	Yes
29	Yes
32	Yes
35	Yes
43	Yes
51	Yes
52	Yes
62	Yes
65	Yes
66	Yes
67	Yes
68	Yes
69	Yes
71	Yes

Masts: The 2 no. anemometer lattice masts will be split into sections so that the mass of each load will be less than 30 tonnes, and the axle load on the transporters will be limited to a maximum of 12 tonnes/axle so that they can travel on the national road network in Ireland.

Various components and systems are contained within the Vestas V-52 wind turbines in Derrybrien including blade bearings, main bearings, yaw bearings/teeth, gearboxes, generators, hydraulic systems and cooling systems. Each of these components/systems contain lubricating agents such as oils, greases and coolants which are changed/topped up at regular maintenance intervals. Approximate lubrication quantities associated with each component/system(per turbine) are provided below:

Table 6 Approximate quantity of lubricant per component

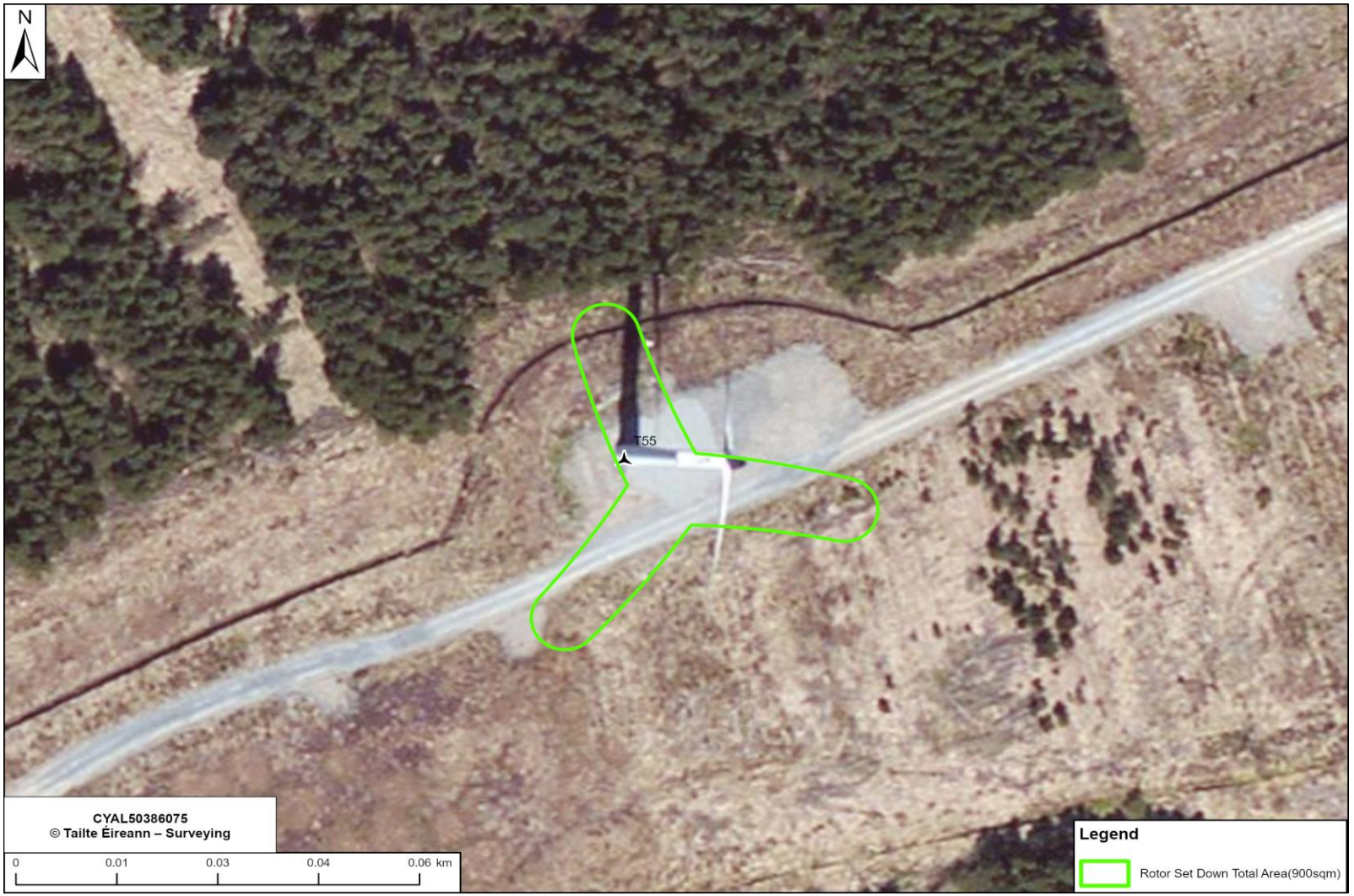
Component/System	Approx. Quantity	Lubricating Agent
Blade Bearings	530g per blade bearing	Grease
Main Bearings (Front & Rear)	400g per main bearing	Grease
Gearbox	175L	Oil
Yaw Bearing	300g	Grease
Yaw Teeth	250g	Grease
Generator Bearings (Front & Rear)	120g per generator bearing	Grease
Hydraulic System	65L	Hydraulic Oil
Coolant System	25L	Coolant

As part of the de-commissioning process in Derrybrien, removal and disposal of the lubricating agents from each wind turbine will be required.

Gearbox and hydraulic oils within the turbines should be drained down and disposed of in accordance with the relevant regulatory guidelines. It is recommended that drain down should be carried out prior to the gearbox and hydraulic system being removed from the turbine. This should be carried out regardless of whether the turbine is being recycled or scrapped.

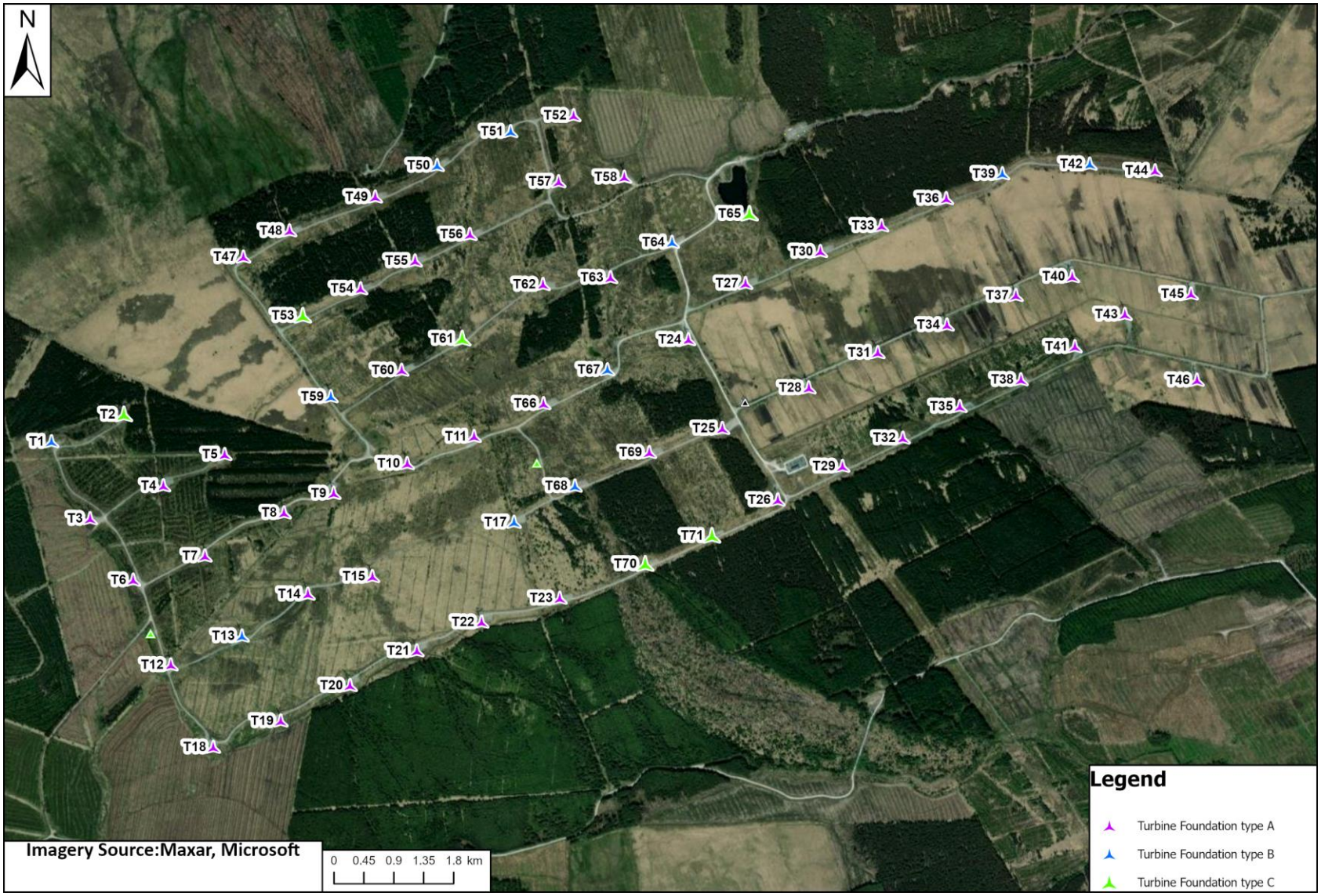
Coolant within the turbines should be drained down and disposed of in accordance with the relevant regulatory guidelines. It is recommended that drain down should be carried out prior to the cooling system being removed from the turbine. This should be carried out regardless of whether the turbine is being recycled or scrapped.

It is recommended that components containing grease lubricants should be removed from turbines and grease should be left in situ and grease inlets/outlets plugged /sealed to aid in preservation of the components.

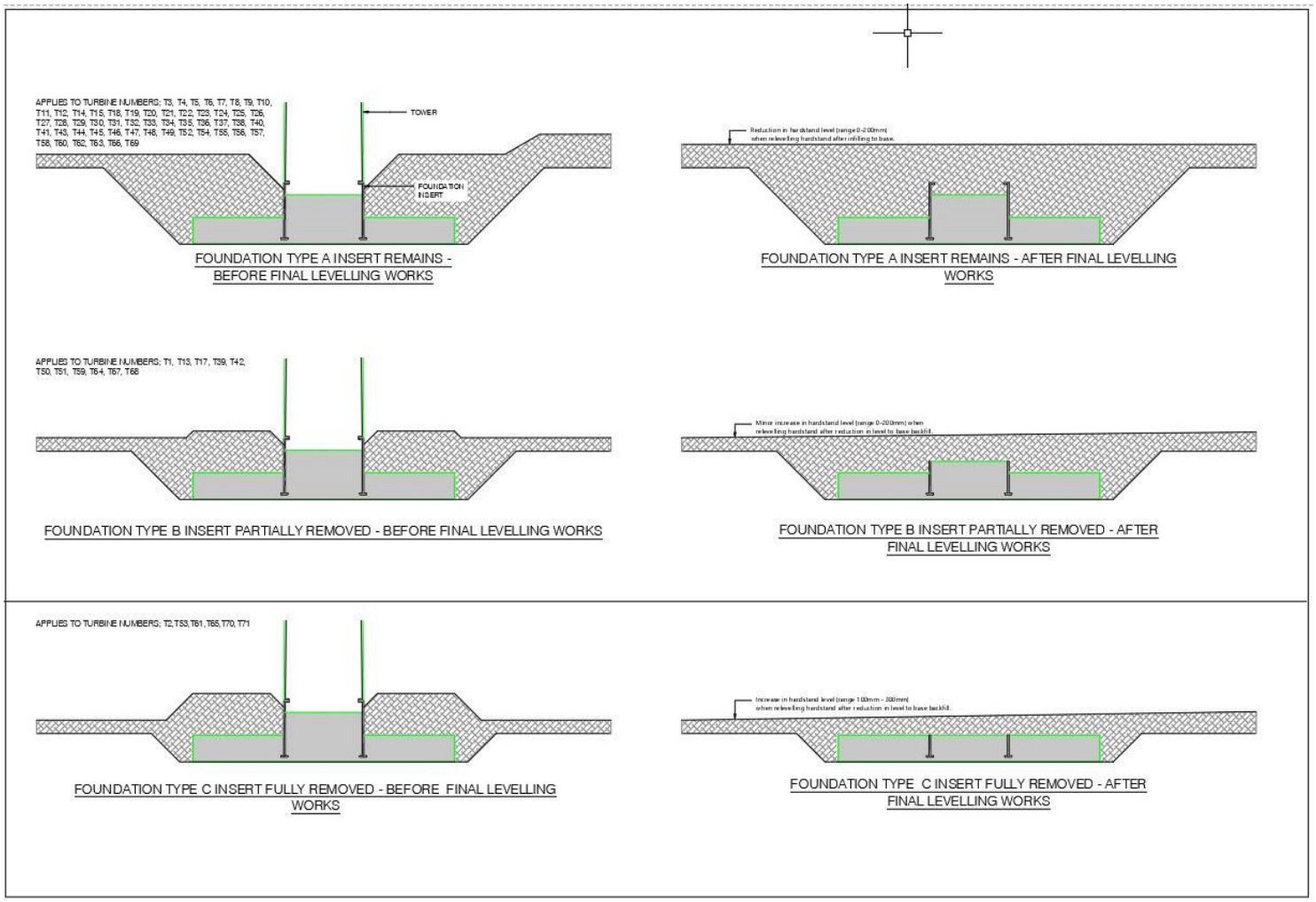


DMP 10 Rotor Set Down Area

DMP 11 Locations for temporary blade storage areas at each turbine



DMP 12 Locations of proposed turbine bases and hardstand works



DMP 13 Turbine Foundations Works

3.5.9 Waste

It is expected the turbines will be sold to a third party and will be transported off site.

If any of the turbines or part of a turbine are unsuitable for re-use then this will be disposed of appropriately with materials being recycled where possible.

Extensive waste categorisation will be in place to ensure the highest possible quality of recycling of the respective categories and to prevent an accumulation of pollutants in the material cycle.

To minimise the generation of waste and waste disposed to landfill, wastes will be managed in accordance with the waste hierarchy and relevant regulatory controls.

During the development, waste will be clearly labelled and segregated on site. Measures will be taken to ensure that wastes cannot blow away.

Housekeeping measures will be followed for the storage of materials to ensure that materials are protected as much as possible

Materials and waste taken off site will be measured and monitored. As a minimum, the following waste management data will be provided:

- Quantity of materials and waste removed from site by type in volume and weight.
- Outcome of the materials and waste on and off site.
- Waste transfer notes.
- Hazardous waste consignment notes.

3.5.10 Third Party Assets

A mobile phone network operator has a cell on the wind farm anemometer mast beside turbine T68 to facilitate phone coverage on site. This mast will be removed from site and if the network operator does not install the cell in another location this may impact the quality of broadband in the area.

There is a 70m high third-party service provider mast (beside turbine T25) which has been present on the site since the 1980s. The mast is located at Easting 559757/Northing 704928. The electricity supply for the instrumentation was via the wind farm supply and an alternative source of energy will be required. It is understood that prior to the supply from the wind farm this was powered by a generator. This is not part of this EIAR assessment.

3.5.11 Methodology for decommissioning the radial cables

Description of the cables:

The 20kv buried cables going to each turbine are Pirelli 20kv A2XS (f) 2Y 95sq which are aluminium XLPE insulated cables and generally 95sq in size but some cable runs have up to 150sq conductor size. The fibre cables are ACOME 1XG657A2 and the

communication cables are made by lapp kabel stuggart unitronic, type L12YCYV (TP) 2X2X0.34.

It is proposed that all sub surface cables are to remain in situ.

Methodology:

Once turbines have been removed all cables exposed on top of the concrete foundation will be cut at top of foundation level. The cables remaining shall be inserted into the upvc ducting to a minimum depth of 300mm below the top of the foundation and then grout shall be placed into the duct to encase the remaining cables and seal the foundation ducting off at top of foundation level

All sections of cables cut will be gathered and transported off-site for disposal and/or recycling in a suitably licensed landfill.

3.6 Derrybrien Substation Decommissioning

3.6.1 High level description of decommissioning

The substation will be decommissioned after the wind turbines have been disconnected. At some stage during or following the decommissioning process the 110kV line will be switched out.

All activities and materials storage will be confined to hardstand areas. Silt fences will be installed on the outlet drain from the substation in case of washout of silt and soil during the decommissioning. One silt fence will be inserted close to the Substation end of the drain.

The high voltage equipment, the substation, and control building will be dismantled, and all equipment removed from site. Before demolition, the building will be inspected for the presence of bats by a suitably qualified and experienced bat ecologist. The demolition works will be carried out under licence from NPWS during the appropriate time of year (as per the steps specified in the bat mitigation strategy) and under supervision by a bat ecologist.

All demolition waste will be removed from the site. SF_6 switchgear from the substation and any oil containing equipment will be carefully removed in compliance with applicable legislation.

The hardstand area for the substation will be left in place after decommissioning.

Components will be reused or recycled where possible. All waste will be managed in accordance with applicable legislation.

3.6.2 Duration

The decommissioning and removal of all equipment is anticipated to take approximately 12 weeks. The removal of the substation building will take approximately 2 weeks.

3.6.3 Site set up

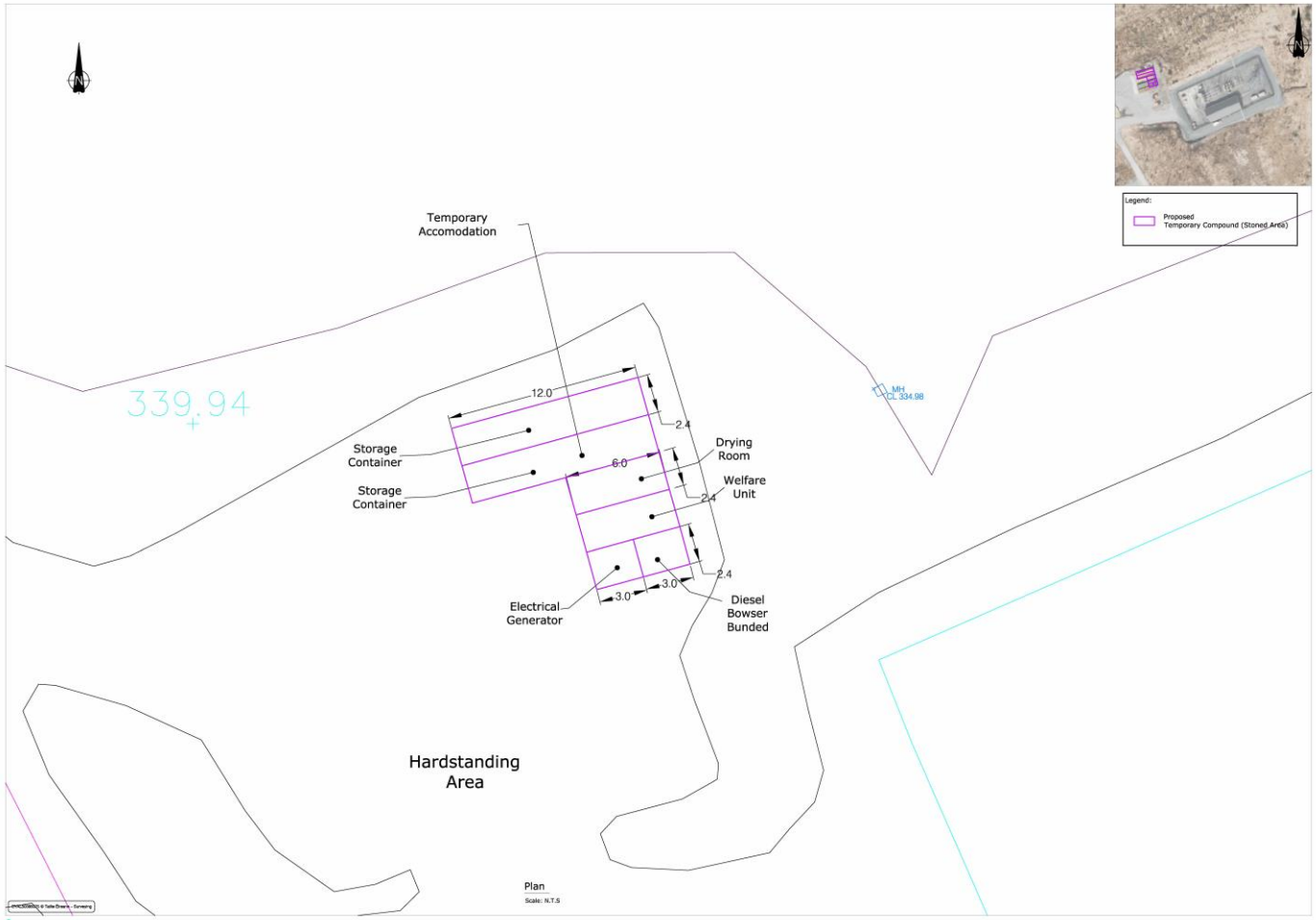
3.6.3.1 Compound

A main compound will already be established at the entrance to the wind farm and the substation decommissioning crew will use it in addition to the substation building whilst a small compound set up is being established at the substation site. Please refer to DMP 14 showing location of temporary substation compound. Therefore, a smaller number of containers will be required at the substation site.

Typical temporary accommodation at Derrybrien substation will consist of:

- 1no. drying room container
- 1no. storage container
- 1no. office/general container
- 1no. Electrical Power Generator + diesel bowser. It is anticipated that electricity will be available through the house supply from the OHL for part of the works
- Self-contained portaloo/portable welfare unit will be serviced and maintained on a regular basis during the construction activities

All portacabins, containers, portaloos and welfare units will be removed upon completion of the works.



DMP 14 Temporary Compound at Derrybrien Substation

3.6.3.2 Water requirements

Drinking water at the substation will be supplied by a proprietary bottled water supplier.

3.6.4 Personnel

Most decommissioning personnel are expected to arrive at the project site in private/developer vehicles. Table 7 identifies the number of expected personnel during the decommissioning phase of the substation.

Table 7 Wind Farm Substation Decommissioning Personnel

Phase & Personnel	Peak Personnel Numbers
Gort Windfarms Ltd. and agents' staff	3
Electrical works contractors (Derrybrien only)	6 to 10
Civil works contractors (Derrybrien only)	6

3.6.5 Plant and abnormal loads

3.6.5.1 Plant

During the decommissioning a range of mechanical plant will be mobilised to the wind farm substation site. This plant will be generally kept on the site and not removed from thesite until it had fulfilled its purpose. The amount and type of plant on site will vary in accordance with the level and type ofactivity on site over the period of decommissioning. The type and number of heavy civil works plant on the site during the peak decommissioning works will comprise:

- Personnel 4- wheel drive vehicles (8)
- Mobile task lighting generator (2)
- MEWPS (2)
- Forklifts/Teleporters (1)
- Hi ab (2)
- Cherry pickers (2)
- Mobile Crane (800ton (1)) and ancillary support vehicles (up to 5 trucks) in once and out once
- Mobile Crane (50ton (1)) and ancillary support vehicles (up to 3 trucks) in once and out once

3.6.5.2 Abnormal loads

Grid transformer:

- 80-tonne step-up power transformer will be transported from site on a specialised circa 30m long multi-axle articulated truck and low-loader transporter

3.6.5.3 Other movements

In addition to the plant listed above, the estimated numbers of vehicles accessing the site during the works (durations indicated in the program) are

- Personal vehicles – up to 6 per day during the dismantling of the transformer.
- HGV vehicles – up to 10 per day to take waste, containers, skips, materials etc.

3.6.6 HV & MV Equipment

A list of main HV & MV equipment in Derrybrien substation is given in Table 8 below.

Table 8 Derrybrien Substation

Item	Voltage	Quantity	Reuse / Recycle
End mast	-	1	Waste
Circuit breaker Siemens 3AP1	110kV	1	Reuse if possible
Current transformer, Arteche	110kV	3	Reuse if possible
Voltage transformer, Arteche	110kV	3	Reuse if possible
Disconnector, Merlin Gerin	110kV	2	Reuse if possible
Power transformer, 70MVA	110/20kV	1	Reuse if possible
Post Insulators	110kV	6	Reuse if possible
Surge arrestors	110kV	3	Reuse if possible
Surge arrestors	20kV	3	Reuse if possible
NER (Neutral Earth Resistor)		1	Reuse if possible
Capacitor banks		2	Reuse if possible
Lightening Mast	-	1	Recycle
House transformer	-	1	Reuse if possible
Diesel generator	-	1	Reuse if possible
Busbar, copper			Recycle
MV switchgear	20kV		Reuse if possible

Item	Voltage	Quantity	Reuse / Recycle
Protection relays	-		Reuse if possible
Capacitor banks	-	2	Reuse if possible

3.6.7 Waste

It is expected the HV & MV equipment will be sold to a third party and will be transported off site.

If any of the equipment or part of the equipment are unsuitable for re-use then this will be disposed of appropriately with materials being recycled where possible.

Extensive waste categorisation will be in place to ensure the highest possible quality of reuse or recycling of the respective categories and to prevent an accumulation of pollutants in the material cycle.

To minimise the generation of waste and waste disposed to landfill, wastes will be managed in accordance with the waste hierarchy and relevant regulatory controls.

During the project, waste will be clearly labelled and segregated on site. Measures will be taken to ensure that wastes cannot blow away.

Housekeeping measures will be followed for the storage of materials to ensure that materials are protected as much as possible

Materials and waste taken off site will be measured and monitored. As a minimum, the following waste management data will be provided:

- Quantity of all materials and waste removed from site by type in volume and weight.
- Waste transfer notes.
- Hazardous waste consignment notes.

The types of waste which will arise during the project comprises

- Domestic waste from the construction compound
- Building material waste from substation including
    - Approx. 58 tonne blockwork
    - Approx. 72 tonne of broken concrete slabs
    - 1 load of Roof tiles
    - Approx. 6 m^3 of Wood - trusses
    - Steel from palisade fences and masts
    - GRP tiles
    - Sanitary/kitchen ware
    - Glass blocks
- Other types of waste including
    - Oils
    - Grease
    - Lead acid batteries

- Plastics
- Porcelain insulators
- Copper
- Aluminium
- Electrical waste such as copper wires/cables, cabinets etc

3.6.8 Methodology

3.6.8.1 Outdoor equipment

The copper droppers from the end masts will be cut and removed manually by crew on MEWPs.

All copper conductors and connectors (copper and/or aluminium) will be removed throughout the substation.

Equipment will be braced for transport, lifted, and disassembled according to the manufacturers' instructions. A hi ab, or other suitable plant, will be used to lift high voltage equipment such as disconnectors, voltage & current transformers, surge arrestors and line traps from their lifting eyes. The equipment will be put into HGVs to transport them off site. For long term storage of equipment, silica gel packs in housing/mech boxes, auxiliary heating and correct positioning shall be considered.

Where materials are not being reused, the waste disposal company involved shall be made aware of SF6 gas, oil contaminated and oil filled equipment to compliantly dispose of this material. In addition, other equipment (Surge Arrester, Line Trap, Line Earth Disconnect) are generally made up of metals (steel, aluminium, copper, brass and metal alloys), porcelain, plastics, greases, silicon and polymers, and ceramics (metal oxide blocks). Engagement with the waste disposal company shall ensure these components and elements are disposed of using the correct route with a view to recycling as much as possible and avoiding landfill.

Oil filled equipment, such as current and voltage transformers, CT and VT, shall be inspected before and after removing from their support steelwork. It is not necessary to remove the oil for transport and they shall be loaded intact on to a bunded platform/trailer and secured for transport. CTs and VTs can be laid horizontally but must be supported to avoid sudden shear force during transport which could cause damage and leakage (for example providing support to the middle of the unit to avoid porcelain dipping and cracking at this midpoint).

A House Transformer can also be loaded without emptying provided the laden weight is not beyond the capability of the transport vehicle and it is secured. The bund being used must also be capable of holding the complete contents of oil from all equipment with an additional margin to avoid spillage. This may require splitting the load for transport.

The loading vehicle shall be capable of lifting the beyond the nameplate rated weight plus a safety margin as dictated by the transport company and considering the max reach of the lifting arm/jib of crane. A single lift is typically performed by HIAB, particularly where equipment is disassembled in sections, however the transport

company shall advise of minimum tolerances and required vehicles where larger loads cannot be broken down to smaller weights. For example, the Siemens 3AP1FG CB is 1500kg which may be loaded by a HIAB rated for this load plus an additional safety margin.

The diesel generator and tank will be removed from site using appropriate transport units.

Earth grid tails will be cut below ground level.

The steel supports for the high voltage equipment will be removed by cutting the anchor bolts, which will be left in place, and lifted with a hi ab.

The 20kV cable will be disconnected from the MV side of the power transformer and from the MV switchgear cubicle and pulled/winched with a cable puller through the ducts.

The lightening towers and end masts will be dismantled using a crane.

Sulphur Hexafluoride (SF6) is used as insulating material in the outdoor Siemens 110 kV circuit breaker (8.10kg SF6) and the two capacitor bank units (2 x0.34kg SF6). SF6 gas filled equipment shall be emptied, i.e. SF6 gas transferred into a suitable cylinder. This requires testing of the SF6 gas quality to ensure the correct cylinder type is used and a review undertaken of the TUV test date of the cylinder (to ensure it is in date). A gas cart is required for this purpose and a log must be kept of SF6 gas quantities/qualities.

Power transformer:

The 80-tonne step-up transformer will be removed from site using a 800 tonne crane and transported from site on a specialised circa 30m long multi-axle articulated truck and low-loader transporter. The area will be regraded to provide a hardstand area for the 800 tonne crane to set up. Any stone require to achieve levels will be hauled from nearby decommissioned hardstands. The transformer will be transported to its final destination in a single supervised and scheduled trip along a defined access route.

The oil will be drained and the transformer tank filled with a positive pressure of dry air for transportation of the transformer. The oil can be stored in the oil road tanker or an external intermediate bulk container, IBC, or other suitable container built for this purpose for later disposal/reuse. If an IBC is used the same requirements for bunding and securing are required for transport as above for oil filled equipment.

Accessories such as bushings, radiators, conservator tank must be removed for transport (after removing oil). The accessories removed shall be packaged and palletised to prevent damage during transport.

If the power transformer is to be re-used some additional care to prevent moisture ingress/deterioration is required. For example: radiators sealed using blanking plates, transformer sealed using blanking plates and filled with slight positive pressure of dry air, bushings lower portion being bagged. In order to preserve the transformer long

term it should be assembled with bushings and conservator and filled under vacuum with oil through an oil filtration plant and stored in a bunded area. All heaters in marshalling and fan boxes should be connected up as well as any silica gel breathers.

3.6.8.2 Indoor equipment

The power and control cables connecting onto the MV switchgear will be disconnected. The MV switchgear will then be unbolted from the floor of the substation building and moved into a transport vehicle. **Sulphur Hexafluoride (SF6)** is used as a quenching material in the circuit breaker of the ten 20 kV switchgear cubicles within the control building. The circuit breaker containing SF6 is labelled and hermetically sealed. SF6 is not removed during the decommissioning of the switchgear.

The lead acid based battery system will be discharged, disconnected from each other, removed by hand and segregated as waste as appropriate. Appropriate safety equipment will be worn when the batteries are being handled e.g. acid-resistant goggles/face shield, gloves, an apron.

All control wiring will be removed from cabinets and the control and protection cabinets will be lifted with the lifting eyes and removed.

All internal fixtures and fittings will be removed, segregated, and disposed of.

3.6.8.3 Civil works

Before demolition, the building will be inspected for the presence of bats by a suitably qualified and experienced bat ecologist. The demolition works will be carried out under licence from NPWS during the appropriate time of year (as per the steps specified in the bat mitigation strategy) and under supervision by a bat ecologist. Where practicable all electrical equipment will be removed from the building and the compound prior to the demolition of the building.

The oil separator will be emptied and flushed out prior to being backfilled with stone. All extracted liquids will be disposed of to a licenced facility. The stone will be sourced from the site.

The sewage treatment plant will be emptied and flushed out prior to being backfilled with stone. All extracted effluent will be disposed of to a licenced facility. The stone will be sourced from the site.

Where practicable, any voids at ground level, such as cable trenches, will be filled with stone reclaimed from site.

The palisade fencing including supports will be removed in sections.

The earth grid will be removed in so far as possible.

Wells to be disconnected and capped, and pumps removed from site.

All internal fixtures and fittings will be removed from the building.

Typical description of works for the demolition of the control building is as follows:

The roof will be removed with the slates and trusses segregated appropriately. The concrete roof/ceiling slabs will be lifted and moved to ground level before being broken up. External blockwork will be removed and cavity insulation segregated from concrete blocks, before demolishing the internal leaf.

4 Decommissioning Derrybrien Wind Farm Grid Connection

4.1 High level description of decommissioning

The OHL poles and mast elements will be removed from site. It is not proposed to replant the route of the overhead line with trees although naturalregrowth of previously felled areas will likely continue.

Destringing of Overhead Line Conductor: Conductor destringing will be carried out. Low pressure tracked plant will be used to access the OHL locations and to pull lines to allow the conductor to be pulled from mast to mast. Where the OHL crosses public roads, temporary goalpost or H frameswill be used to support the conductor etc. over the road so that safe access can be maintained on the public roads.
Foundations will be left in situ and pole sets and masts will be cut off 300mm below ground level. Access routes for decommissioning works have been identified.

4.2 Duration

Estimates for the duration of the decommissioning works are included in Table 9 below. Please note that some of the elements are likely to happen concurrently, therefore the overall start-to-finish duration is estimated to be 9 weeks.

Table 9 Estimated Duration of Works

Element	Estimated Duration
Overhead Line Preparatory Works	18 Working Days
Retire Existing Conductors	15 Working Days
Retire Wooden Pole Set Structures	15 Working Days
Retire Steel Towers Structures	8 Working Days

4.3 Site set up

There will be a mobile welfare unit for each crew. These welfare units feature an integral diesel powered generator, a bathroom facility, drying room, wash station, a seating area, and kitchenette with necessary cooking equipment. There's also hot and cold water. The mobile units will have their own built in water and waste tanks which will be serviced when required.

This unit will be moved along the decommissioning route with the crew as the work progresses. It will be left on the existing forestry road network and will not require additional hardstand to be constructed.

4.4 Personnel

Most decommissioning personnel are expected to arrive at the OHL works' locations in private/developer vehicles. Table 10 identifies the number of expected personnel during the decommissioning phase of the overhead line.

Table 10 Overhead Line Decommissioning Personnel

Phase & Personnel	Peak Personnel Numbers
Gort Windfarms Ltd. and agents' staff	3
OHL crew – 2 crews of up to 5 operatives	10

4.5 Plant

During the decommissioning a small range of mechanical plant will be mobilised to the works location when it is required. This plant will be generally kept on the site, moved from location to location and not removed from thesite until it had fulfilled its purpose. The amount and type of plant on site will vary in accordance with the level and type ofactivity on site over the period of decommissioning. The type and number of heavy civil works plant on the site during the peak decommissioning works will comprise:

- Stringing machine
- Tracked excavator (2)
- Tracked dumpers (2)
- Winch tractor and trailer
- Tirfor ® bond or other suitable alternative
- Drum carrier
- Tractor and diesel bowser (1)
- Tractor and trailer (1)
- Teleporter
- 3 & 4 axle lorries (2)
- Personnel 4- wheel drive vehicles (6)
- Mobile task lighting generator (2)

4.6 Waste/ materials

A waste management company may be appointed for the project and will be responsible for the disposal of materials, waste disposal logistics, compliance with requirements to complete removal and issuing a proof of disposal. The waste management company and the dismantling company will be appropriately monitored by Gort Windfarms Ltd.

Extensive waste categorisation will be in place to ensure the highest possible quality of recycling of the respective categories and to prevent an accumulation of pollutants in the material cycle.

To minimise the generation of waste and waste disposed to landfill, wastes will be managed in accordance with the waste hierarchy and relevant regulatory controls.

During the development, waste will be clearly labelled and segregated on site. Measures will be taken to ensure that wastes cannot blow away.

Housekeeping measures will be followed for the storage of materials to ensure that materials are protected as much as possible

Materials and waste taken off site will be measured and monitored. As a minimum, the following waste management data will be provided:

- Quantity of materials and waste removed from site by type in volume and weight.
- Waste transfer notes.
- Hazardous waste consignment notes.

The wooden pole sets have been treated with creosote and they will be disposed of appropriately. The steel angle masts and cross arms cannot be reused and will be recycled. The porcelain insulators and the conductor are expected to be recycled also.

4.7 Haul route

Access to the overhead line structures is from nearby roads and forestry tracks – see DMP 01 & DMP 02

There is one possible exception to this for access to polesets PS17 – PS22.

An alternative access may be required to Polesets PS17 – PS22 as it transpires that a portion of Coillte track between PS16 & PS17 may traverse private lands. Therefore, it is necessary to review/assess 2 no. alternative access routes in case one of these may be required. Where the alternative access is required it is expected that the access would be required for a maximum of 4 weeks.

Alternative No. 1

This would involve deviating from the Coillte track south of PS16 at point A and taking the alternative route shown in green on DMP 01This would then re-join the Coillte access track at point B where one would continue on the Coillte track just south of AM20 and then follow the fire break to PS21 and track within OHL corridor to PS22. This alternative would cross 2 no. streams and felling some mature forest trees. Streams would be crossed using temporary clear span bridging structures.

Please see DMP 01 in Section 1.2.2

Waste and materials may be stored at the at the wind farm or Agannygal site until a sufficient sized load is reached before being transported off site.

See DMP 07 and DMP 08 detailing HGV haul route for OHL decommissioning works.

4.8 Methodology

4.8.1 Sequence of works

The decommissioning of the 110kV OHL will require a staged sequence of works;

1. Overhead Line preparatory works (Access)
2. Retirement of existing conductor and shieldwire (destringing)
3. Retirement of wooden poleset structures
4. Retirement of steel tower structures.

4.8.2 Preparatory works

The existing forestry access tracks typically comprise a 3m wide track constructed of crushed rock which has been founded on the mineral soil underlying the peat. Minor upgrades/repairs of sections of these tracks may be required.
The following section outlines the methodology to be followed in advance of decommissioning of the existing conductors.

- Temporary access roads will be installed where required.
- Stringing wheels will be installed at each poleset to allow for the retirement of conductors.
- Environmental mitigation measures to be implemented where required.

4.8.3 Access routes to work area

As above, an existing network of roads will be used to access a pole set or an angle mast on the OHL. From there it will be necessary to transport material, plant, and personnel over land. In advance of works along the OHL route the Project Ecologist, Geotechnical Engineer and project contractor will undertake a joint walkover surveys to demarcate agreed access routes and agree detailed approach. This walkover will verify ground conditions at the time of work, including where soft or wet conditions occur to enable advance planning by the contractor to prevent soil damage and erosion during the decommissioning of the OHL. Where very poor and/or soft boggy ground is encountered, it may be necessary to construct a temporary track with mats (wooden, aluminium, EPDM/Duraflex etc) to facilitate access to the overhead line site.

Tracked machines and bog mats may have to be utilised in all areas. In some instances, where the area is dry or damaged through bog cutting, there may be

no need to use these measures. In such an instance, it will be the responsibility of the Project Ecologist to recommend the best practice. Similarly, if conditions are particularly wet/dry, construction measures will have to be implemented to meet these conditions.

Any drain crossings identified during the pre-commencement survey should be traversed using steel plates of log bridges to prevent or at least minimise damage to these and to minimise any associated solids release.

4.8.4 Destringing of existing conductors

The following section outlines the methodology to be followed during decommissioning works of the existing conductors and shieldwire.

- Tension stringing machines will be set up at each angle tower.
- The existing conductor will be winched onto empty drums at one end and a pulling/bond rope will be used from the opposite end to maintain tension on the conductor.
- Once all of the conductors have been coiled on the drums, the pulling/bond rope can be re-wound back to its original position. Guide ropes will be used to maintain tension on the pulling rope.
- Traffic Management will be required on all road crossings during the retirement of conductors in the particular section above those crossings..

4.8.5 Retirement of Wooden Poleset Structures

The existing Derrybrien – Agannygal 110kV OHL consists of 34nr. double pole sets. Each wood pole set consists of 2 nr. wood poles and a steel crossarm.

The following section outlines the methodology to be followed during decommissioning works of the existing wooden poleset structures:

- A tracked dumper and tirfor® hoist, or suitable alternative, will be used to swing the crossarm and fix to a single pole.
- Each pole will be felled using a chainsaw.
- Ground will be hand dug to 300mm surrounding pole to allow for cutting.
- Each pole will be retired to 300mm below ground level.
- Poles will be removed from site using a tracked excavator where possible or cut into smaller pieces and removed with a tracked dumper to the closest hardstand area where materials will be loaded onto a flatbed trailer.
- Works shall be planned to ensure number of vehicle movements across terrain will be kept to a minimum.

4.8.6 Retirement of Steel Tower Structures

The Derrybrien – Agannygal 110kV OHL consists of 2nr. End Towers (EM) 6 nr. Angle Towers (AM) and 1 nr. Intermediate Tower (IM).

The following methodology may be used during decommissioning works of the existing tower structures.

Option 1

- A winch excavator with steel bond will be attached to a fixing point on the tower.
- The front two legs of the tower will be cut halfway through to create a hinge point.
- The back two legs will be cut through and the tower pulled over using the winch tractor.
- Once pulled over the tower will be disassembled manually or using an excavator with shears where possible
- Protruding concrete will be broken to circa 300mm below ground level and removed from site. Concrete foundation below this level will remain in place.

Option 2: If an area cannot be accessed with a winch excavator/tracked dumper due to poor ground the following methodology will be employed

- Linesmen will climb the particular mast to be decommissioned and will work to dismantle the structural members of the mast one by one.
- A light pulley block will be secured to the mast and the selected member for removal. The selected member for removal will be unbolted or cut away from the mast structure.
- The dismantled member will be winched safely to the ground using the pulley system and loaded onto a light weight tracked dumper for disposal.
- The workers will progress through each mast, member by member, in this manner.

Where steel structural members are cast into concrete foundations, steel members will be cut flush with the concrete foundation.

The concrete foundations will be left in place, All removed concrete and steel would be removed to a registered waste disposal facility.

Works shall be planned to ensure number of vehicle movements across terrain will be kept to a minimum.

4.8.7 Water crossing

At INT30 and PS31 suitable sized bog mats or steel plates should be placed over the small streams to allow vehicles to cross over at these points.s.

For access to structures AM 24 and poles sets 23 and 25, at the Owendalulleegh fording point, in the absence of alternative advice from IFI, the fish rescue and protection options outlined here will be implemented in order to prevent or minimise fish mortalities at the fording place: (1) The operation will only take place between July to September (inclusive) and will be planned so that the minimum number of vehicles required will be used and the lowest possible frequency of over-and-back crossings will take place. (2) As narrow a crossing corridor as possible will be used

that will still accommodate the largest vehicle needed for the decommissioning and all traffic will stick to this lane. This will be facilitated by (a) demarcating the lane with red and white marker tape by the Project Ecologist which will be maintained as necessary throughout and (b) only one vehicle at a time will be allowed to cross and at a very slow speed. Steel Plates shall be placed on the river bed, on this crossing corridor to protect the substrate beneath which will also discourage fish swimming in this area. The steel plates will be removed after the operation is completed. The area will be monitored very closely and if required additional drainage measures will be implemented external to river banks to prevent waters from potential plant tracks entering the river at this point.

Immediately prior to works commencing the channel 15 m upstream and downstream of the crossing point will be electrofished (3 repeats) and fish obtained will be removed in oxygenated water and poured back into the river approximately 1 km downstream. .

This approach should reduce to the absolute minimum the number of fish likely to be killed due to crossing.

If there is evidence of ground damage leading to solids washout during heavy rainfall, a French drain will be installed diagonally across the Coillte track 5m north of the crossing point, in order to direct any silt contaminated run-off into the ditch at the side of the track so that it isn't flushed into the river.

5 Agannygal Substation Decommissioning

5.1 High level description of decommissioning

The decommissioning of Agannygal Substation will involve the removal of the above ground elements of the substation and will entail:

- De-energising of the electrical equipment in site
- Removal of sub-station building and equipment

The decommissioning and removal of all equipment is anticipated to take approximately 12 weeks. The removal of the substation building will take approximately 2 weeks.

The hardstand area for the substation and control building will be left in place after decommissioning as will the access road to the site.

The substation and control building will be dismantled from the hardstand area.

Before demolition, the building will be inspected for the presence of bats by a suitably qualified and experienced bat ecologist. The demolition works will be carried out under licence from NPWS during the appropriate time of year (as per the steps specified in the bat mitigation strategy) and under supervision by a bat ecologist.All demolition waste will be removed from the site. Substation equipment will be reused or recycled where possible. SF_6 switchgear from the substationand any oil containing equipment will be carefully removed in compliance with applicable legislation. All waste will be managed in accordance with applicable legislation.

5.2 Duration

The decommissioning and removal of all equipment is anticipated to take approximately 12 weeks. The removal of the substation building will take approximately 2 weeks.

5.3 Site set up

5.3.1 Compound

A temporary site compound will be established on existing stoned hardstand areas. per DMP 15 below. Temporary portacabin accommodation will be located within the construction compound and will consist of offices, welfare facilities, meeting room and toilet facilities for use by construction contractors and owner's representatives. Temporary portacabin structures will be transported to the construction compound complete on flatbed lorries and lifted into position.

Typical temporary accommodation will consist of:

- 2no. office containers

- 1no. canteen containers
- 1no. drying room container
- 2no. storage containers
- 1no. Electrical Power Generator + diesel bowser

Container units will be placed in the compound area or within the substation for the storage of tools and materials during the decommissioning works.

Self-contained portaloos will be provided and will be serviced and maintained on a regular basis during the construction activities.

All portacabins, containers, portaloos and welfare units will be removed upon completion of the works.

5.3.2 Water requirements

Drinking water at the substation will be supplied by a proprietary bottled water supplier.

DMP 15 Temporary Compound at Agannygal Substation

5.4 Personnel

Most decommissioning personnel are expected to arrive at the project site in private/developer vehicles. Table 11 identifies the number of expected personnel during the decommissioning phase of the substation.

Table 11 Wind Farm Substation Decommissioning Personnel

Phase & Personnel	Peak Personnel Numbers
Gort Windfarms Ltd. and agents' staff	3
Electrical works contractors	6 to 10
Civil works contractors	6

5.5 Plant and abnormal loads

5.5.1 Plant

During the decommissioning a wide range of mechanical plant will be mobilised to the wind farm substation site. This plant will be generally kept on the site and not removed from thesite until it had fulfilled its purpose. The amount and type of plant on site will vary in accordance with the level and type ofactivity on site over the period of decommissioning. The type and number of heavy civil works plant on the site during the peak decommissioning works will comprise:

- Personnel 4- wheel drive vehicles (8)
- Mobile task lighting generator (2)
- MEWPS (2)
- Forklifts/Teleporters (1)
- Hi ab (2)
- Cherry pickers (2)
- Mobile Crane (60ton (1)) and ancillary support vehicles (up to 2 trucks) in once and out once

5.5.2 Other movements

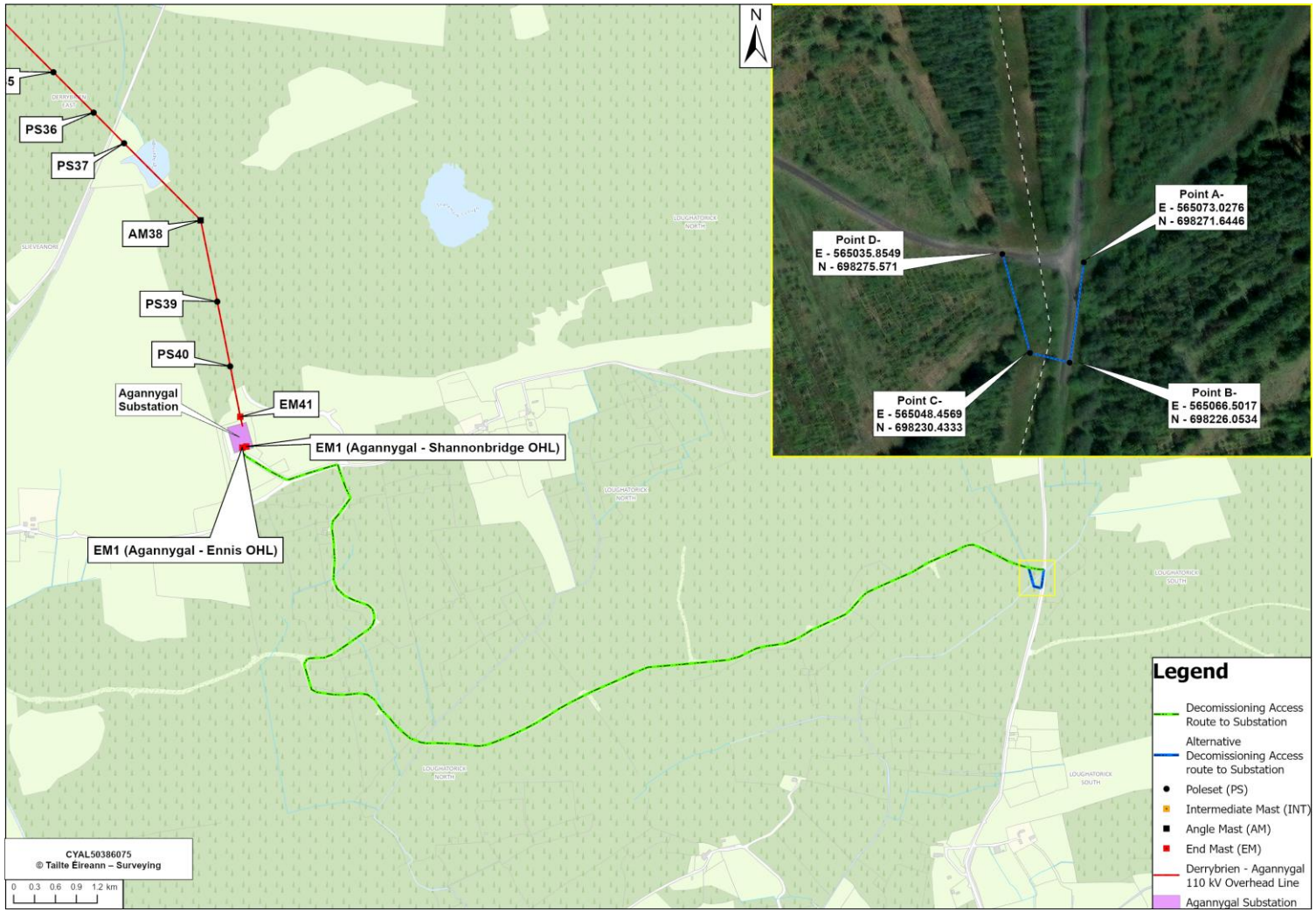
The haul route is shown in DMP 07. Provision must be also made a potential minor deviation to the haul route at the entrance to Coillte track as shown on DMP 16 below. If required this deviation would entail constructing approximately 65m of new track with a new temporary access onto the local public road. The track would be constructed from point D to the stream (by point C) and from the public road to the stream by point C prior to installing a new temporary culvert in the stream, The temporary culvert shall be formed by installing an oversized diameter heavy duty twin

walled plastic pipe into the channel and backfilled with cleaned crushed stone & capped with bog mats. The embankments would be lowered to negate the necessity to ramp the approach track from the public road. Embankments would be reinstated carefully after works have been completed. The exact location of the crossing point will be microsited on the ground to avoid as far as possible impacting on willow or other trees in the area.

Minor Pothole filling works will be required on the existing Coillte track in addition to remediation 1 no. minor culvert crossings.

In addition to the plant listed above, the estimated numbers of vehicles accessing the site during the works (durations indicated in the program) are

- Personal vehicles – up to 16 per day during the dismantling of the turbines.
- HGV vehicles – up to 10 per day to take waste, containers, skips, materials etc.



DMP 16 Agannygal Indicative Decommissioning Access Route

5.6 HV & MV Equipment

A list of main HV & MV equipment in Derrybrien substation is given in Table 12 below.

Table 12 Agannygal Substation

Item	Voltage	Quantity	Reuse / Recycle
End mast	-	3	Waste
Circuit breaker Siemens 3AP1	110kV	3	Reuse if possible
Current transformer, Arteche	110kV	9	Reuse if possible
Voltage transformer, Arteche	110kV	9	Reuse if possible
Disconnector, Merlin Gerin	110kV	6	Reuse if possible
Post Insulators	110kV	6	Reuse if possible
Surge arrestors	110kV	9	Reuse if possible
Lightening Mast	-	2	Recycle
House transformer	-	1	Reuse if possible
Diesel generator	-	1	Reuse if possible
Busbar, copper			Recycle
Protection relays	-		Reuse if possible

5.7 Waste

A waste management company may be appointed and will be responsible for the disposal of materials, waste disposal logistics, compliance with requirements to complete removal and issuing a proof of disposal. The waste management company and the dismantling company will be appropriately monitored by Gort Windfarms Ltd.

It is expected the HV equipment will be sold to a third party and will be transported off site.

If any of the equipment or part of the equipment are unsuitable for re-use then this will be disposed of appropriately with materials being recycled where possible.

Extensive waste categorisation will be in place to ensure the highest possible quality of reuse or recycling of the respective categories and to prevent an accumulation of pollutants in the material cycle.

To minimise the generation of waste and waste disposed to landfill, wastes will be managed in accordance with the waste hierarchy and relevant regulatory controls.

During the project, waste will be clearly labelled and segregated on site. Measures will be taken to ensure that wastes cannot blow away.

Housekeeping measures will be followed for the storage of materials to ensure that materials are protected as much as possible

Materials and waste taken off site will be measured and monitored. As a minimum, the following waste management data will be provided:

- Quantity of materials and waste removed from site by type in volume and weight.
- Waste transfer notes.
- Hazardous waste consignment notes.

The types of waste which will arise during the project comprises

- Domestic waste from the construction compound
- Building material waste from substation including
    - Approx. 58 tonne blockwork
    - Approx. 72 tonne of broken concrete slabs
    - 1 load of Roof tiles
    - Approx. 6 m^3 of Wood - trusses
    - Steel from palisade fences and masts
    - GRP tiles
    - Sanitary/kitchen ware
    - Glass blocks
- Other types of waste including
    - Oils
    - Grease
    - Lead acid batteries
    - Plastics
    - Porcelain insulators
    - Copper
    - Aluminium
    - Electrical waste such as copper wires/cables, cabinets etc

5.8 Methodology

5.8.1 Outdoor equipment

The copper droppers from the end masts will be cut and removed manually by crew on MEWPs.

All copper conductors and connectors (copper and/or aluminium) will be removed throughout the substation. The tubular busbar will be removed with a Hiab.

Equipment will be braced for transport, lifted and disassembled according to the manufacturers' instructions. A hi ab, or other suitable plant, will be used to lift high voltage equipment such as disconnectors, voltage & current transformers, surge arrestors and line traps from their lifting eyes. The equipment will be put into HGVs

to transport them off site. For long term storage of equipment, silica gel packs in housing/mech boxes, auxiliary heating and correct positioning shall be considered.

Where materials are not being reused, the waste disposal company involved shall be made aware of SF6 gas, oil contaminated and oil filled equipment to compliantly dispose of this material. In addition, other equipment (Surge Arrester, Line Trap, Line Earth Disconnect) are generally made up of metals (steel, aluminium, copper, brass and metal alloys), porcelain, plastics, greases, silicon and polymers, and ceramics (metal oxide blocks). Engagement with the waste disposal company shall ensure these components and elements are disposed of using the correct route with a view to recycling as much as possible and avoiding landfill.

Oil filled equipment, such as current and voltage transformers, CT and VT, shall be inspected before and after removing from their support steelwork. It is not necessary to remove the oil for transport and they shall be loaded intact on to a bunded platform/trailer and secured for transport. CTs and VTs can be laid horizontally but must be supported to avoid sudden shear force during transport which could cause damage and leakage (for example providing support to the middle of the unit to avoid porcelain dipping and cracking at this midpoint).

A House Transformer can also be loaded without emptying provided the laden weight is not beyond the capability of the transport vehicle and it is secured. The bund being used must also be capable of holding the complete contents of oil from all equipment with an additional margin to avoid spillage. This may require splitting the load for transport.

The loading vehicle shall be capable of lifting the beyond the nameplate rated weight plus a safety margin as dictated by the transport company and considering the max reach of the lifting arm/jib of crane. A single lift is typically performed by HIAB, particularly where equipment is disassembled in sections, however the transport company shall advise of minimum tolerances and required vehicles where larger loads cannot be broken down to smaller weights. For example, the Siemens 3AP1FG CB is 1500kg which may be loaded by a HIAB rated for this load plus an additional safety margin.

The diesel generator and tank will be removed from site using appropriate transport units.

Earth grid tails will be cut below ground level.

The steel supports for the high voltage equipment will be removed by cutting the anchor bolts, which will be left in place, and lifted with a hi ab.

The 20kV cable will be disconnected from the MV side of the power transformer and from the MV switchgear cubicle and a pulled/winched with a cable puller through the ducts.

The lightening towers and end masts will be dismantled using a crane.

Sulphur Hexafluoride (SF6) is used as insulating material in the outdoor Siemens 110 kV circuit breaker (8.10kg SF6) and the two capacitor bank units (2 x0.34kg SF6). SF6 gas filled equipment shall be emptied, i.e. SF6 gas transferred into a suitable cylinder. This requires testing of the SF6 gas quality to ensure the correct cylinder type is used and a review undertaken of the TUV test date of the cylinder (to ensure it is in date). A gas cart is required for this purpose and a log must be kept of SF6 gas quantities/qualities in case of audit.

5.8.2 Indoor equipment

The lead acid based battery system will be discharged, disconnected from each other, removed by hand and segregated as waste as appropriate. Appropriate safety equipment will be worn when the batteries are being handled e.g. acid-resistant goggles/face shield, gloves, an apron.

All control wiring will be removed from cabinets and the control and protection cabinets will be lifted with the lifting eyes and removed.

All internal fixtures and fittings will be removed, segregated, and disposed of.

5.8.3 Civil works

Before demolition, the building will be inspected for the presence of bats by a suitably qualified and experienced bat ecologist. The demolition works will be carried out under licence from NPWS during the appropriate time of year (as per the steps specified in the bat mitigation strategy) and under supervision by a bat ecologist.

Where practicable all electrical equipment will be removed from the building and the compound prior to the demolition of the building.

The sewage treatment plant will be emptied and flushed out prior to being backfilled with stone. All extracted effluent will be disposed of to a licenced facility. The stone will be sourced from the site.

Where practicable, any voids at ground level, such as cable trenches, will be filled with stone reclaimed from site.

The palisade fencing including supports will be removed in sections.

The earth grid will be removed in so far as possible.

Wells to be disconnected and capped, and pumps removed from site.

All internal fixtures and fittings will be removed from the building.

Typical description of works for the demolition of the control building and IPP building is as follows:

The roof will be removed with the slates and trusses segregated appropriately. The concrete roof/ceiling slabs will be lifted and moved to ground level before being broken up. External blockwork will be removed and cavity insulation segregated from concrete blocks, before demolishing the internal leaf.

6 Ennis-Shannonbridge Line reinstatement

Following the decommissioning of the wind farm the Ennis-Shannonbridge 110kV Overhead Line will be reinstated, involving mid span joints and conductoring of the OHL, bypassing the existing Agannygal 110kV Substation.

Refer to DMP 17 Ennis-Shannonbridge OHL Reinstatement Works)

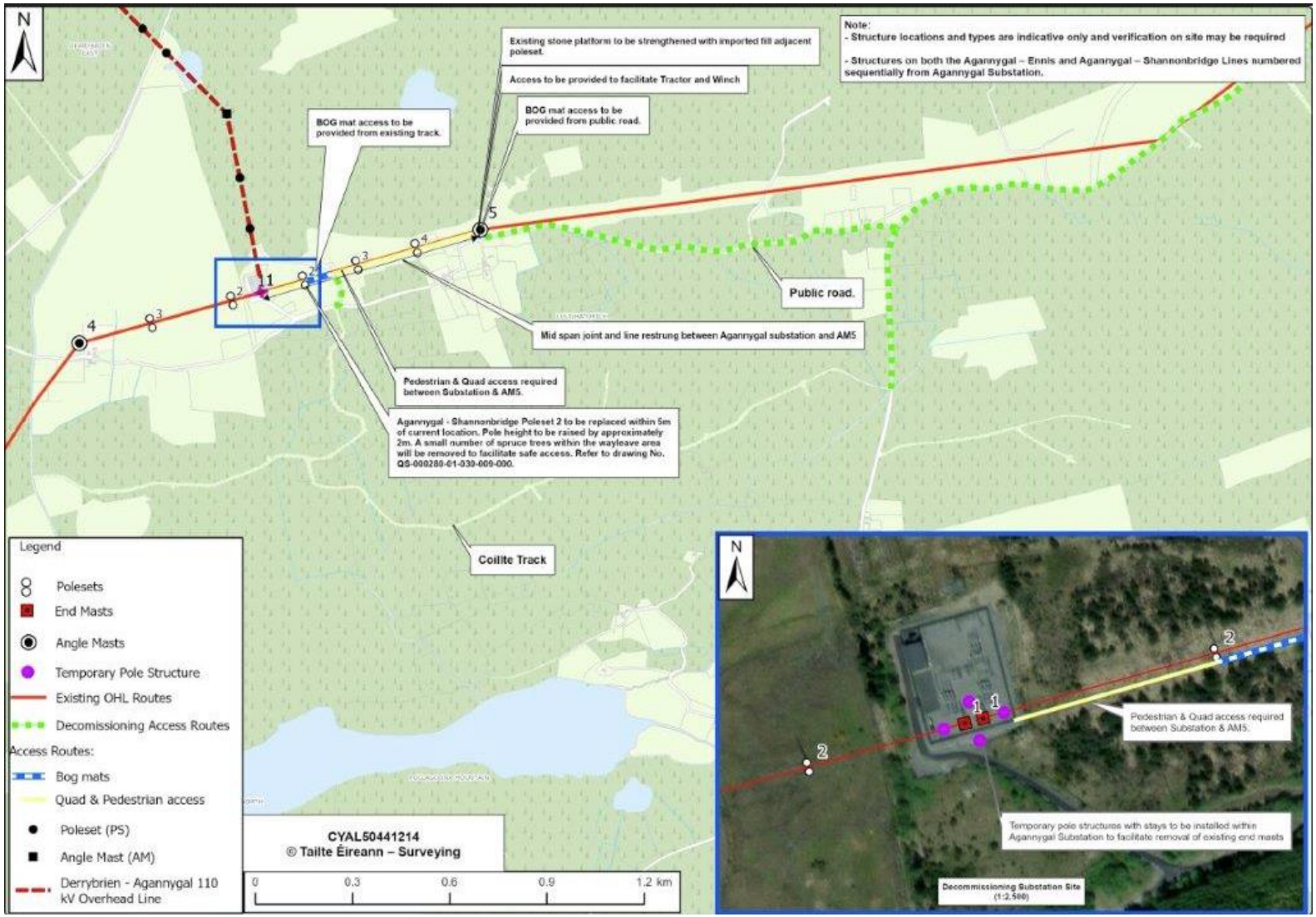
Access to Angle Mast 5, AM5, east of substation will be provided by laying bog mats from the public road to the angle mast area. The existing stone platform will be strengthened with imported fill. An excavator will be utilised to lay bog mats and place imported fill. Access will then be available for tractor & winch.

Access to Poleset No. 2 east of substation will be provided by laying bog mats from the existing forest track. Poleset No. 2 (east of substation) will be replaced with a new pole approximately 2m higher than existing pole. A Tracked excavator will be utilised during laying of bog mats and installation of new poleset. If necessary, a small number of spruce trees within the wayleave area will be removed to facilitate safe access.

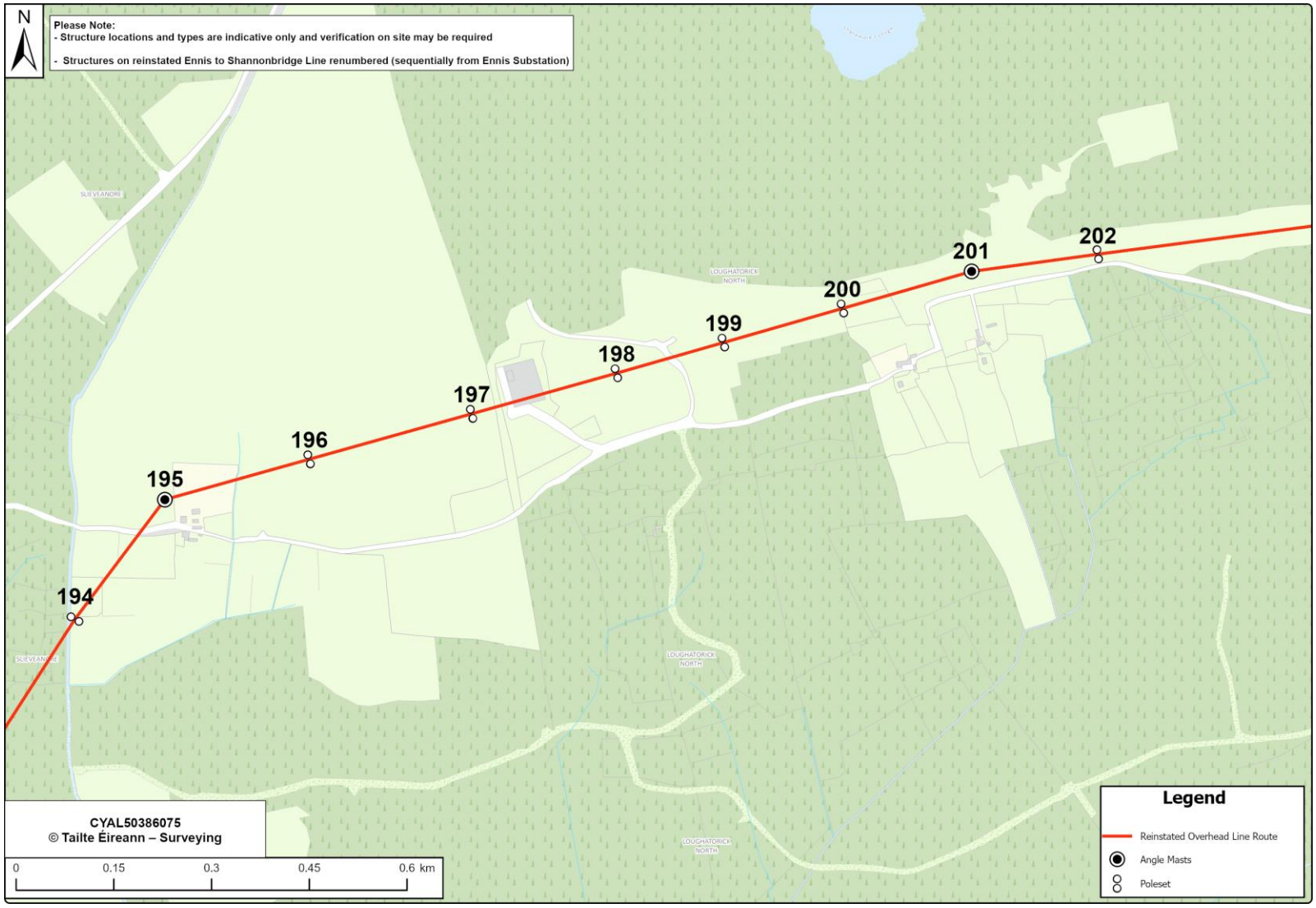
Access to the existing Agannygal substation will be via route shown on drawing. A temporary structure will be installed in the existing hardstand area to facilitate removal of existing end masts. An excavator, teleporter and a crane will be utilised to carry out works.

Stringing equipment utilised will comprise 4x4 vehicles, puller – tensioners, teleporters, stringing wheels, conductor drums, compressor & head, transit vans, chains and other small tools, drum stands and drum carriers. It is estimated that the work would take 6 weeks to undertake.

Upon completion of the reinstatement works the final arrangement can be seen on DMP 18 Post Decommissioning :Reinstated Ennis – Shannonbridge OHL



DMP 17 Ennis-Shannonbridge OHL Reinstatement Works



DMP 18 Post Decommissioning :Reinstated Ennis – Shannonbridge OHL

APPENDIX 4-3

OUTLINE CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN

Planning and Environmental Consultants

Construction and Environmental Management Plan

Derrybrien Wind Farm Decommissioning Project

DOCUMENT DETAILS

Client:	**Gort Windfarms Ltd**
Project Title:	**Derrybrien Wind Farm Decommissioning Project**
Project Number:	**220437**
Document Title:	**Construction and Environmental Management Plan**
Document File Name:	**CEMP F – 2025.04.25 - 220437**
Prepared By:	**MKO** **Tuam Road** **Galway** **Ireland** **H91 VW84**

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1. INTRODUCTION

This Construction and Environmental Management Plan (CEMP) has been developed by MKO on behalf of Gort Windfarms Ltd who intend to apply to An Bord Pleanála for planning permission to decommission the existing Derrybrien Wind Farm, and associated infrastructure, including the existing Derrybrien wind farm, the Derrybrien 110kV substation, 110kV grid connection, and the existing 110kV Agannygal substation in the eleven townlands of Coppanagh, Boleyneendorrish, Kilbeg, Toormacnevin, Funshadaun, Bohaboy, Derrybrien North, Derrybrien East, Derrybrien West, Derreennamucka, and Loughatorick North, County Galway (the Prospective Development).

The CEMP has been prepared in conjunction with the Environmental Impact Assessment Report (EIAR) and the Natura Impact Statement (NIS) which will accompany the planning application for the Prospective Development to be submitted to An Bord Pleanála. In addition, the Project also comprises the retention in situ of at-ground and below-ground structures such as turbine and other foundations; development associated with historic peat slide events that occurred during construction such as barrages, peat repositories, on-site borrow pits/quarries etc ('the Retained Development') and an application has been made simultaneously, under section 177E of the 2000 Act, for substitute consent (which application is accompanied by, inter alia, a remedial Environmental Impact Assessment Report [rEIAR]).

Should the project secure planning permission, the CEMP will be updated, in line with all conditions and obligations which apply to any grant of permission. The CEMP should be read in conjunction with the EIAR, NIS and planning drawings. This CEMP is a key contract document which the Contractor will be legally required to implement. The CEMP due to its structure and nature will also require constant updating and revision throughout the construction period where required under any planning condition. Therefore, this is a working document and will be developed further prior to and during the construction works of the Prospective Development.

Triggers for amendments to the CEMP will include:

- When there is a perceived need to improve performance in an area of environmental impact.
- As a result of changes in environmental legislation applicable and relevant to the project.
- Where the outcomes from auditing establish a need for change.
- Where Work Method Statements identify changes to a construction methodology to address high environmental risk.
- As a result of an incident or complaint occurring that necessitates an amendment.
- Any amendments will be in full compliance with the planning consent and mitigation measures as presented in the EIAR, NIS and all other relevant planning documents.

This report provides the environmental management framework to be adhered to during the Prospective Development and it incorporates the mitigating principles to ensure that the work is carried out in a way that minimises the potential for any environmental impacts to occur.

This report is intended as a single consolidated point of reference relating to all decommissioning, environmental and drainage requirements for the Planning Authority, developer and contractors alike.

1.1 Scope of the Construction and Environmental Plan

This report is presented as a guidance document for the decommissioning of the existing Derrybrien Wind Farm Development. Where the term 'site' is used in the CEMP it refers to all works associated

with the Prospective Development. The CEMP outlines clearly the mitigation measures and monitoring proposals that will be adhered to in order to complete the works in an appropriate manner.

The report is divided into nine sections, as outlined below:

- Section 1 provides a brief introduction as to the scope of the report.
- Section 2 outlines the Site and Project details, detailing the targets and objectives of this plan along with providing an overview of methodologies that will be adopted throughout the project.
- Section 3 sets out details of the environmental controls to be implemented on site. Site drainage measures, peat stability measures and a waste management plan are also included in this section.
- Section 4 sets out a fully detailed implementation plan for the environmental management of the project outlining the roles and responsibilities of the project team.
- Section 5 outlines the Emergency Response Procedure to be adopted in the event of an emergency in terms of site health and safety and environmental protection.
- Section 6 consists of a summary table of all mitigation proposals to be adhered to during the Prospective Development.
- Section 7 consists of a summary table of all monitoring requirements and proposals to be adhered to during the Prospective Development.
- Section 8 sets out a programme for the timing of the works.
- Section 9 outlines the proposals for reviewing compliance with the provisions of this report.

2. SITE AND PROJECT DESCRIPTION

2.1 Site Location

The site is located in the northern part of the Slieve Aughty Mountains, approximately 11 km due south of Loughrea, 12.7 km northeast of Gort and 24km west of Portumna, Co. Galway. The approximate location for the centre of the site in Irish Transverse Mercator (ITM) is X 559599, Y 705169. The site covers an area of approximately 344.5 hectares in total.

The Prospective Development comprises of the decommissioning, dismantling, and removal of 70 No. wind turbines (existing), 2 No. anemometer lattice masts, removal of electrical equipment from Derrybrien substation and demolition of substation building and wind farm control building, decommissioning and removal of the Derrybrien Wind Farm grid connection comprising Derrybrien-Agannygal 110 kV Overhead Line (7.8 km) and 110kV Agannygal Substation connecting into the Ennis-Shannonbridge 110 kV Overhead Line, and reconnection of the existing Ennis-Shannonbridge 110 kV Overhead Line. It is proposed that turbine foundation and site roads will remain in-situ. The site location context is shown in Figure 2-1 and Figure 2-2 below.

Access to the site for construction traffic and for the removal of turbine components will be via the current existing entrance from the Coillte access road in the townlands of Bohaboy, Funshadaun and Coppanagh, via a minor public road known as the Black Road (approximately 3.1 km from the wind farm to the Black Road/Coillte junction). Access to the Black Road is via the R353 Regional Road, which originates near Portumna, passes over Flaggy Bridge before passing through the village of Derrybrien to join the N66 Loughrea - Gort National Secondary Road near Gort. From Gort the Black Road is accessed via the N66 for a distance of 1.7 km and the R353 for a distance of 14km. Alternatively, the Black Road /Coillte access road can be accessed via minor public roads from Loughrea a distance of approximately 10km.

A full and detailed description of the Prospective Development for the purposes of the planning application and the additional elements that form part of the overall project, assessed in the EIAR, is contained in Chapter 4 of the EIAR.

The townlands within the Prospective Development and ancillary infrastructure are located are listed in Table 2-1 below.

Table 2-1 Townlands within which the Prospective Development is Located.

Element of Prospective Development	Townland
Wind turbines, site access roads	Toormacnevin, Boleyneendorrish, Derrybrien West, Derrybrien North, Bohaboy, Funshadaum, Coppanagh, Kilbeg
Windfarm substation, control building and associated compound	Derrybrien North
Meteorological masts and associated compounds	Boleyneendorrish, Derrybrien North
Grid Connection and temporary access roads	Derrybrien North, Derrybrien East, Derreennamucka, Loughatorick North
Agannygal Substation	Loughatorick North

2.2 Description of the Development

2.2.1.1 Enabling Works to facilitate the decommissioning of the Derrybrien Wind Farm

Enabling works will be undertaken at the Derrybrien Wind Farm site to facilitate the decommissioning, dismantling and removal of the Derrybrien Wind Farm. The enabling works will include the following:

- Establish temporary compounds for contactors. 3 no. temporary site compounds and hardstand areas will be re-established at the Derrybrien Wind Farm site and the Agannygal Substation.
- Vegetation, scrub clearance and minor leveling works at existing hardstand areas and access tracks. Waste arising from enabling works is expected to comprise vegetation, rubble and gravel. Any clean material that cannot be reused on site will be removed by licenced waste carriers and sent for reuse at another local development site, recycled into secondary aggregate or sent for disposal at appropriately licenced facilities.
- Minor improvements to existing access tracks: The existing forestry access tracks typically comprise a 3m wide track constructed ofcrushed rock which has been founded on the mineral soil underlying the peat. Minor upgrades of sections of these tracks may be required. It is envisaged that the improvement works will include filling potholes and localised widening where necessary. Temporary widening of the turbary road and certain sections of turning heads may also be required to provide safe access to the mobile crane that will be used to dismantle the turbines. 1 No. 10m long turning area at Turbine No.4 is required to facilitate access and it is proposed to remain in place post decommissioning.

2.2.2 Decommissioning Derrybrien Wind Farm and associated auxiliary components.

The decommissioning works will include the removal of the above ground structures only, leaving the access tracks, hard stands, wind turbine foundations, underground LV cables, meteorological mast foundations and substation foundations in situ. Wind turbine foundations will be left in-situ and will be covered with a layer of topsoil/peat and reseeded with an appropriate wild native seed mix. No bog rehabilitation or active drain blocking are proposed to be carried out, and the existing drainage network would be left to naturally rehabilitate. Access tracks, borrow pits, onsite peat repositories and hardstands would also be left in place. No replanting of forest would occur although some natural regrowth would be likely. Decommissioning of the Derrybrien Wind Farm is expected to be approximately 24 months. The decommissioning works associated will include the following:

- De-energising of the site, which will involve initial disconnection of turbines, low voltage (LV) components followed by disconnection of high voltage (HV) elements;
- Temporary widening of the Turbary Road and certain sections of turning heads;
- Controlled dismantling of 70 no. turbines (blades, nacelle, and tower) and 2no. anemometer lattice masts;
- Controlled removal of electrical equipment from Derrybrien Substation and demolition of substation building.

Dismantling and decommissioning of 70 no. turbines and 2 no. anemometer lattice masts:

The 70 no. turbines and 2 no anemometer masts will be dismantled by mobile cranes operating on the adjacent hardstand areas, which are designed to support the crane loads.

It is not proposed to carry out any remediation works on any of the elements of the wind farm that will be left in place after decommissioning. Turbine foundations will be left in place. Once the turbines are removed, the foundations will be infilled and reprofiled to match adjoining areas.

It may be necessary to carry out temporary road widening works along the narrow (approx. 3 metres) road between Turbines T31 and T45 to provide safe access for the mobile crane that will be used to dismantle the turbines. If this is required, then the roads will be widened temporarily using a combination of steel plates, timber and/or bog mats, as necessary to provide adequate edge support to the wheels of the crane without significantly increasing the loads on the peat as outlined in section 3 of the Decommissioning Management Plan.

Specialist trucks and low-loader transporters will be required to remove the heavy and oversize components of the turbines from the site. The mass and length of the main turbine components are as follows for the Vestas V52/850 turbine: Nacelle (22 tonnes), 26m Rotor Blades (1.9 tonnes), Tower sections (base tower 29.9 tonnes, top tower 20.5 tonnes)) and 49m Mast (55 tonnes).

The 2 no. anemometer lattice masts will be split into sections so that the mass of each load will be less than 30 tonnes, and the axle load on the transporters will be limited to a maximum of 12 tonnes/axle so that they can travel on the national road network in Ireland. Wind turbines and components will be reused or recycled where possible.

Controlled removal of electrical equipment from Derrybrien substation and demolition of substation building:

The Derrybrien substation and control building will be dismantled and demolished. Before demolition, the building will be inspected for the presence of bats by a suitably qualified and experienced bat ecologist. The demolition works will be carried out under licence from NPWS during the appropriate time of year (as per the steps specified in the bat mitigation strategy) and under supervision by a bat ecologist. Demolition of the control building will be carried out on the hardstand areas with mechanical demolition equipment and hydraulic breakers being required for the reinforced concrete foundations. There will be no blasting on the site. The 80-tonne step-up transformer will be removed from site on a specialised articulated truck and low-loader transporter. All demolition waste will be removed from the site for treatment and disposal by an appropriately licensed contractor. Sulphur hexafluoride (SF_6) switchgear from the substation and any oil containing equipment will be carefully removed in compliance with applicable legislation and disposed of appropriately. All waste generated will be managed in accordance with applicable legislation.

On completion of the works, the wind farm site will be free of all above ground structures. All sub-surface infrastructure (including ducting), hardstand areas and the internal road network will remain in-situ. Locations of works will be infilled and reprofiled to match adjoining areas . It is not proposed to replant the wind farm site with trees although natural regrowth of previously felled areas will likely continue.

The following main elements of the wind farm will be left in place after decommissioning:

- Reinforced concrete foundations for 70no. wind turbines.
- Reinforced concrete foundations of structures within the Derrybrien Substation compound.
- Reinforced concrete foundations of 2no. Anemometer masts.
- Approximately 17.5km of access tracks and 70no. hardstand areas.
- Direct buried underground electrical and communications cabling.
- 3no. Borrow Pits / Quarries.
- Naturalised Peat Repository areas.
- Onsite Drainage Infrastructure.
- The third-party mast will remain in situ but the electricity supply to the site will be disconnected.

2.2.3 Decommissioning Derrybrien Wind Farm Grid Connection

The decommissioning and removal of the Derrybrien Wind Farm Grid Connection is anticipated to take approximately 20 weeks. The decommissioning works will include:

- Destringing of the overhead Line conductor
- Removal of the overhead line infrastructure (34 no. double wood pole structures and 8 no. masts)
- Controlled removal of Agannygal substation and demolition of control building
- Controlled removal of standby generator (bunded) and diesel tank, external lighting poles, lightning mast
- Removal of palisade fencing surrounding the Agannygal substation
- Reinstatement of the Ennis-Shannonbridge 110kV Line.

Destringing of Overhead Line Conductor: Access routes for decommissioning the OHL have been identified in the Decommissioning Management Plan subject to detailed design. The Decommissioning Management Plan has been included in **Appendix 4.2**. All-terrain vehicles (ATV) will be used to access the Overhead Line (OHL) locations. Conductor destringing will be carried out and ATV's will be used to pull lines to allow the conductor to be pulled from mast to mast. Where the OHL crossed public roads, temporary goalpost or H frames will be used to support the conductor etc. over the road so that safe access can be maintained on the public roads.

Removal of Overhead Line infrastructure: Access routes for decommissioning the OHL's have been identified subject to detailed design. The overhead line (OHL) will be decommissioned and will entail the removal of the OHL infrastructure between the Derrybrien substation and Agannygal substation. During the removal of the overhead line all polesets and masts will be cut at base. The OHL poles and mast elements will be removed from site for disposal by an appropriately licensed contractor. On completion of the works, the route of the overhead line and the Agannygal substation site would be free of all above ground structures. Any disturbed areas would be reinstated with topsoil/peat to match the ground levels of the surrounding area.

Decommissioning of Agannygal Substation: The decommissioning of Agannygal Substation will involve the removal of all above ground elements of the substation. The works will entail the de-energising of the electrical equipment and the removal of sub-station from site by an appropriately licensed contractor. The substation equipment will be reused or recycled where possible. All waste will be managed in accordance with applicable legislation. On completion of the works, no above ground structures associated with the Agannygal substation will remain at the site. The palisade fencing surrounding the substation will be dismantled and removed from site. The reinforced concrete base for the substation will be left in-situ as will the access road to the site.

Reinstatement of the Ennis-Shannonbridge 110 kV Line: When the Derrybrien-Agannygal 110 kV Overhead Line is removed, reinstatement of the Ennis-Shannonbridge 110kV Overhead Line will be required. These works will involve the re-conductoring of the OHL span at Agannygal Substation. The full section of line between angle masts will be wheeled and re-tensioned (approximate length 1.3km). Stringing equipment will comprise 4x4 vehicles, tensioners, teleporters, stringing wheels, conductor drums, compressor & head, transit vans, chains and other small tools, drum stands and drum carriers. It is estimated that this work would take less than a month to undertake. On completion of the work, the Derrybrien-Agannygal 110 kV Overhead Line will be removed and the Ennis-Shannonbridge 110kV Overhead Line will be reinstated.

On completion of the works, the route of the overhead line and the Agannygal substation site would be free of all above ground structures. Any disturbed areas would be reinstated. The OHL poles and mast elements will be removed from site by an appropriately licensed contractor and in accordance with the

relevant legislation. The reinforced concrete bases will remain in-situ. Tree replanting is not proposed although natural regrowth of previously felled areas will likely continue.

The layout of the Prospective Development is shown on Figure 2-1 and 2-2.

2.3 Targets and Objectives

The Prospective Development works are designed to approved standards, which include specified standards, specifications and codes of practice. The design of the project has considered environmental issues and this is enhanced by the works proposals.

The key site targets are as follows;

- Ensure decommissioning and construction works and activities are completed in accordance with mitigation and best practice approach presented in the EIAR, NIS and associated planning documentation;
- Ensure decommissioning and construction works and activities are completed in accordance with all planning documents for the development;
- Ensure decommissioning and construction works and activities have minimal impact/disturbance to local landowners and the local community;
- Ensure decommissioning and construction works and activities have minimal impact on the natural environment;
- Adopt a sustainable approach to decommissioning and construction; and,
- Provide adequate environmental training and awareness for all project personnel.

The key site objectives are as follows;

- Using recycled materials, if possible, e.g. excavated stone, overburden and peat material;
- Avoidance of any pollution incident or near miss as a result of working around or close to existing watercourses and having emergency measures in place;
- Avoidance of vandalism;
- Keeping all watercourses free from obstruction and debris;
- Keep impact of decommissioning and construction to a minimum on the local environment, watercourses, and wildlife;
- Correct fuel storage and refuelling procedures to be followed;
- Good waste management and housekeeping to be implemented;
- Air and noise pollution prevention to be implemented;
- Monitoring of the works and any adverse effects that it may have on the environment. Decommissioning and construction Methods and designs will be altered where it is found there is an adverse effect on the environment;
- Comply with all relevant water quality legislation listed throughout this document.

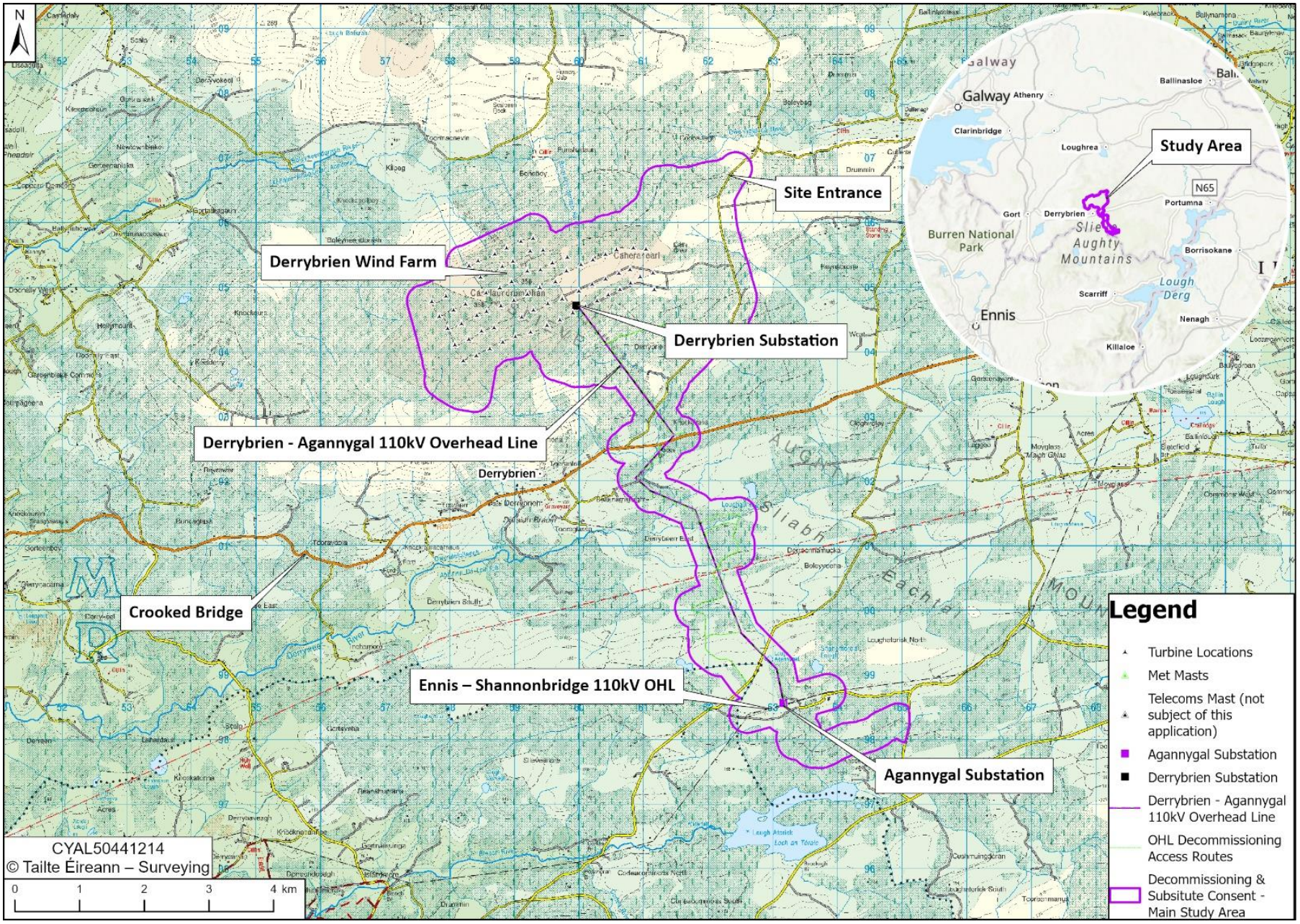

Figure 2-1 Site Location and EIAR Study Area

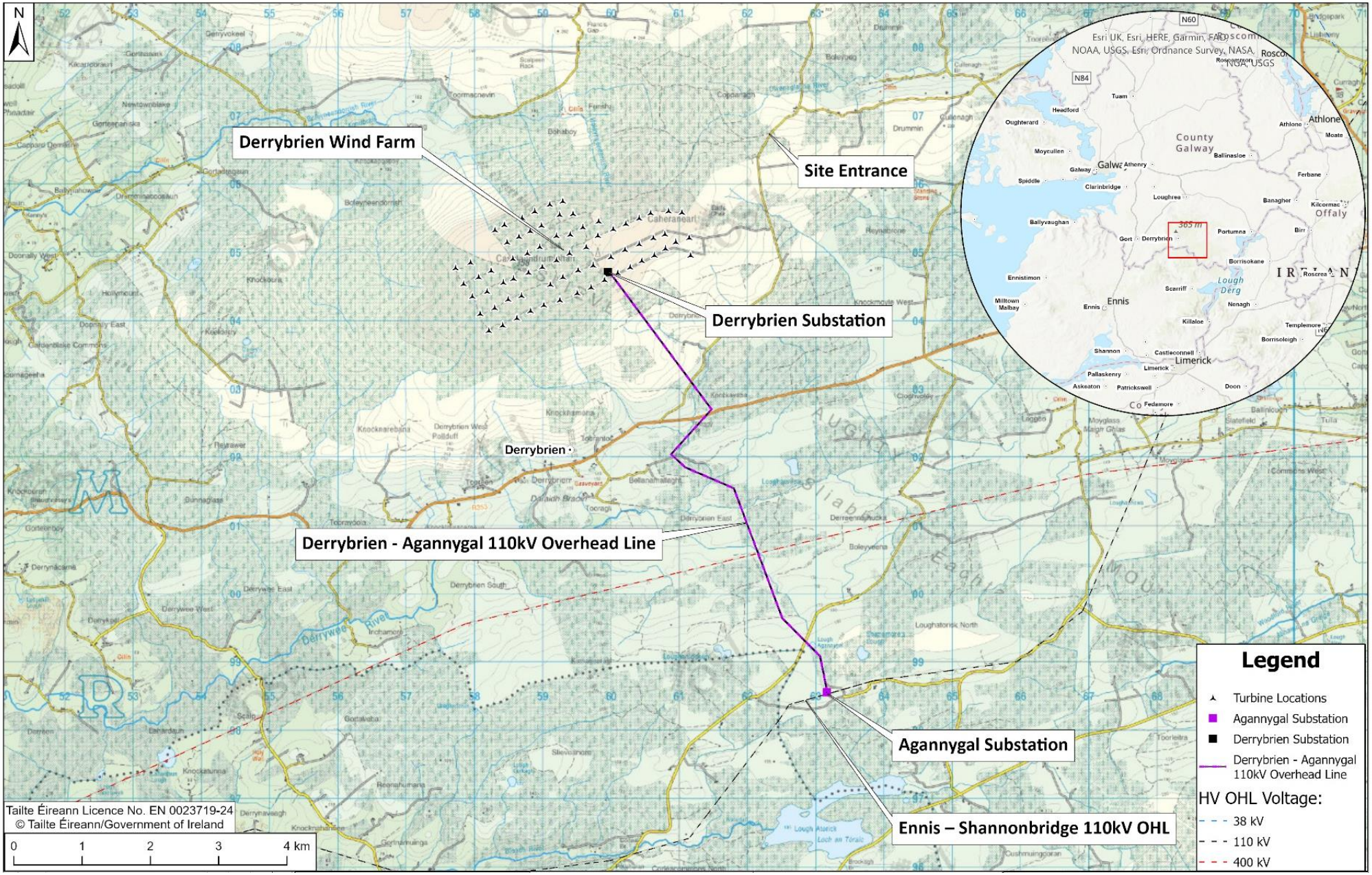

Figure 2-2 Existing Derrybrien Wind Farm Development

2.4 Construction Methodology Overview

2.4.1 Introduction

An experienced main contractor will be appointed for the civil works for the decommissioning and construction works associated with the Prospective Development. The appointed contractor for the works will be required to comply with this CEMP and any revisions made to this document in the preparation of method statements for the various elements of the Prospective Development. An overview of the proposed Construction and Decommissioning Methodologies is provided below.

2.4.2 Overview of Proposed Works

The Project consists of the decommissioning of the 70-turbine wind farm and a grid connection, comprising c. 7.8km 110kV overhead line (OHL) connecting into the Ennis-Shannonbridge 110kV line, together with Derrybrien and Agannygal substation.

The proposed anticipated methodology to be utilised during the Prospective Development associated with the turbines is outlined below:

- Enabling Works.
- Temporary Construction Compound and Site Facilities.
- Site Services.
- Site Drainage.
- Dismantling of Turbines and Anemometer Lattice Masts.
- Decommissioning of Underground Cables.
- Decommissioning of Derrybrien Substation.
- Reinstatement of Ennis-Shannonbridge OHL.

2.4.2.1 Enabling Works

A number of enabling works will be carried out at the site prior to decommissioning works starting. These would primarily consist of hedge trimming along the Black Road and site roads to restore circa 4m x 4m road envelope. If there are any signs of cracking/distress on the road prior to decommissioning works taking place, agreement will be sought from Galway County Council to carry out localised road repairs. It is anticipated that such enabling works will take two weeks to complete.

It is not proposed to carry out any remediation works on any of the elements of the windfarm that will be left in place after decommissioning. However, it may be necessary to carry out temporary road widening works along some section of narrow to allow for safe access to the mobile crane that will be used to dismantle the turbines.

If such widening works are required, then the roads will be widened as follows:

- Where the existing peat is lower than the floating road, a layer of bog mats will be placed on the existing intact peat and covered with varying depths of crushed rock granular fill over a 2 m wide strip along the upslope side of the existing floating road which will then be reinforced with a single layer of geogrid and 150mm of capping stone across the full width of the road.
- Where the existing peat is higher than the floating road, turves will be excavated to a level of 150mm lower than the road and stored locally for reuse, and then bog mats and stone will be place on the exposed ground.
- Existing drains will not be disturbed. This is necessary to provide adequate edge support to the wheels of the crane without significantly increasing the loads on the peat.

- Measures will be put in place such as silt fences and check dams to prevent silt or other sediments from running off the new capping layer into the adjacent drains.

It is anticipated that stone for road repairs/construction will be sourced from nearby quarries. Stone may also be sourced from the existing hardstands, providing that the geotechnical consultant confirms that it's acceptable to do so and confirms that it is suitable for road construction. On completion of the works all stone and bog mats will be removed and turves replaced to return area to existing condition.

2.4.2.2 Temporary Construction Compound and Site Facilities

A temporary site compound will be established in the northeast corner of the Derrybrien Windfarm Site, on an existing hardstand area, adjacent to the existing forestry track. Temporary portacabin accommodation will be located within the construction compound and will consist of offices, welfare facilities, meeting room and toilet facilities for use by construction contractors and owner's representatives. Temporary portacabin structures will be transported to the construction compound complete on flatbed lorries and lifted into position.

The temporary accommodation will consist of:

- 8 no. office containers.
- 2 no. canteen containers.
- 1 no. drying room container.
- 2 no. toilet block.
- 2 no. storage containers.
- 1 no. Electrical Power Generator + diesel bowser.

The toilet facilities at the compound will be formed by a self-contained toilet block with a temporary holding tank for managing the sewage and wastewater which will be emptied on a regular basis by an appropriately licensed contractor. These toilet facilities will be removed upon completion of the works.

Container units will be placed in the compound area for the storage of tools and materials during the decommissioning works. In addition, some of the existing hardstands throughout the site, including at Derrybrien substation, will be used as temporary storage locations during the decommissioning of the project. All portacabins, containers, portaloos and welfare units will be removed upon completion of the works.

2.4.2.3 Site Services

Drinking water at the wind farm site compound will be supplied by a bottled water supplier. Non-potable water supply for toilet blocks etc. may be supplied by 3rd party suppliers or from either an existing well installed at the compound or the water from the on site borrow pit/quarry. There is an existing well which was used during the construction phase which was decommissioned and capped following the completion of the construction phase.

Temporary electrical generators will be used to supply power at the wind farm site construction compound and the compound at Derrybrien substation. These generators will be stored within an appropriately bunded area.

2.4.2.4 Site Drainage

Drainage installed at each of the turbine bases during construction stage generally consisted of a buried land drain around the perimeter of the turbine base. The outlet of each land drain is to an open drainage channel, which was specifically installed to transfer the water to one of the existing main drains within the site. As required at specific turbine excavation locations, existing drains were re-routed

around the excavation area when they were present. This ensured the continuing operation of drainage in the area and non-entry of silt into the existing drains.

Culverts were constructed at various wind farm access road crossings so as to maintain the conveyance path of the pre-existing and constructed drains crossed and thus prevent excessive ponding of water on the uphill sides of these roads.

As the vast majority of roads are floating, they can remain in place without the need in principle to maintain associated drainage because they allow for natural infiltration, interflow and saturated groundwater flow. There will be no requirement for additional drainage associated with the decommissioning of the Derrybrien Wind Farm. Over time the drains will likely fill in and revegetate naturally and become less effective over time

Prior to decommissioning all existing culverts will be checked for integrity and remediated if required prior to commencement of decommissioning. All culverts will be checked before vacating the site to ensure water is flowing freely.

2.4.3 Dismantling of Turbines, Anemometer Lattice Masts and Underground Cables

The 70 no. turbines and masts will be dismantled by mobile cranes operating on the adjacent hardstand areas, which are designed to support the crane loads.

Specialist trucks and low-loader transporters, extendable trailers & step frame trailers will be required to remove the heavy and oversize components of the turbines from the site.

It is anticipated that the following methodology will be used for dismantling the turbines:

- Rotor to be dismounted from tower with the 3 blades attached and disassembled when on the hardstand. Some turbines will require the blades to be dismantled singly from the tower. A general arrangement drawing for the Rotor set down area can be seen on figure DMP08 in the Decommissioning Management Plan which has been submitted as part of this application.
- Blades to be stored on straw bales on land adjacent to the road verge or beside the hardstand, subject to geotechnical and ecological assessment at each location.
- Where constraints indicate there is no suitable location for the blades adjacent to the road, they will be loaded directly on a transport and moved to a temporary storage location on site, such as a nearby hardstand.
- Nacelle to be dismounted, set on transport frame, and loaded straight to trailer, where possible.
- Top and bottom tower to be loaded directly to transport.
- Tower trailers and nacelle trailer are to leave site as a single convoy. A Garda escort may be required and the convoy may have to wait on site for a short period of time e.g. only travelling outside peak periods, travelling from site only during daylight hours.
- Blades to be placed in transport frames and loaded accordingly. Due to the abnormal size of the turbine blades, it is anticipated that a garda escort will be required for this convoy also.
- MV switchgear, power transformers and ancillary equipment from the turbines will be loaded to a small trailer and brought to an existing hardstand near the site compound for safe keeping until they are loaded on trailers and hauled off site.
- Hubs can be loaded in series with small cranage, up to five per load, and can be self-escorted off site.

The 2 no. anemometer lattice masts will be split into sections so that the mass of each load will be less than 30 tonnes, and the axle load on the transporters will be limited to a maximum of 12 tonnes/axle so that they can travel on the national road network in Ireland.

As outlined in Chapter 4 of the EIAR, it is proposed to leave all underground cables and ducting in-situ. Once turbines have been removed all cables exposed on top of the concrete foundation will be cut at top of foundation level. The cables remaining shall be inserted into the unplasticised polyvinyl chloride (uPVC) ducting to a minimum depth of 300mm below the top of the foundation and then grout shall be placed into the duct to encase the remaining cables and seal the foundation ducting off at top of foundation level. All sections of cables cut will be gathered and transported off-site for disposal and/or recycling in a suitably licensed landfill. Once all turbine components have been removed, the remaining foundation will be covered in topsoil, levelled and reseeded with an appropriate native seed mix.

2.4.4 Decommissioning of Derrybrien and Agannygal Substations

The proposed anticipated methodology to be utilised during the Prospective Development associated with the Derrybrien and Agannygal Substation is outlined below:

- Site Setup.
- Plant and Abnormal Loads.
- Power Transformer Decommissioning (Derrybrien only).
- Decommissioning and Removal of Indoor Equipment.
- Civil Works during Decommissioning of Substation.

2.4.4.1 Site Setup

A main compound will already be established at the entrance to the wind farm and the substation decommissioning crew will utilise this. Temporary site compounds will also be established on the existing hardstanding areas of the Derrybrien and Agannygal Substations

Temporary components to be installed in the compounds are anticipated to consist of the following:

- Drying room container.
- Storage container.
- Office/general container.
- Canteen container.
- Electrical Power Generator + diesel bowser.
- Self-contained portaloo/portable welfare unit which will be serviced and maintained on a regular basis throughout the works.
- Drinking water at the substations will be supplied by a bottled water supplier.

2.4.4.2 Plant and Abnormal Loads

It is anticipated that a range of mechanical plant will be mobilised to the wind farm substation sites. This plant will be kept on site and not removed until their purpose has been completed. It is anticipated that plant on site will comprise the following:

- Personnel 4- wheel drive vehicles.
- Mobile task lighting generator.
- MEWPS.
- Forklifts/Teleporters.
- Hi ab.

- Cherry pickers.
- Mobile Cranes and ancillary support vehicles.

The 80-tonne power transformer located at the Derrybrien substation will be removed from the site on a specialised articulated truck and low-loader transporter.

2.4.4.3 Decommissioning of Outdoor Equipment

The copper droppers from the end masts will be cut and removed manually by crew on scissor lifts. All copper conductors and connectors (copper and/or aluminium) will be removed throughout the substation.

The tubular busbar will be removed with a Hiab. Equipment will be braced for transport, lifted and disassembled according to the manufacturers' instructions. High voltage equipment such as disconnectors, voltage & current transformers, surge arrestors and line traps will be lifted from their lifting eyes. The equipment will be put into HGVs to transport them off site. For long term storage of equipment, silica gel packs in housing/mech boxes, auxiliary heating and correct positioning shall be considered.

Where materials are not being reused, the waste disposal company involved shall be made aware of SF_6 gas, oil contaminated and oil filled equipment to ensure correct disposal of this material. In addition, other equipment are generally made up of metals (steel, aluminium, copper, brass and metal alloys), porcelain, plastics, greases, silicon and polymers, and ceramics (metal oxide blocks). Engagement with the waste disposal company shall ensure these components and elements are disposed of using the correct route with a view to recycling as much as possible and avoiding landfill, where possible.

Oil filled equipment, such as transformers, shall be inspected before and after removing from their support steelwork. It is not necessary to remove the oil for transport and they shall be loaded intact on to a bunded platform/trailer prior to transport off-site. Transformers can be laid horizontally but must be supported to avoid sudden shear force during transport which could cause damage and leakage.

The diesel generator and tank will be removed using appropriate transport units. Earth grid tails will be cut below ground level. The steel supports for the high voltage equipment will be removed by cutting the anchor bolts will be left in place. The 20kV cable will be disconnected from the MV side of the power transformer and from the MV switchgear cubicle and a pulled/winched with a cable puller through the ducts. The lightening towers and end masts will be dismantled using a crane.

2.4.4.4 Power Transformer Decommissioning (Derrybrien Substation)

The 80-tonne transformer will be removed from site using a crane and transported from site on a specialised articulated truck and low-loader transporter. Prior to the removal of the transformer, the area will be regraded to provide a hardstand area for the crane to set up. The transformer will be transported to its final destination in a single supervised and scheduled trip along a defined access route.

Oil from the transformer will be drained prior to transportation off the site. The oil can be stored in the oil road tanker or an external intermediate bulk container, IBC, or other suitable container built for this purpose for later disposal/reuse. The IBC, if utilised will be stored within an appropriate bunded area at all times prior to removal from the site.

Accessories such as bushings, radiators, conservator tank must be removed for transport (after removing oil). The accessories removed shall be packaged and palletised to prevent damage during transport.

2.4.4.5 Decommissioning and Removal of Indoor Equipment

The power and control cables connecting onto the MV switchgear will be disconnected. The MV switchgear will then be unbolted from the floor of the substation building and moved into a transport vehicle. Sulphur Hexafluoride (SF_6) is used as a quenching material in the circuit breaker in the switchgear cubicles within the control building. The circuit breaker containing SF_6 is labelled and sealed. It should be noted that SF_6 will not be removed during the decommissioning of the switchgear.

The lead acid-based battery system will be disconnected, removed by hand and segregated as waste as appropriate. Appropriate safety equipment will be worn when the batteries are being handled e.g. acid-resistant goggles/face shield, gloves, an apron.

All control wiring will be removed, and the control and protection cabinets will be lifted with the lifting eyes and removed. All internal fixtures and fittings will be removed, segregated and disposed of appropriately.

2.4.4.6 Civil Works during the Decommissioning of the Substations

The following civil works will be carried out at the site during the decommissioning of the Substation:

- Prior to demolition, the roof space will be inspected for bats.
- Where practicable all electrical equipment will be removed from the building and the compound prior to the demolition of the building.
- The oil separator will be emptied prior to being backfilled with stone. All extracted liquids will be disposed of to a licenced facility by an appropriately licensed contractor.
- The sewage treatment plant will be emptied and flushed out prior to being backfilled with stone. All extracted effluent will be disposed of to a licenced facility. The stone will be sourced from the site.
- Where practicable, any voids at ground level, such as cable trenches, will be filled with stone reclaimed from site.
- The palisade fencing including supports will be removed in sections.
- The earth grid will be removed in so far as possible.
- Wells will be disconnected, capped and sealed, and pumps removed from site.
- All internal fixtures and fittings will be removed from the building.

Typical description of works for the demolition of the control building is as follows:

- The roof will be removed with the slates and trusses segregated.
- The concrete roof/ceiling slabs will be lifted and moved to ground level before being broken up.
- External blockwork will be removed, and cavity insulation segregated from concrete blocks, before demolishing the internal leaf.

2.4.5 Decommissioning of Overhead Lines

Approximately 7.8km of 110kV overhead lines (OHL) will be decommissioned as part of the proposed project. The overhead line structures will be accessed by local roads and forestry tracks.

The OHLs are supported on double pole sets and mast structures. Mast heights range from 13.4m to 20.1m above ground level. There are 43 structures in total comprised of the following:

- 34 double wooden pole sets.
- 2 end masts.
- 6 angle masts.

- 1 intermediate mast.

A detailed decommissioning methodology of the OHLs is outlined in Section 4.2 of the accompanying Decommissioning Management Plan. The OHLs decommissioning methodology is summarised below:

- Site Setup.
- Preparatory Works.
- Destringing of Existing Conductors.
- Decommissioning of Structures (Wooden Polesets and Steel Towers).
- Water Crossings.

2.4.5.1 Site Setup and Plant

There will be a mobile welfare unit for each crew. These welfare units feature an in-built diesel-powered generator, a bathroom facility, drying room, wash station, a seating area, and kitchenette. The mobile units will have their own built-in water and waste tanks which will be serviced and emptied when required by an appropriately licensed contractor.

As the decommissioning works progress, the unit will be moved along the course of the OHLs with the crew. It will be situated on existing forestry road and will not require the installation of additional hardstand areas.

2.4.5.2 Preparatory Works

The existing network of roads will be used to access the existing OHLs and associated structures. There may be a requirement to transport material and plant over land, in areas where the OHLs are not in close proximity to existing roads. Prior to transporting plant and materials over land, an ecologist will carry out a walkover survey of the off-road sections to identify where soft or wet conditions occur to enable advance planning by the contractor to prevent soil damage, compaction or erosion. Where very soft or boggy areas are identified, it may be necessary to install temporary tracks with mats to facilitate access to OHLs.

2.4.5.3 Destringing of Existing Conductors

The existing conductors will be decommissioned using the following methodology:

- Tension stringing machines will be set up at each angle tower.
- The existing conductor will be winched onto empty drums at one end and a pulling/bond rope will be used from the opposite end to maintain tension on the conductor.
- Once all of the conductors have been coiled on the drums, the pulling/bond rope can be re-wound back to its original position. Guide ropes will be used to maintain tension on the pulling rope.
- Traffic management will be required on all road crossings during the retirement of conductors in the particular section above those respective crossings.

2.4.5.4 Decommissioning of Structures (Wooden Polesets and Steel Towers)

Wooden poles sets will be decommissioned using the following methodology:

- A tracked dumper and hoist, or suitable alternative, will be used to swing the crossarm and fix to a single pole.

- Each pole will be felled using a chainsaw. Appropriate safety measures will be implemented.
- Ground will be hand dug to 300mm surrounding pole to allow for cutting.
- Each pole will be retired to 300mm below ground level.
- Poles will be removed from site using a tracked excavator where possible or cut into smaller pieces and removed with a tracked dumper to the closest hardstand area where materials will be loaded onto a flatbed trailer.
- Works shall be planned to ensure number of vehicle movements across terrain will be kept to a minimum.

Steel tower structures will be decommissioned using two methods, dependent on accessibility of winches and excavators to the site.

Method 1 will utilise the following methodology:

- A winch excavator will be attached to a fixing point on the tower.
- The front two legs of the tower will be cut halfway through to create a hinge point.
- The back two legs will be cut through and the tower pulled over using the winch tractor.
- Once pulled over the tower will be disassembled manually or using an excavator with shears where possible.

Method 2 would only be utilised if an area cannot be accessed with a winch, excavator or tracked dumper as a result of poor ground conditions. Method 2 would follow the following methodology:

- Linesmen will climb the particular mast to be decommissioned and will work to dismantle the structural members of the mast one by one.
- A light pulley block will be secured to the mast and the selected member for removal. The selected member for removal will be unbolted or cut away from the mast structure.
- The dismantled member will be winched safely to the ground using the pulley system and loaded onto a light weight tracked dumper for disposal.
- The workers will progress through each mast, member by member, in this manner.
- Where steel structural members are cast into concrete foundations, steel members will be cut flush with the concrete foundation.
- The concrete foundations will be left in place, All removed concrete and steel would be removed to a registered waste disposal facility.
- Works shall be planned to ensure number of vehicle movements across terrain will be kept to a minimum.

2.4.5.5 Water Crossings

In order to access and decommission all of the existing OHL support structures, a number of small streams and drains will be crossed. These minor watercourses will be crossed by placing suitable sized bog mats or steel plates over the streams/drains to allow vehicles to cross over at that point.

The following fish rescue and protection options outlined below will be implemented in order to prevent or minimise impacts on the aquatic habitat or aquatic life:

- The operation will be planned so that the minimum number of vehicles required will be used and the lowest possible frequency of over-and-back crossings will take place.
- As narrow a crossing corridor as possible will be used that will still accommodate the largest vehicle needed for the decommissioning and all traffic will stick to this lane. This will be facilitated by demarcating the lane with red and white marker tape which will be maintained as necessary throughout and only one vehicle at a time will be allowed to cross and at a very slow speed.

- Steel Plates shall be placed on the riverbed, on this crossing corridor to protect the substrate beneath which will also discourage fish swimming in this area.
- The area will be monitored very closely and if required additional drainage measures will be implemented external to riverbanks to prevent waters from potential plant tracks entering the river at this point.

Prior to works commencing an initial fish rescue will be carried out with any removed fish being transported downstream to the outflow from the Flaggy Bridge tributary. This approach will reduce to the absolute minimum the number of fish which may be impacted as a result of the crossing. These methodologies are further outlined in Section 4.9.7 of the accompanying Decommissioning Management Plan.

2.4.6 Ennis – Shannonbridge Line Reinstatement

After the removal of the Derrybrien – Agannygal OHL, the Ennis – Shannonbridge 110kV line will be required to be reinstated. The full section of line between angle masts will be wheeled and tensioned (approximate length 1.3km). Stringing equipment utilised will comprise 4x4 vehicles, tensioners, teleporters, stringing wheels, conductor drums, compressor & head, transit vans, chains and other small tools, drum stands and drum carriers. It is estimated that the work would take 6 weeks to undertake. Where access is required the surface drain just west of the substation boundary will be bridged utilising sleepers over a large plastic corrugated culvert pipe or other suitable construction

3. ENVIRONMENTAL MANAGEMENT

3.1 Introduction

This CEMP includes all best practice measures required to construct the proposed renewable energy development. The drainage proposals will be developed further prior to the commencement of construction however, any such improvements will be in line with the principles set out here and will also be in full compliance with the planning consent and mitigation measures as presented in the EIAR, NIS and all other relevant planning documents. The following sections give an overview of the drainage design, dust and noise control measures and a waste management plan for the site.

While the decommissioning methodology and mitigation measures are presented in this CEMP, the Decommissioning Management Plan lists these all in detail in a single document. The Decommissioning Management Plan is an accompanying document for this CEMP within the application to An Bord Pleanála.

3.2 Protecting Water Quality

3.2.1 Good Environmental Management During Construction

Timing of decommissioning works can strongly influence the potential for damaging the freshwater environment. Operations during wetter periods of the year pose a significantly greater risk of causing erosion and siltation, which can be particularly severe following major rainfall or snowmelt events. Activities in the close proximity to watercourses shall be avoided during or after prolonged rainfall or an intense rainfall event and work will cease entirely near watercourses when it is evident that water quality could potentially be impacted. Given that this site has an established drainage network it is anticipated that there will be no adverse impacts on watercourses.

3.2.2 Suspended Solids

The decommissioning works have the potential to result in the release of suspended solids relative to baseline conditions. Identified potential sources of sediment-laden water include but are not limited to erosion of sediment from maintenance work on existing channels and culverts, loss of crushed rock granular fill material transferred from existing hardstand areas or nearby quarriers to deposit for widening of turbary road or loss of stone and / or tarmacadam imported for filling potholes on the wind farm site.

The following mitigation measures will be implemented, if required at the site to prevent suspended solids from entering adjacent drains and watercourses:

- Silt traps – these can be installed on either the inlet or outlet side of culverts and must be robust enough to allow for frequent clearing out of collected sediments.
- Silt fencing – involves installation of some semi-permeable geotextile fabric, vertically held on simple timber posts, and is used primarily as an additional means of filtering out sediments from runoff water. These should be installed alongside any sensitive areas, e.g. watercourses, larges areas of stripped materials, or downstream from outlet ends of culverts, and can usually be arranged in a horse-shoe configuration to contain and allow settlement of suspended sediments.

- Straw bales – these can be used to filter out sediments from normal flows in drainage ditches, but their installation positions require careful consideration and should allow for potential overtopping in periods of high flow.
- Settlement lagoons – these usually take the form of a large, contained pool area, either partially dug into the ground or bunded to act as a barrier to stop the surface run-off escaping.
- Pumping - Where there is a significant build-up of water it may be required to pump this to avoid further build-up, or to allow works to progress in that area. Any required pumping should be planned to ensure that the discharge is either entering a settlement lagoon or that it can discharge directly over an area of suitable vegetation, an appropriate distance away from watercourses and groundwater to filter out any suspended sediments.

As outlined in Chapter 9 of the EIAR, it is also recommended that continuous monitoring systems are put in place, particularly in principal surface water features draining the site, e.g. remote sensing, or telemetric monitoring sensors can be employed in this regard. It is recommended that a handheld turbidity meter is available to accurately measure the quality of water discharging from the Site.

3.3 Refuelling, Fuel and Hazardous Materials

The following mitigation measures are proposed to avoid release of hydrocarbons at the site:

- Road-going vehicles will be refuelled off site wherever possible.
- Only designated trained and competent operatives will be authorised to refuel plant on site.
- Mobile measures such as drip trays and fuel absorbent mats will be used during all refuelling operations.
- The plant used will be regularly inspected for leaks and fitness for purpose.
- Spill kits will be available to deal with and accidental spillage in and outside the refuelling area.
- A programme for the regular inspection of plant and equipment for leaks and fitness for purpose will be developed at the outset of the Prospective Development.
- Minimal refuelling or maintenance of construction vehicles or plant will take place on site.
- On-site refuelling will take place using a mobile double skinned fuel bowser. The fuel bowser, a double-axel custom-built refuelling trailer will be re-filled off site or at the primary construction compound, via a fuel tanker, and will be towed around the site by a 4x4 jeep to where machinery is located.
- Fuels volumes stored on site shall be minimised. Fuel storage areas will be bunded appropriately for the fuel storage volume for the time period of the decommissioning works.
- An emergency plan for the construction works to deal with accidental spillages will be developed (refer to Section 5 of the CEMP). Spill kits will be available to deal with any accidental spillage in and outside the refuelling area.
- A programme for the regular inspection of plant and equipment for leaks and fitness for purpose will be developed at the outset of the Prospective Development.
- Hazardous wastes that may occur on site during the Prospective Development may include oil, diesel fuel, chemicals, paints, preservatives etc.
- All hazardous wastes will be stored in bunded containers/areas before being collected by an authorised waste contractor and brought to an EPA licensed waste facility.
- Hazardous wastes will be kept separate from non-hazardous wastes so that contamination does not occur.
- Refuelling should only take place on level ground in hardstanding (e.g. crane hardstands or tracks, and under constant supervision while refuelling is in progress.

3.4 Peat Stability Management

Peat instability or failure refers to a significant mass movement of a body of peat that would have an adverse impact on the site and the surrounding environment. Peat failure excludes localised movement of peat that could occur below an access road, creep movement or erosion type events. In the absence of appropriate mitigation, the consequence of peat failure at the study area may result in:

- Death or injury to site personnel.
- Damage to machinery.
- Damage or loss of access tracks.
- Drainage disrupted.
- Site works damaged or unstable.
- Contamination of watercourses, water supplies by sediment particulates.
- Degradation of the environment.

3.4.1 General Recommendations for Good Practices

The following measures which will be implemented during the Prospective Development will assist in the management of the risks for this site.

- Appointment of experienced and competent contractors.
- The site will be supervised by experienced and qualified personnel.
- The works on site will be supervised by a suitably qualified geotechnical engineer.
- Sufficient time will be allocated for the proposed decommissioning works to be carried out.
- Undercutting of slopes and unsupported excavations will be prevented.
- Decommissioning method statements will be developed and agreed before commencement of works and are followed by the contractor.
- The Risk Register will be revised and amended as decommissioning works progresses to ensure that risks are managed and controlled for the duration of works.
- The hydrology of area will be maintained as far as possible by maintaining existing drains to water pressures in the peat to avoid peat becoming “buoyant”.
- The use of experienced geotechnical staff for site investigations, if required.
- The use of experienced contractors and trained operators will carry out the works.

3.5 Dust Control

Dust can be generated from many on-site activities such as excavation and backfilling. The primary source of dust as a result of the decommissioning works is expected to arise from vehicle movements on site along the access tracks and any minor civil works that are required. The extent of dust generation will depend on the type of activity undertaken, the location, the nature of the dust, i.e. soil, sand, peat, etc. and the weather. In addition, dust dispersion is influenced by external factors such as wind speed and direction and/or, periods of dry weather.

Proposed measures to control dust include:

- A wheel wash facility will be installed on site and will be used by vehicles before leaving site.
- Dust suppression measures will be implemented on site to minimise the potential nuisance caused by dust at the nearest sensitive receptors and on sensitive eco systems. Water misting shall be used as required if particularly dusty activities are necessary on site during dry and/or windy conditions.
- All site related traffic will have speed restrictions on un-surfaced roads to 30 kph.
- Regular inspection of the site to examine dust measures and their effectiveness.

- All plant and materials vehicles shall be stored in dedicated areas (on site).
- Turbines and construction materials will be transported away from the site on specified haul routes only.
- The agreed haul route roads adjacent to the site will be regularly inspected for cleanliness and cleaned as necessary.
- The Site access roads will be checked weekly for damage/potholes and repaired as necessary.
- The transport of construction materials which may have the potential to generate dust will be undertaken with tarpaulin cover or similar, where necessary.
- Water for dust suppression shall be sourced from the existing borrow pit/quarry at the entrance to the wind farm.

3.6 Noise Control

As set out in Chapter 11 Noise and Vibration, apart from one potential exception, $L_{Aeq\ 1\ h}$ levels at offsite receptors during the construction phase will not exceed the identified 65 dB criterion, and indeed will be markedly lower than this criterion throughout the project. It follows that noise mitigation measures are not specifically warranted in relation to these receptors. However, a number of general measures are proposed in order to follow good construction practice:

- Construction operations will in general be confined to the period Monday-Friday 07:00-19:00 and Saturday 08:00-13:00.
- Drivers of plant and vehicles will be instructed to avoid hooting at all times, unless necessary.
- Plant used onsite during the construction phase will be maintained in a satisfactory condition and in accordance with manufacturer recommendations. In particular, exhaust silencers will be fitted and operating correctly at all times. Defective silencers will be immediately replaced.
- Queuing of trucks near offsite receptors will be prohibited.
- Machinery not in active use will be shut down.
- A site representative will be appointed as a liaison officer with the local community.
- Complaints of noise received during the construction phase will be logged in a register, and investigated immediately. Details of follow-up action will be included in the register.
- Where it is proposed to import potentially noisy plant to the site, the potential impact of noise emissions will be assessed in advance.
- Guidance set out in British Standard BS 5228-1:2009+A1:2014 Code Of Practice For Noise And Vibration Control On Construction And Open Sites – Part 1: Noise (2014) with respect to noise control will be applied throughout the construction phase.

3.7 Invasive Species Management

No problematic alien invasive species were recorded on site.

Two individual non-native New Zealand Flax (*Phormium tenax*) occur along the roadside nearby the onsite substation. The plants are likely to have been planted there intentionally in the past. There is no evidence of this species spreading within the site.

The toxic weed Common Ragwort (*Senecio jacobaea*) is sparsely distributed in areas of recolonising bare ground proximate to the site infrastructure in association with Colt's Foot (*Tussilago farfara*).

Neither Japanese Knotweed (*Fallopia japonica*) or Rhododendron (*Rhododendron ponticum*) have been recorded within the site.

3.7.1 Other Invasive Species

In the event that the presence of other such species is found at or adjacent to the development footprint during pre-commencement surveys, particularly in areas where its excavation may be required, an invasive species management plan will be prepared for the site to prevent the introduction or spread of any invasive species within the footprint of the works. The ISMP will include measures to avoid and/or control any non-native plant species that may be present, in accordance with The Management of Invasive Alien Plant Species on National Roads – Technical Guidance (TII, 2020). An invasive species management plan, if required, will set out best practice control methods as summarised in the following sections.

3.7.2 Site Management

Careful preparation of the site and planning of the works is crucial to successful treatment of invasive species. The following list of guidelines, which is not exhaustive, shall be followed by all on-site personnel. Only those who have been inducted into biosecurity measures on-site may enter the contaminated zones within the works areas. Should any risk of contaminated material escaping be observed by the site supervisor, the management plan for the site must be amended by an appropriately qualified person to mitigate against the risk.

3.7.3 Establish Good Site Hygiene

The following measures are proposed to establish good site hygiene to ensure the control of any potential spread of invasive species during construction works:

- A risk assessment and method statement will be provided by the Contractor prior to commencing works.
- Fences will be erected around areas of infestation, as confirmed by test pits, and warning signs shall be erected.
- A designated wash-down area will be created, where power-washed material from machinery can be contained, collected and disposed of with other contaminated material. This area will contain a washable membrane or hard surface.
- Stockpile areas will be chosen to minimise movement of contaminated soil.
- Stockpiles will be marked and isolated.
- Contaminated areas which will not be excavated will be protected by a root barrier membrane if they are likely to be disturbed by machinery. Root barrier membranes will be protected by a layer of sand above and below and topped with a layer of hardcore.
- The use of vehicles with caterpillar tracks within contaminated areas will be avoided to minimise the risk of spreading contaminated material.
- An ECoW/suitably qualified ecologist will be on site to monitor and oversee the implementation of invasive species management plans.

Plant and equipment which is operated within an area for the management of materials in contaminated areas will be decontaminated prior to relocating to a different works area. The decontamination procedures will take account of the following:

- Personnel may only clean down if they are familiar with the plant and rhizome material and can readily identify it.
- Decontamination will only occur within designated wash-down areas.
- Vehicles will be cleaned using stiff-haired brush and pressure washers, paying special attention to any areas that might retain rhizomes e.g. wheel treads and arches.
- All run-off will be isolated and treated as contaminated material. This will be disposed of in already contaminated areas.

3.8 Waste Management

The generation of waste as a result of demolition and decommissioning related activity will provide the majority of on-site wastes which will need to be managed under guidelines set out in this document. This section of the CEMP provides a Waste Management Plan (WMP) which outlines the best practice procedures during the demolition and construction works of the project. This plan has been compiled based on The Department of the Environment document entitled, *'Best Practice Guidelines on the Preparation of Resource and Waste Management Plans for Construction and Demolition Projects' (2021).*

The WMP will outline the methods of waste prevention and minimisation by recycling, recovery and reuse at each stage of decommissioning and demolition works of the project. Disposal of waste will be seen as a last resort.

3.8.1 Legislation

The Waste Management Act 1996 to 2011 and its subsequent amendments provide for measures to improve performance in relation to waste management, recycling and recovery. The Act also provides a regulatory framework for meeting higher environmental standards set out by other national and EU legislation.

The Act requires that any waste related activity has to have all necessary licenses and authorisations. It will be the duty of the Waste Manager on the site of the project to ensure that all contractors hired to remove waste from the site have valid Waste Collection Permits. It will then be necessary to ensure that the waste is delivered to a licensed or permitted waste facility. The hired waste contractors and subsequent receiving facilities must adhere to the conditions set out in their respective permits and authorisations.

The Department of the Environment provides a document entitled, 'Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects' (2006).

3.8.2 Waste Management Hierarchy

The waste management hierarchy sets out the most efficient way of managing in the following order:

Prevention and Minimisation:

The primary aim of the WMP will be to prevent and thereby reduce the amount of waste generated at each stage of the project. The prevention and minimisation of waste of this development will be developed by implementing effective on-site materials management in terms of both material acquisition and storage on site

Reuse of Waste:

Reusing as much of the waste generated on site as possible will reduce the quantities of waste that will have to be transported off site to recovery facilities or landfill. Site management will be required to encourage the appropriate reuse of materials where possible as well as identify re-use opportunities to achieve ultimate goal of waste reduction.

Recycling of Waste:

There are a number of established markets available for the beneficial use of Construction and Demolition waste.

At all times during the implementation of the WMP, disposal of waste to landfill will be considered only as a last resort.

3.8.3 Decommissioning and Demolition Works Waste Management

3.8.3.1 Description of the Works

The decommissioning works will involve the removal of above ground structures, leaving infilled wind turbine foundations, underground LV cables, meteorological mast foundations and substation foundations in situ. No bog rehabilitation or active drain blocking would occur, and the existing drainage network would be left to naturally rehabilitate. Access tracks, borrow pits, onsite peat repositories and hardstands would also be left in place. No replanting of forest would occur although some natural regeneration would be likely.

The project is outlined in further detail in Section 2.2.1 above. Decommissioning of the Derrybrien Wind Farm is expected to be approximately 24 months.

Prior to the commencement of any decommissioning and demolition works, as described in Section 2.2 above, a full audit of waste material that will be generated will be carried out.

A list of expected waste types that may be generated has been drawn up and the List of Waste Codes pertaining to each waste type is included in Table 3-1 below. The lists have been prepared following a visit to the Prospective Development site and inspection of the existing structures.

Table 3-1 Expected waste types arising during the Decommissioning and Demolition Works

Material Type	Example	LOW Code
Cables	Electrical wiring	17 04 11
Metals	Copper, aluminium, lead, iron and steel	17 04 07
Inert materials	Sand, stones, plaster, rock, blocks	17 01 07
Mixed municipal waste	Daily canteen waste from workers, miscellaneous	20 03 01
Plastic	PVC frames, electrical fittings	17 02 03
Plastic packaging	Packaging with new materials	15 01 02
Tiles and ceramics	Slates and tiles	17 01 03
Resins	Turbine blades and components	20 01 27
Wood	Roofing	15 01 03
Concrete	Surfacing, Flooring material	17 01 01

The associated components will be removed from site for re-use, recycling or waste disposal. Any structural elements that are not suitable for recycling will be disposed of in an appropriate manner. All lubrication fluids will be drained down and put aside for appropriate collection, storage, transport and disposal. Any materials which cannot be re-used or recycled will be disposed of by an appropriately licenced contractor.

Hazardous wastes that may occur on site during the Prospective Development may include oil, diesel fuel, chemicals, paints, preservatives etc. All hazardous wastes will be stored in bunded containers/areas before being collected by an authorised waste contractor and brought to an EPA licensed waste facility. (Sulphur hexafluoride (SF6) switchgear from the substation and any oil containing equipment will be carefully removed in compliance with applicable legislation and disposed of appropriately. As mentioned above, hazardous wastes will be kept separate from non-hazardous wastes so that contamination does not occur. Further details on how hazardous wastes and oils will be dealt with during decommissioning are outlined in the accompanying Decommissioning Management Plan.

The majority of the waste generated by the demolition works at the Derrybrien Substation will consist of concrete rubble, metal cladding, the existing wall structures (internal and external), doors, windows (glass) and other associated support components (steel beams/bracing). These materials will be segregated from all other waste components and sent by an authorised waste collector to an authorised waste recovery facility. The remaining volume of waste material will not be large enough to warrant any further segregation, therefore, this waste generated during the demolition of the building will be deposited into a single skip. This waste material will be transferred to a Materials Recovery Facility (MRF) by a fully licensed waste contractor where the waste will be sorted into individual waste streams for recycling, recovery or disposal.

3.8.3.2 Reuse

Many decommissioned materials will be reused a number of times before they have to be disposed of:

- Wind turbines and their associated components will be reused where possible.
- Decommissioned components from the Derrybrien substation will be reused where possible.
- Concrete associated with the demolition of the substation will be reused as aggregate for roads cable trench backfilling material.

3.8.3.3 Recycling

If a certain type of material cannot be reused, then recycling is the most suitable option. If any of the turbines or part of a turbine are unsuitable for re-use then this will be disposed of appropriately with materials being recycled where possible.

Components such as the lightening mast, busbar and copper from the Derrybrien substation will also be recycled. Wooden polesets, steel angle masts and cross arms cannot be reused and will be recycled. Porcelain insulators and the conductor are anticipated to be recycled also.

All waste that is produced during the demolition and decommissioning works including dry recyclables will be deposited in the on-site skip initially and sent for subsequent segregation at a remote facility.

3.8.4 Implementation

3.8.4.1 Roles and Responsibilities

Prior to the commencement of the Prospective Development, a Waste Manager will be appointed by the Contractor. The Waste Manager will be in charge of the implementation of the objectives of the plan, ensuring that all hired waste contractors have the necessary authorisations and that the waste management hierarchy is adhered to. The person nominated must have sufficient authority so that they can ensure everyone working on the site adheres to the management plan.

3.8.4.2 Training

It is important for the Waste Manager to communicate effectively with colleagues in relation to the aims and objectives of the waste management plan. All employees working on site during the Prospective Development will be trained in materials management and thereby, should be able to:

- Distinguish reusable materials from those suitable for recycling.
- Ensure maximum segregation at source.
- Co-operate with site manager on the best locations for stockpiling reusable materials.
- Separate materials for recovery.
- Identify and liaise with waste contractors and waste facility operators.

3.8.4.2.1 *Record Keeping*

The WMP will provide systems that will enable all arisings, movements and treatments of waste to be recorded. This system will enable the contractor to measure and record the quantity of waste being generated as a result of the Prospective Development. It will highlight the areas from which most waste occurs and allows the measurement of arisings against performance targets. The WMP can then be adapted with changes that are seen through record keeping.

The fully licensed waste contractor employed to remove waste from the site will be required to provide documented records for all waste dispatches leaving the site. Each record will contain the following:

- Consignment Reference Number
- Material Type(s) and EWC Code(s)
- Company Name and Address of Site of Origin
- Trade Name and Collection Permit Ref. of Waste Carrier
- Trade Name and Licence Ref. of Destination Facility
- Date and Time of Waste Dispatch
- Registration no. of Waste Carrier vehicle
- Weight of Material
- Signature of Confirmation of Dispatch detail
- Date and Time of Waste Arrival at Destination
- Site Address of Destination Facility

3.8.4.3 Waste Management Plan Conclusion

The WMP will be properly adhered to by all staff involved in the project which will be outlined within the induction process for all site personnel. The waste hierarchy will always be employed when designing the plan to ensure that the least possible amount of waste is produced during the Prospective Development.

4. ENVIRONMENTAL MANAGEMENT IMPLEMENTATION

4.1 Roles and Responsibilities

The Site Supervisor/Manager and/or Environmental Clerk of Works (ECoW) are the project focal point relating to construction-related environmental issues.

In general, the ECoW will maintain responsibility for monitoring the works and Contractors/Sub-contractors from an environmental perspective. The ECoW will act as the regulatory interface on environmental matters by reporting to and liaising with Galway County Council and other statutory bodies as required.

The ECoW will report directly to the Site Supervisor/ Manager. An ECoW, Project Ecologist, Project Hydrologist, Project Geotechnical engineer will visit the site regularly and report to the Site Office. This structure provides a "triple lock" review/interaction by external specialists. An organogram structure for the construction stage is as follows:

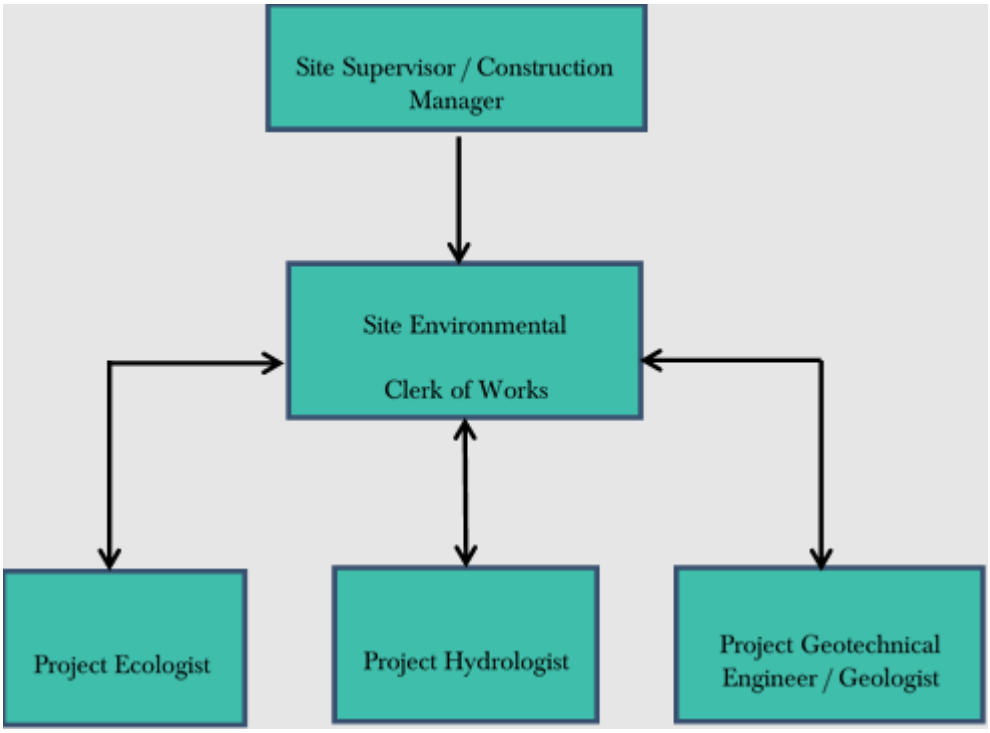

Figure 4-1 Site Management Chain of Command

Any requirement of the granted permission, for the works to be supervised by an engineer with professional indemnity insurance, who upon completion of the decommissioning works, including site stability, shall certify the said works, will be adhered to. Such an engineer will be appointed to oversee and supervise the Prospective Development.

4.1.1 Site Manager /Site Supervisor

The Site Manager / Site Supervisor will have overall responsibility for the organisation and execution of all related environmental activities as appropriate, in accordance with regulatory and project environmental requirements. The duties and responsibilities of the Site Supervisor/ Manager will include:

- Ensure that all works are completed safely and with minimal environmental risk.
- Approve and implement the Project CEMP and supporting environmental documentation, and ensure that all environmental standards are achieved during the Prospective Development.
- Take advice from the Environmental Clerk of Works on legislation, codes of practice, guidance notes and good environmental working practice relevant to their work.
- Ensure compliance through audits and management site visits.
- Ensure timely notification of environmental incidents.
- Ensure that all site activities are planned and performed such that minimal risk to the environment is introduced.

4.1.2 Environmental Clerk of Works

The main contractor will be required to engage a qualified Environmental Engineer, Environmental Scientist, or equivalent, with experience in wind farm construction to fulfil the role of Environmental Clerk of Works, and to monitor all site works and to ensure that methodologies and mitigation are followed throughout decommissioning to avoid negatively impacting on the receiving environment.

The ECoW will report to the Site Supervisor/ Manager. The responsibilities and duties of the ECoW will include the following:

- Preparation and update of the CEMP as required, and supporting environmental documentation and review/approval of contractor method statements.
- Undertake inspections and reviews to ensure the works are carried out in compliance with the CEMP.
- Monitor the implementation of the CEMP, particularly all proposed/required Environmental Monitoring.
- Generate environmental reports as required to show environmental data trends and incidents and ensure environmental records are maintained throughout the works duration.
- Advise site management/contractor/sub-contractors on:
    - Prevention of environmental pollution and improvement to existing working methods.
    - Changes in legislation and legal requirements affecting the environment.
    - Suitability and use of plant, equipment and materials to prevent pollution.
    - Environmentally sound methods of working and systems to identify environmental hazards.
- Ensure the specified mitigation measures are initiated and adhered to during the construction works.
- Liaise with Project Ecologist, Project Hydrologist, Project Geotechnical Engineer and any other members of the project team to ensure regular site visits and audits/inspections are completed.
- Ensure adequate arrangements are in place for site personnel to identify potential environmental incidents.
- Ensure that details of environmental incidents are communicated in a timely manner to the relevant regulatory authorities, initially by phone and followed up as soon as is practicable by e-mail.
- Support the investigation of incidents of significant, potential or actual environmental damage, and ensure corrective actions are carried out, recommend means to prevent recurrence and communicate incident findings to relevant parties.
- Identify environmental training requirements and arrange relevant training for all levels of site based staff/workers.

The level, detail and frequency of reporting expected from the ECoW for the Site Manager, developer's project manager, and any Authorities or other Agencies, will be agreed by all parties prior

to commencement of construction, and may be further adjusted as required during the course of the project.

4.1.3 Project Ecologist

The Project Ecologist will report to the ECoW and is responsible for the protection of sensitive habitats and species encountered during the Prospective Development. The Project Ecologist will not be full time on site but will visit the site at least once a month.

The responsibilities and duties of the Project Ecologist will include the following:

- Review and input to the final phase CEMP in respect of ecological matters.
- In liaison with Environmental Clerk of Works, oversee and provide advice on all relevant ecology mitigation measures set out in the EIAR and planning permission conditions.
- Regular inspection and monitoring of the site, throughout the Prospective Development and provide ecological advice as required.
- Carry out ecological monitoring and survey work as may be required by the planning authority.

4.1.4 Project Hydrologist

The Project Hydrologist will report to the ECoW and is responsible for inspection and review of drainage and water quality aspects associated with decommissioning of the Wind Farm. The Project Hydrologist will not be full time on site but will visit the site at least once a month during decommissioning.

The responsibilities and duties of the Project Hydrologist will include the following:

- Assist in compiling a detailed drainage design before decommissioning commences and attend the site to set out and assist with micro siting of drainage controls. This will be completed over several site visits at the start of the Prospective Development.
- Review and input to the final phase CEMP in respect of drainage and water quality management.
- Following the initial stage of drainage, regular site visits will be required, at least once a month, to complete hydrological and water quality audits and reviews and report any issues noted to the Site Supervisor/ Manager; and,
- Complete ongoing inspection and monitoring of the decommissioning, particularly in areas of drainage control, throughout the Prospective Development and ensure all works is carried out as specified in the EIAR, and in relevant planning conditions.

4.1.5 Project Geotechnical Engineer/Geologist

The Geotechnical Engineer or Project Geologist will report to the ECoW and is responsible for inspection and review of geotechnical aspects associated with decommissioning of the site. The Geotechnical Engineer will not be full time on site but will visit site at least once a month during the Prospective Development.

The responsibilities and duties of the Geotechnical Engineer or Geologist will include the following:

- Visit site regularly, or at least once a month, to complete geotechnical audits and reviews and report any issues to the Site Supervisor/ Manager.
- Ensuring that identified hazards are listed in the Risk Register and that these are subject to ongoing monitoring.

- Ongoing inspection and monitoring of the decommissioning works, particularly in areas of peatland throughout the decommissioning works, and ensure all works are carried out as specified in the EIAR, NIS and in relevant planning conditions.

4.2 Water Quality and Monitoring

The methodology for water quality monitoring before, during and after the Prospective Development is outlined in detail in Chapter 9 of the EIAR.

It is recommended that site water runoff quality be monitored on a continuous basis at a reasonable frequency (e.g. daily), however the frequency of monitoring can gradually reduce thereafter. It is recommended that continuous monitoring systems are put in place, particularly in principal surface water features draining the site, e.g. remote sensing, or telemetric monitoring sensors can be employed in this regard. It is recommended that a handheld turbidity meter is available to accurately measure the quality of water discharging from the Site.

Surface water runoff control infrastructure will be checked and maintained on a regular basis and stilling ponds and check dams will be maintained (de-sludged/settled solids removed) on a regular basis. It is important to minimise the agitation of solids during these works, otherwise it will likely lead to an acute significant loading of suspended solids in the drainage network.

5. EMERGENCY RESPONSE PLAN

An Emergency Response Plan (ERP) is presented in this section of the CEMP. It provides details of procedures to be adopted in the event of an emergency in terms of site health and safety and environmental protection.

5.1 Overview

The Emergency Response Plan (ERP) is presented in this section of the CEMP. It provides details of procedures to be adopted in the event of an emergency. The site ERP includes details on the response required and the responsibilities of all personnel in the event of an emergency. The ERP will require updating and submissions from the contractor/PSCS and suppliers as the project progresses. Where sub-contractors that are contracted on site are governed by their own emergency response procedure a bridging arrangement will be adopted to allow for inclusion of the sub-contractor's ERP within this within this document.

This is a working document that requires updating throughout the various stages of the project.

5.1.1 Roles and Responsibilities

The chain of command during an emergency response sets out who is responsible for coordinating the response. The Site Supervisor/ Manager will lead the emergency response which makes him responsible for activating and coordinating the emergency response procedure. The other site personnel who can be identified at this time who will be delegated responsibilities during the emergency response are presented in Figure 5-1. In a situation where the Site Supervisor/ Manager is unavailable or incapable of coordinating the emergency response, the responsibility will be transferred to the next person in the chain of command outlined in Figure 5-1. This will be updated throughout the various stages of the project.

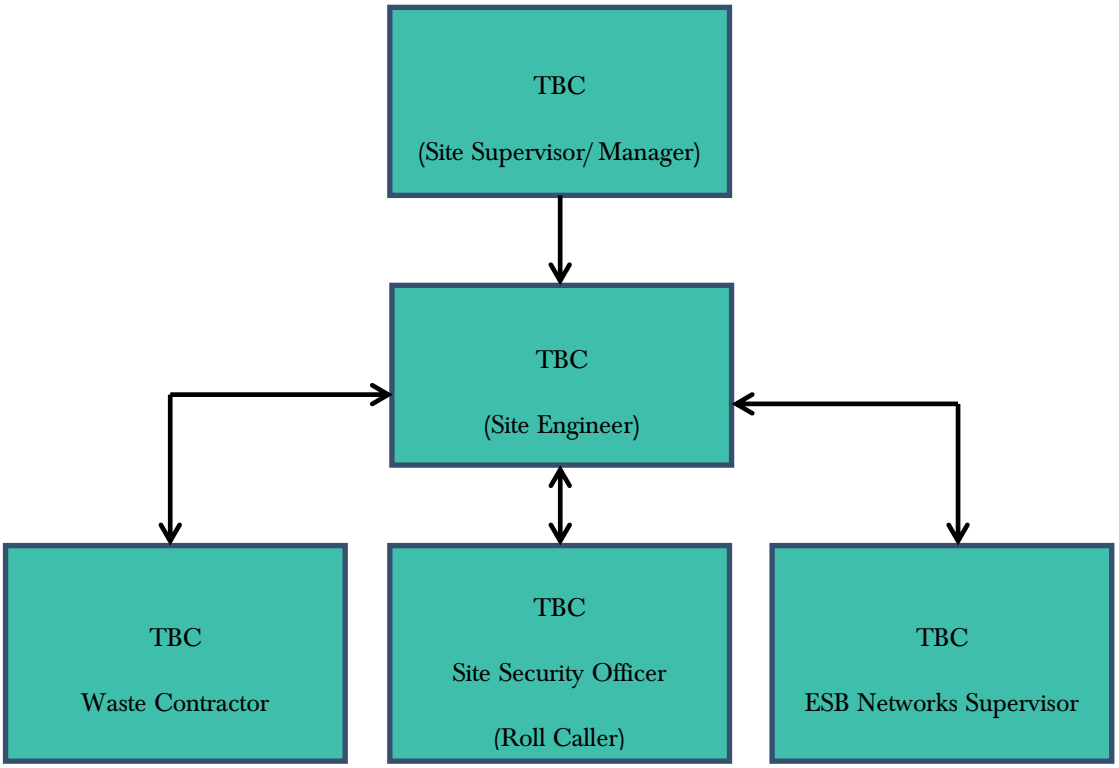

Figure 5-1 Emergency Response Procedure Chain of Command

5.1.2 Hazard Identification

In order to establish the type and scale of potential emergencies that may occur, the following hazards have been identified as being potential situations that may require an emergency response in the event of an occurrence.

Table 5-1 Hazards associated with potential emergency situations

Hazard	Emergency Situation
Construction Vehicles: Dump trucks, tractors, excavators, cranes etc.	Collision or overturn which has resulted in operator or third-party injury.
Abrasive wheels/Portable Tools	Entanglement, amputation or electrical shock associated with portable tools
Contact with services	Electrical shock or gas leak associated with an accidental breach of underground services
Fire	Injury to operative through exposure to fire
Falls from heights including falls from scaffold towers, turbines, scissor lifts, ladders, roofs and turbines	Injury to operative after a fall from a height
Sickness	Illness unrelated to site activities of an operative e.g. heart attack, loss of consciousness, seizure

In the event of an emergency situation associated with, but not restricted to, the hazards outlined in Table 5-1 the Site Supervisor/ Manager will carry out the following:

- Establish the scale of the emergency situation and identify the number of personnel, if any, have been injured or are at risk of injury.
- Where necessary, sound the emergency siren/fog-horn that activates an emergency evacuation on the site. The Site Supervisor/ Manager must proceed to the assembly point if the emergency poses any significant threat to their welfare **and if there are no injured personnel at the scene that require assistance**. The Site Supervisor/ Manager will be required to use their own discretion at that point. In the case of fire, the emergency evacuation of the site should proceed, without exception. The site evacuation procedure is outlined in Section 5.1.3.
- Make safe the area if possible and ensure that there is no identifiable risk exists with regard to dealing with the situation e.g. if a machine has turned over, ensure that it is in a safe position so as not to endanger others before assisting the injured.
- Contact the required emergency services or delegate the task to someone. If delegating the task, ensure that the procedures for contacting the emergency services as set out in Section 5.3 is followed.
- Take any further steps that are deemed necessary to make safe or contain the emergency incident e.g. cordon off an area where an incident associated with electrical issues has occurred.
- Contact any regulatory body or service provider as required e.g. ESB Networks the numbers for which as provided in Section 5.4.
- Contact the next of kin of any injured personnel where appropriate.

5.1.3 Site Evacuation/Fire Drill

A site evacuation/fire drill procedure will provide basis for carrying out the immediate evacuation of all site personnel in the event of an emergency. The following steps will be taken:

- Notification of the emergency situation. Provision of a siren or fog-horn to notify all personnel of an emergency situation.
- An assembly point will be designated in the compound area and will be marked with a sign. All site personnel will assemble at this point.
- A roll call will be carried out by the Site Security Officer to account for all personnel on site.
- The Site Security Officer will inform the Site Supervisor/ Manager when all personnel have been accounted for. The Site Supervisor/ Manager will decide the next course of action, which be determined by the situation that exists at that time and will advise all personnel accordingly.

All personnel will be made aware of the evacuation procedure during site induction. The Fire Services Acts of 1981 and 2003 require the holding of fire safety evacuation drills at specified intervals and the keeping of records of such drills.

5.2 Environmental Emergency Response Procedure

5.2.1 Excessive Peat Movement

Where there is excessive peat movement or continuing peat movement identified at any location within the site, but no apparent signs of distress to the peat (e.g. cracking, surface rippling) then the following shall be carried out.

- All activities shall cease within the affected area.
- Increased monitoring at the location shall be carried out. The area will be monitored, as appropriate, until such time as movements have ceased.
- Re-commencement of limited site activity shall only start following a cessation of movement and the completion of a geotechnical risk assessment by a geotechnical engineer.

5.2.2 Onset of Peat Slide

Where there is the onset or actual detachment of peat (e.g. cracking, surface rippling) then the following shall be carried out.

- On alert of a peat slide incident, all site activities will cease and all available resources will be diverted to assist in the required mitigation procedures.
- Where considered possible action will be taken to prevent a peat slide reaching any watercourse. This will take the form of the construction of check barrages on land. Due to the terrain, the possible short run-out length to watercourses, speed of movement and the inability to predict locations it may not be possible to implement any on-land prevention measures, in this case a watercourse check barrage will be implemented.
- For localised peat slides that do not represent a risk to a watercourse and have essentially come to rest the area will be stabilised initially by rock infill, if required. The failed area and surrounding area will then be assessed by the engineering staff

and stabilisation procedures implemented. The area will be monitored, as appropriate, until such time as movements have ceased.

5.2.3 Spill Control Measures

Every effort will be made to prevent an environmental incident during the Prospective Development. Oil/fuel spillages are one of the main environmental risks that will exist on the site which will require an emergency response procedure. The importance of a swift and effective response in the event of such an incident occurring cannot be over emphasised. The following steps will be implemented in the event of such an incident:

- The source of the spill will be stopped, and the alarm will be raised to alert people working in the vicinity of any potential dangers.
- If applicable, any sources of ignition will be eliminated in the immediate vicinity of the incident.
- The spill will be contained using the spill control materials, track mats or other material as required. Do not spread or flush away the spill.
- If possible, any vulnerable areas will be covered or bunded off where appropriate such as drains, watercourses or sensitive habitats.
- If possible, clean up as much as possible using the spill control materials.
- Any used spill control material will be contained and disposed of appropriately using a fully licensed waste contractor with the appropriate permits so that further contamination is limited.
- The ECoW will be notified immediately giving information on the location, type, and extent of the spill so that they can take appropriate action.
- The ECoW will inspect the site and ensure the necessary measures are in place to contain and clean up the spill and prevent further spillage from occurring.
- The ECoW will notify the appropriate regulatory body such as Galway County Council, and the Environmental Protection Agency (EPA), if deemed necessary.

The importance of a swift and effective response in the event of such an incident occurring cannot be over emphasised. Environmental incidents are not limited to just fuel spillages. Therefore, any environmental incident will be investigated in accordance with the following steps.

- The ECoW must be immediately notified.
- If necessary, the ECoW will inform the appropriate regulatory authority. The appropriate regulatory authority will depend on the nature of the incident.
- The details of the incident will be recorded on an Environmental Incident Form which will provide information such as the cause, extent, actions and remedial measures used following the incident. The form will also include any recommendations made to avoid reoccurrence of the incident.
- If the incident has impacted on an ecologically sensitive receptor, such as a sensitive habitat, protected species or designated conservation site (pSPA or cSAC), the ECoW will liaise with the Project Ecologist.
- If the incident has impacted on a sensitive receptor such as an archaeological feature the ECoW will liaise with the Project Archaeologist.
- A record of all environmental incidents will be kept on file by the ECoW and the Main Contractor. These records will be made available to the relevant authorities such as Galway County Council, EPA if required.

The ECoW will be responsible for any corrective actions required as a result of the incident e.g. an investigative report, formulation of alternative construction methods or environmental sampling, and will advise the Main Contractor as appropriate.

5.3 Contact the Emergency Services

In the event of requiring the assistance of the emergency services the following steps will be taken:

Stay calm. It is important to take a deep breath and not get excited. Any situation that requires 999/112 is, by definition, an emergency. The dispatcher or call-taker knows that and will try to move things along quickly, but under control.

Know the location of the emergency and the number you are calling from. This may be asked and answered a couple of times but do not get frustrated. Even though many emergency call centres have enhanced capabilities meaning they are able to see your location on the computer screen they are still required to confirm the information. If for some reason you are disconnected, at least emergency crews will know where to go and how to call you back.

Wait for the call-taker to ask questions, then answer clearly and calmly. If you are in danger of assault, the dispatcher or call-taker will still need you to answer quietly, mostly "yes" and "no" questions.

If you reach a recording, listen to what it says. If the recording says your call cannot be completed, hang up and try again. If the recording says all call takers are busy, WAIT. When the next call-taker or dispatcher is available to take the call, it will transfer you.

Let the call-taker guide the conversation. He or she is typing the information into a computer and may seem to be taking forever. There is a good chance, however, that emergency services are already being sent while you are still on the line.

Follow all directions. In some cases, the call-taker will give you directions. Listen carefully, follow each step exactly, and ask for clarification if you do not understand.

Keep your eyes open. You may be asked to describe victims, suspects, vehicles, or other parts of the scene.

Do not hang up the call until directed to do so by the call taker.

Due to the remoteness of the site it may be necessary to liaise with the emergency services on the ground in terms of locating the site. This may involve providing an escort from a designated meeting point that may be located more easily by the emergency services. This should form part of the site induction to make new personnel and sub-contractors aware of any such arrangement or requirement if applicable.

5.4 Contact Details

A list of emergency contacts is presented in Table 5-2. A copy of these contacts will be included in the Site Safety Manual and in the site offices and the various site welfare facilities.

Table 5-2 Emergency Contacts

Contact	Telephone no.
Emergency Services – Ambulance, Fire, Gardaí	999/112
Doctor – Lakeshore Medical Centre	(091) 841 509
Hospital – University Hospital Galway	(091) 524 222
ESB Emergency Services	1850 372 999

Contact	Telephone no.
Gas Networks Ireland Emergency	1850 20 50 50
Gardaí – Loughrea Garda Station.	091 842 870
Health and Safety Co-ordinator - Health & Safety Services	TBC
Health and Safety Authority	1890 289 389
Inland Fisheries Ireland (IFI)	1890 347 424
Project Supervisor Construction Stage (PSCS): TBC	TBC
Project Supervisor Design Stage (PSDS): TBC	TBC

5.4.1 Procedure for Personal Tracking

All operatives on site without any exception will have to undergo a site induction where they will be required to provide personal contact details which will include contact information for the next of kin.

In the event of a site operative becoming in an emergency situation where serious injury has occurred and hospitalisation has taken place, it will be the responsibility of the Site Manager or next in command if unavailable to contact the next of kin to inform them of the situation that exists.

5.5 Induction Checklist

Table 5-3 provides a list of items highlighted in this ERP which must be included or obtained during the mandatory site induction of all personnel that will work on the site. This will be updated throughout the various stages of the project.

Table 5-3 Emergency Response Plan Items Applicable to the Site Induction Process

ERP Items to be included in Site Induction	Status
All personnel will be made aware of the evacuation procedure during site induction	
Due to the remoteness of the site it may be necessary to liaise with and assist the emergency services on the ground in terms of locating the site. This may involve providing an escort from a designated meeting point that may be located more easily by the emergency services. This should form part of the site induction to make new personnel and sub-contractors aware of any such arrangement or requirement if applicable.	
All operatives on site without any exception will have undergo a site induction where they will be required to provide personal contact details which will include contact information for the next of kin.	

6. MITIGATION MEASURES

All mitigation measures relating to the Project were set out in the various sections of the Environmental Impact Assessment Report (EIAR), NIS, remedial Environmental Impact Assessment (rEIAR), and remedial NIS prepared as part of the planning permission applications to An Bord Pleanála.

This section of the CEMP groups together all of the mitigation measures presented in the above documents.

All mitigation measures across all phases of the Project to date are outlined in Table 6-1 below. Mitigation measures proposed for the Prospective Development are outlined in Table 6-2. Mitigation measures proposed for the Retained Development are outlined in Table 6-3.

By presenting the mitigation proposals in the below format in Tables 6-2 and 6-3, it is intended to provide an easy to audit list that can be reviewed and reported on during the project. The tabular format in which the below information is presented, can be further expanded upon during the course of the project to provide a reporting template for site compliance audits

Table 6-1 Mitigation Measures – Implemented to Date

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure
Construction Phase			
Population and Human Health			
MM1	Health and Safety	Chapter 5 Section 5.4.2.6	The Project was constructed in accordance with all relevant Health and Safety Legislation, including: › Safety, Health and Welfare at Work Act 2005 (No. 10 of 2005); › Safety, Health and Welfare at Work (General Application) (Amendment) Regulations 2016 (S.I. No. 36 of 2016); › Guidelines on the Procurement, Design and Management Requirements of the Safety, Health and Welfare at Work (Construction) Regulations 2006; › Safety, Health and Welfare at Work (Work at Height) Regulations 2006 (S.I. No. 318 of 2006).
MM2	Noise	Chapter 5 Section 5.4.2.8	The Irish Planning Institute Wind Energy Guidelines (1995) recommended that wind farms should be located a minimum distance of 500m from existing dwellings although it is stated that this distance may vary from site to site. The nearest turbine was constructed about 2000m from the nearest occupied dwelling, well outside recommendations.
MM3	Traffic and Transport	Chapter 5 Section 5.4.2.9	› Significant volumes of construction materials were sourced on-site thereby reducing impacts on the surrounding transport network in relation to material movements to the site. › Deliveries of abnormal loads were undertaken in the hours of darkness as much as possible in order to minimise impacts on road users and effects experienced by them.

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure
MM4	Pollution of Water Supply	Chapter 5 Section 5.4.2.10	Concrete wash-out areas were established for the purpose of capturing washout water from ready-mix concrete lorries. All concrete lorries delivering ready-mix concrete to the site were required to wash-out their vehicles at these specific wash-out points upon completion of their concrete deliveries and prior to exiting the site. Spill kits were available and used to deal with any minor or localised oils and / or fuels from the machinery in operation at the site and the re-fuelling of that machinery. Drip trays were used during refuelling. The offsite measures to minimise the impact of the peat slide included the installation of a 10 no. barrages, two within the wind farm boundary with the remaining eight, (of which four remain in place) along the route of the slide on Coillte land between the wind farm and Flaggy Bridge on the R353. Following the initial peat slide mitigation measures, the contractor was instructed to carry out further precautionary drainage measures as follows: › Improvement of drainage in the slide area of the wind farm, clearance of obstructions and release of any visibly trapped water and construction of silt traps. › Cleaning out of 3 no. gorges (pre-existing narrow steep-sided streams adjacent to offsite repositories) including construction of areas locally from available materials (trees, brash, boulder clay, etc.) to store removed peat, removal of sidecasting of the removed peat, provision of silt traps as necessary and possible reduction of rock barrage. › Re-establishment of the original stream and access road at Black Road Bridge to include construction of areas to store removed peat from available materials (trees, brash, boulder clay, etc.), removal and side casting of the removed peat, provision of silt traps as necessary.
Biodiversity (Terrestrial Ecology)			
MM5	Off-site Peat slide Works	rEIAR Chapter 6 Section 6.4.3	Emergency measures were undertaken to address significant impacts arising from the peat slide in 2003. These emergency measures, which mainly involved the installation of barrages and creation of repositories for peat debris, largely related to the safeguarding of downstream water quality and reducing the risk of further peat slides.

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure
MM6	Bats	rEIAR Chapter 6 Section 6.4.3.3	In relation of the peat slide, the damage of three bridges may have resulted in the loss of potential roosting features for bats. Bat Conservation Ireland provides guidance for planners, engineers and developers on appropriate mitigation for the loss of roosting opportunities in bridges stating: *"Ready-made roosting boxes or tubes are available and can be easily inserted into structures to provide roosting sites for bats. Where natural crevices are not available or cannot be retained, a bat tube should be attached to the structure. Ensure that the bat tube is located at sufficient height (at least 1m) above winter flood waters to prevent residing bats from being drowned. Bat boxes are also available for attachment to mature trees or buildings"(BCI, 2010)* A minimum of two bat boxes will be fixed to Black Road Bridge (Bridge C) and Flaggy Bridge. Two boxes will also be placed on Black Road Bridge (Bridge B) rather than Slattery's Bridge.
		Land, Soils, and Geology	
MM7	Mitigation of Stability Impacts	rEIAR Chapter 8 Section 8.6.2.1.2	***Construction Management and Supervision*** › The civil works were carried out by an experienced earthworks and civil contractor – Ascon Ltd. (now BAM Civil). › The works were carried out under the supervision of ESBI engineers with experience of construction for wind farms on upland blanket bogs in Ireland. ***Site Access Tracks*** › A basal layer of brash and small trees and 1-2 layers of geogrid reinforcement were incorporated into the design of the floating roads to minimise the thickness of granular rockfill used to construct the roads, and to spread the dead load of the road evenly over the surface of the intact peat. › On the north side of the site the access track between Turbines T50 and T47 was originally aligned along the north side of the turbines – in close proximity to the edge of the steep slopes on that side of the site. At an early stage in construction the track was re-aligned to the south side of the turbines to move it further back from the edge of the steep slopes.

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure
			Spoil Management › Peat and glacial till excavated from the turbine foundations sidecast on the intact peat slopes adjacent to the excavations was spread out over the surface of the peat, generally to a depth of 0.5-1.5 m, to minimise the dead load surcharge and distribute it over a wide area. › The live load surcharge from construction plant operating on the peat slopes was minimised through a combination of long reach excavators operating on the access tracks, and LGBP (low ground-bearing pressure) wide-tracked excavators operating on the peat. ***Stability of Peat Excavations at Turbine Foundations*** Wherever possible the temporary peat slopes at the turbine foundations were battered back to a stable temporary slope angle of 1V:1H or flatter. Where the sides of the excavations were unstable in deep weak peat, rockfill was backfilled up against the slopes as temporary support. ***Drainage*** Some improvements were carried out to the existing drainage network on the site to clear out blocked drains, to relieve groundwater levels in areas of deep peat, and to prevent ponding of surface runoff in areas where the access roads and turbines were constructed. Culverts were also installed under the new site access tracks to preserve the existing hydrology. ***Borrow Pits*** Borrow pits were opened up on the site to extract rock and process it into the granular rockfill that was used to construct the site access tracks and crane hardstandings. Blasting was only carried out in Borrow Pit No.3, near the site entrance. The blasting was carried out by an experienced licensed professional and charge delays were used to minimise blast-induced vibrations.

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure
			Tree Felling Tree felling works were carried out by experienced specialist subcontractors under the management of Coillte. The trees were felled and gathered using specialised forestry equipment comprised of a wide-tracked hydraulic excavator fitted with a harvesting attachment and 8-12 tonne rubber-tyred forwarders that have been widely used in commercial conifer forests on upland blanket bogs in Ireland. › In areas of soft peat the contractors placed timber brash and trimmed branches along the access routes of the harvesters and forwarders through the forest to spread out the concentrated live load surcharge under the tracks or tyres of the machines.
MM8	Mitigation of Direct Impacts	rEIAR Chapter 8 Section 8.6.2.2.1	***Mitigation of Direct Impacts*** During the second phase of construction in 2004/2005, Turbine T16 and a 475 m long section of floating road between Turbines T15 and T17 were omitted from the scope of work on the project as a precautionary measure out of concerns for site stability in the area, which was close to where the peat slide occurred in October 2003 and had similar topography and ground/groundwater conditions. The sections of partially completed floating roads that had been constructed between T15 and T17 at the time of the slide were closed and abandoned.
MM9	Wind Farm Site: Construction Phase (2003-2006) – After the October 2003 Peat Slide	rEIAR Chapter 8 Section 8.6.2.2.2	***Instrumentation and Monitoring*** 4 No. clusters of instrumentation were installed to monitor groundwater levels and ground movements in the peat around the perimeter of the site near Turbines T2, T18, T34 and T49/50. At each location: › 3 No. vibrating-wire push-in piezometers were installed to provide a continuous record of daily and seasonal groundwater level fluctuations [12 No. total]. › 3-4 No. electronic tiltmeters provided a continuous record of any downslope movement or creep in the peat at the sensor locations [15 No. total].

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure
			The electronic sensors were connected to a central logger unit in each area. The logger units were fitted with GSM cards to allow remote access to the data, which was downloaded regularly to a central server. The tiltmeters were set up with an automated alarm system to alert wind farm technical representatives of incidents of peat movement that exceeded pre-defined limits for rapid response. ***Geotechnical Supervision and Certification*** The level of geotechnical supervision for the civil works contract was significantly increased for the second phase of construction on the site in 2004/2005. AGL Consulting were appointed by the main contractor Ascon Ltd. (now BAM Civil) to provide geotechnical analysis, design, supervision and inspection services for the project from October 2003 and the end of the civil works in 2005. The scope of services included: › An assessment of the peat slide, including walkover surveys, specialised sampling and testing of the peat, stability analyses and computer modelling. › Specification, supervision and reporting of supplemental geotechnical investigations on the site. › Slope stability analyses for all of the floating roads. › Identification and assessment of suitable peat repository sites. › Inspection of full-scale load testing on the floating roads. › Assessment and monitoring of the impact of blast-induced vibrations on peat. › Periodic site inspections and attendance at progress meetings by a Geotechnical Director. › Full-time on call office-based technical support. › Review and certification of the Contractor's Method Statements. Engineers from ESB International had a full-time presence on site to supervise the civil works, manage the Permit to Work scheme, and coordinate with the mechanical/electrical sub-contractors. Geotechnical engineers from ESBI also carried out extensive supplemental ground investigations to establish the depth and strength of the peat across the site to assess the potential

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure
			impact of tree felling operations on peat stability. They also carried out site inspections, reviewed Contractor's design submittals and attended project meetings. Applied Ground Engineering Consultants (AGEC) provided geotechnical services to ESBI between October 2003 and the end of the civil works contract in 2005 including: › An appraisal of site stability after the peat slide, with detailed walkover surveys, supplemental ground investigations (peat probing and in-situ vane shear testing), and slope stability analyses. › Review of technical submittals from the Contractor, including certified method statements and reports for additional geotechnical investigations, site stability analyses, and in-situ testing. › Periodic site inspections and attendance at project meetings. ***Supplemental Geotechnical Investigations*** Comprehensive supplemental geotechnical investigations were carried out after the peat slide in October 2003 to characterise the depth and material characteristics of the peat, glacial till and bedrock across the site, as well as the groundwater levels in the peat. In general, the scope of the supplemental investigations included: › A desk study review of aerial photography – including 3D stereoscopic imaging. › Detailed walkover surveys and inspections by suitably qualified and experienced geotechnical engineers. › Aerial LiDAR surveys, satellite GPS surveys, and in-situ slope angle measurements with a hand-held Abney Level to characterise the site topography. › Extensive peat probing, in-situ vane shear testing, undisturbed sampling and specialised laboratory testing to characterise the depth, strength and material characteristics of the peat. › Rotary coring at the remaining turbine foundations to determine the strength of the cohesive glacial till overburden below the peat and the depth to competent rock. › Installation of manual and electronic piezometers in the peat to monitor groundwater levels.

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure
			Analysis and Testing of the Floating Roads The mitigation measures for the floating roads on the peat consisted of: › Supplemental investigations. › Stability analyses. › Full-scale serviceability and proof load tests on the working roads. › A trial load test on a test section of floating road. › Remedial works to improve the performance of sections of the floating roads. › Site controls. › Modifications to the site access tracks in the vicinity of the slide. ***Assessment of the Excavations for the Turbine Foundations & Crane Hardstandings*** The mitigation measures for the excavation of the turbine foundations and crane hardstanding areas consisted of: › Supplemental investigations. › Stabilisation measures and temporary works designs for the side slopes around the perimeter of the excavations. › Review and certification of the Contractor's Method Statements. ***Spoil Management & Disposal – Peat Repository Sites*** After the peat slide strict controls were placed on the disposal of peat and glacial till excavated from the turbine foundations, crane hardstanding areas, substation site, borrow pits and anemometer masts. The heavier glacial till was segregated from the peat and stored in the borrow pits so that it was not placed on the intact peat slopes. The majority of the excavated peat was stored to a maximum depth of 1.0 m in designated repository areas on the intact peat slopes in suitable areas of flat or gently sloping ground on the site. A small volume of the peat was stored within rockfill bunds in Borrow Pits BP-2 and BP-3. The additional mitigation measures that were implemented for the peat repository sites on the slopes included:

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure
			› Desk studies and walkover surveys. › Supplemental investigations. › Stability analyses. › Geotechnical certification. › Site control measures. ***Tree Felling*** The following monitoring and risk mitigation measures were implemented for the felling of the trees that were remaining on the site after the slide: › Extensive geotechnical investigations comprised of peat depth probes, in-situ vane shear tests, slope angle measurements, piezometers and undisturbed gouge auger core sampling were carried out across the site by ESB International to assess the stability of the peat on the site for the tree felling operations. › Site stability analyses were carried out in order to inform the appropriate felling methodology for various areas across the site. › The trees were left in place in areas that were considered unsuitable for the mechanical harvesting and forwarding equipment. › Where clear felling was permitted the works were carried out by experienced specialist subcontractors under the management of Coillte. › The trees were felled and gathered using specialised equipment that has been widely used in commercial conifer forests on upland blanket bogs in Ireland. › In areas of soft peat, the contractors placed timber brash and branches under the harvester tracks to spread out the concentrated live load surcharge on the surface of the peat. › Where the trees were too small for the harvesting machinery, the trees were felled by hand. Some of the larger trees in these areas were felled with a light machine harvester, formed into windrows and left in place on the slopes.

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure
			Rock Blasting in Borrow Pit No.3 Blasting was carried out in Borrow Pit No.3 (BP3) to extract the rock that was processed into granular fill for the construction of the floating roads, and the hardstanding areas for the crane pads, substation and anemometer masts. The following monitoring and mitigation measures were implemented to confirm that the large peat slide that occurred in 2003 was outside the range of the blast-induced vibrations from the borrow pit, and that the peak particle velocity and acceleration of the vibrations were within acceptable limits: › The blasting was carried out by a suitably qualified fully licensed professional. › The pattern, sequence, timing and maximum instantaneous charge of the blasts were designed to minimise blast-induced vibrations on the slopes around the perimeter of the borrow pit. › Vibration monitoring was carried out on the site for the blasts. › AGL Consulting carried out a comprehensive review of the blast monitoring records to establish threshold limits for the Peak Particle Velocity (PPV) and Peak Particle Acceleration (PPA) of the blast-induced vibrations, and to establish the radius of impact for the blasting. › Glacial till excavated from the site was used to construct a berm along the face of the peat at the top of the rock slope around the perimeter of the borrow pit to act as a shear key to prevent a localised peat slide inundating the pit where the surrounding slopes were sloping down towards the pit. ***Drainage*** The following risk mitigation measures were also implemented for the drainage works: › Wherever possible, minor drainage works were carried out by hand to avoid machine or equipment loading on the peat. › Where mechanical excavators were required the works were carried out using wide-tracked LGBP 10-13 tonne excavators suitable for working directly on the peat. › The peat excavated from the trenches was sidecast on the adjacent intact peat slopes and spread out to depths typically <0.5 m.

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure
			› Where large culverts were constructed at road crossings over the main watercourses on the site all of the peat was excavated out from under the culverts and granular surround to avoid surcharge loading on the peat. ***Cable Trenching & Ducting*** The following risk mitigation measures were implemented for the cable trenching and ducting: › The alignment of the cable trenches were designed to follow the shortest, most direct route across the site to the control building with the minimum number of road crossings. › Most of the cable trenches were aligned alongside the site access tracks so that the cable spools could be transported along the floating roads, minimising construction traffic on the intact peat slopes. › The cable trenches in the peat were excavated using wide-tracked LGBP 10-13 tonne excavators suitable for working directly on the peat. › To minimise the impact of the road crossings on the floating roads the new ducts were pushed horizontally through the peat under the roads to avoid having to open up a trench across the road, which would cut through the geogrid reinforcement. › The works were carried out by specialist sub-contractors who were experienced with similar work for wind farms on upland blanket bogs in Ireland.
MM10	Grid Connection: Construction Phase (2003-2006)	rEIAR Chapter 8 Section 8.6.3.1	***Tree Felling*** › Tree felling works were carried out by experienced specialist subcontractors under the management of Coillte. The trees were felled and gathered using specialised forestry equipment comprised of a wide-tracked hydraulic excavator fitted with a harvesting attachment and 8-12 tonne rubber-tyred forwarders that have been widely used in commercial conifer forests on upland blanket bogs in Ireland. › In areas of soft peat the contractors placed timber brash and trimmed branches along the access routes of the harvesters and forwarders through the forest to spread out the concentrated live load surcharge under the tracks or tyres of the machines.

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure
			Site Access Track › In a single area of deep peat along the route of the OHL, a temporary floating access was constructed in order to provide access to AM38, around 600m north of the Agannygal substation. In this instance existing trees were felled and placed to form a 'floating road' mat of timber on the OHL corridor for access to the mast location. This mat of timber would spread the dead load of the road evenly over the surface of the intact peat. ○ For the remainder of the grid connection, access to the masts was from existing roads and forestry tracks. Construction for access to masts consisted of removal and disposal locally of peat (less than 1m typically) and tree stumps/brash to competent material to allow access for tracked excavators and dumpers and a rough terrain crane.
	Peat Slide and Response Works: Construction Phase (2003-2006) – After the October 2003 Peat Slide	rEIAR Chapter 8 Section 8.6.4.1.1	In order to restrict the movement of the slide debris, which was essentially peat, a series of barrages were constructed. These were constructed between the wind farm project site boundary and downslope of the Flaggy Bridge on the R353 local road. The permanent barrages (1-4) comprised coarse rock fill which was placed onto competent ground.
MM11	Peat Slide and Response Works: Construction Phase (2003-	rEIAR Chapter 8 Section 8.6.4.1.2	***Construction of Floating access tracks to Barrages 1 and 2*** An access track 830m in length was constructed from an existing Coillte forest track in order to access the location of barrage 1 and replace the Coillte access track removed by the slide. The access track comprised a western and eastern section. The access track to the west of barrage 1 was constructed as a floating track on peat. The eastern access track was founded on competent ground.

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure
	2006) – After the October 2003 Peat Slide		A floating access track 300m in length was constructed from an existing Coillte forest track in order to access the location of barrage 2. The floating access track was constructed on peat. Both access tracks were designed to the appropriate standards and constructed using low pressure bearing pressure excavators when working on peat or were constructed from the existing section of track. Construction of these tracks was closely monitored to ensure that no peat stability issues arose. ***Construction of Barrages to Restrict the Movement of Debris*** In order to restrict the movement of the slide debris, which was essentially peat, a series of barrages were constructed. These were constructed between the wind farm project site boundary and downslope of the Flaggy Bridge on the R353 local road. The permanent barrages (1-4) comprised coarse rock fill which was placed onto competent ground, which avoided any loading of peat. ***Construction of Repositories to Store Slide Debris*** The majority of the peat was stored to a maximum depth of 1.0 m in designated repository areas on the intact peat slopes in suitable areas of flat or gently sloping ground on the site. **Site controls** were implemented on site for the use of the peat repository areas, i.e.: › The boundaries of the approved repository sites were clearly marked out on site with survey tape between probe locations. › The depth of excavated peat that was placed in the site was strictly limited to 1.0 m and no temporary stockpiling was permitted on the peat slopes. ***Construction Traffic on Intact Peat*** Construction traffic was required to pass over intact peat during the construction of some of the barrages, peat repositories and other construction activities. In general, construction machines that trafficked over particularly deeper peat would have been light

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure
			or low ground bearing pressure (LGBP) wide-tracked machines suitable for working on the peat. The risk of a peat slide under such machines loading would be limited.
			Hydrology and Hydrogeology
MM12	Felling of Forestry	rEIAR Chapter 8 Section 9.4.1.2	The methodology agreed for carrying out felling between ESBI and Coillte included the requirement that existing drains be regularly inspected and maintained. Immediately following clearance of plots on site, the drainage in that area was to be evaluated and any required drainage works carried out. The suitability of new drain designs for the terrain of any given felling area was also to be re-evaluated on site following felling. Silt traps were installed along all newly constructed drains before they entered any pre-existing drainage systems or watercourses and were subject to regular maintenance. Drainage discharges were monitored for suspended solids content to determine the effectiveness of silt traps. All available records of this monitoring noted no cause for concern.
MM13	Suspended Solids – Wind Farm, OHL Route and Grid Connection	rEIAR Chapter 8 Section 9.4.1.3	At each turbine base during construction, in cases where water ponded in the excavation, this was removed using 4-inch or 6-inch mobile pumps and pumped to a nearby existing drain, often over ground on existing vegetation. Any silt resulting from this pumped water was captured by both existing vegetative matter and constructed straw bales which connected into the local existing drainage. When the turbine bases were completed, a buried drain was installed around the turbine bases, the outlets of which were connected into the surface drainage network. Given that the new drainage for each of the turbines would not have been inserted until completion of the turbine foundations, the risk of significant washout of solids was minimised.
MM14	Suspended Solids – Wind Farm, OHL Route and Grid Connection	rEIAR Chapter 9 Section 9.4.1.3	Pre-existing drainage on the wind farm site was maintained and any of this drainage affected by access tracks or turbine base construction was directed into a suitable known watercourse and through a silt trap prior to the water leaving the site. Where works were being carried out in areas of deep peat or poor ground conditions the drains were piped through and backfilled to reduce the risk of sediment loss. Additional measures practised on site to mitigate against the occurrence of silty water included: › Reducing the amount of mud on haul roads and areas of hardstanding.

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure
			› Preventing water entering excavations. Excavations were opened for short periods of time where feasible and drainage water was locally diverted away. › Controlling surface water runoff from spoil mounds. › Providing sumps as required for local silt control. › Regular monitoring of streams by contractor staff.
MM15	Hydrocarbons and Cement	rEIAR Chapter 9 Section 9.4.1.5	A number of mitigation measures were put in place to address the risk to both surface and groundwater. Concrete wash-out areas were established for the purpose of capturing wash-out water from ready-mix concrete lorries. All concrete lorries delivering ready-mix concrete to the site were required to wash-out their vehicles at these specific wash-out points upon completion of their concrete deliveries and prior to exiting the site. Spill kits were available and used to deal with any minor or localised oils and / or fuels from the machinery in operation at the site and the re-fuelling of that machinery. Drip trays were used during refuelling.
MM16	Drainage Diversions	rEIAR Chapter 9 Section 9.4.1.8	Following the initial peat slide mitigation measures, the contractor was instructed to carry out further precautionary drainage measures as follows: › Improvement of drainage in the slide area of the wind farm, clearance of obstructions and release of any visibly trapped water and construction of silt traps. › Cleaning out of 3 no. gorges (pre-existing narrow steep-sided streams adjacent to offsite repositories) including construction of areas locally from available materials (trees, brash, boulder clay, etc.) to store removed peat, removal of sidecasting of the removed peat, provision of silt traps as necessary and possible reduction of rock barrage. › Re-establishment of the original stream and access road at Black Road Bridge to include construction of areas to store removed peat from available materials (trees, brash, boulder clay, etc.), removal and side casting of the removed peat, provision of silt traps as necessary.
Air and Climate			
MM17	Construction Phase Impacts (2003-2006)	rEIAR Chapter 10	› Dust suppression measures were implemented on site to minimise the potential nuisance caused by dust at the nearest sensitive receptors and on sensitive eco systems. Water misting was used as required if particularly dusty activities were necessary on site during dry and/or windy conditions. › All site related traffic had speed restrictions on un-surfaced roads.

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure
		Section 10.1.4.2	› Regular inspection of the site was undertaken to examine dust measures and their effectiveness. › All plant and materials vehicles were stored in dedicated areas (on site). › Turbines and construction materials were transported away from the site on specified haul routes only. › The agreed haul route roads adjacent to the site was regularly inspected for cleanliness and cleaned as necessary. › The Site access roads were checked regularly for damage/potholes and repaired as necessary. › The transport of construction materials which had the potential to generate dust was undertaken with tarpaulin cover or similar, where necessary.
MM18	Construction Phase Impacts (2003-2006)	rEIAR Chapter 10 Section 10.2.6.2	› Construction staff were trained how to inspect and maintain construction vehicles and plant to ensure good operational order while onsite, thereby minimising any emissions that arise. › All plant and materials vehicles were stored in dedicated areas (onsite). Machinery will be switched off when not in use. › Turbines and construction materials were transported to the site on specified routes only, unless otherwise agreed with the Planning Authority. › The expected waste volumes generated onsite are unlikely to be large enough to warrant source segregation at the site. Therefore, all wastes streams generated onsite were deposited into a single waste skip which was covered. ○ This waste material was transferred to a licensed /permitted Materials Recovery Facility (MRF) by a fully licensed waste contractor where the waste will be sorted into individual waste streams for recycling, recovery or disposal. ○ The MRF was local to the Project to reduce the emissions associated with vehicle movements › A Construction and Environmental Management Plan (CEMP) was in place throughout the construction phase.
Cultural Heritage			
MM19	Construction Phase	rEIAR Chapter 12	The construction of the temporary site compound areas, site access tracks, turbine foundations, turbine hardstands, substation compounds, underground low-voltage (LV) cables and ducting, borrow pits / quarries and drainage channels were subject to continuous archaeological monitoring during the construction phase and nothing of archaeological significance was identified.

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure
	Impacts (2003-2006)	Section 12.4.1	
			Material Assets
MM20	Construction Phase Impacts (2003 –2006)	rEIAR Chapter 14 Section 14.1.4.1	During the construction of the Project, the following mitigation measures were implemented in order to reduce significant effects relating to roads, traffic and transport: › Significant volumes of construction materials were sourced on-site thereby reducing impacts on the surrounding transport network in relation to material movements to the site.
			Major Accidents and Natural Disasters
MM21	Construction Phase Mitigation	rEIAR Chapter 15 Section 15.4.6.1	Following the peat slide, a significantly increased level of site investigation was carried out and assessments of each activity separately and in combination (using current risk assessment methodologies) were undertaken. Mitigation measures were implemented to prevent any further peat instability on the site. These broadly consisted of: › Additional geotechnical investigations, stability analyses, testing, monitoring and geotechnical supervision during the construction stage of the project (e.g. geotechnical assessment and full-scale proof testing of floating roads). › Changes to the site characteristics due to improved drainage and an increase in the strength of the peat under sustained dead load surcharges (i.e. the floating roads, peat repositories and material side cast areas); and › Disposal of excavated material in designated repositories on the peat slopes where the peat stability had been assessed as having an adequate margin of safety, and in the borrow pits Emergency Management Plan: During the construction phase, an emergency plan was in place, which: › Identified the hazards on site › Listed contact numbers of emergency services

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure
			› Defined the roles and responsibilities of key personnel on site › Detailed emergency procedures in the event of specific major accidents › Outlined the safety systems available which would reduce the impact of a major accident Site emergency procedures were updated following the peat slide.
Operational Phase			
Population and Human Health			
MM22	Health and Safety	rEIAR Chapter 5 Section 5.4.3.2	Derrybrien Wind Farm operated a Safety Management System (SMS) which met the requirements of OHSAS 18001. Derrybrien Wind Farm operated an emergency procedure. This covered procedure in event of accidents, lone working, persons falling into water, forest/gorse fire, fire in wind turbine towers and procedure in event of landslide. Contact details are provided for emergency services, including the local authority and An Garda Síochána.
MM23	Accidents and Natural Disasters	rEIAR Chapter 5 Section 5.4.3.3	› Mitigation measures were implemented which included instrumentation and monitoring of the site, geotechnical supervision of maintenance works and site inspections, maintenance, repair of infrastructure, as well as drainage improvement and maintenance.
MM24	Water Quality Impacts	rEIAR Chapter 5 Section 5.4.3.3.2	An Envirocare P6 sewage treatment plant unit caters for the wastewater generated in these facilities. It is regularly serviced under a maintenance contract with Environmental Services. At Agannygal Substation wastewater is adequately treated by a Biocycle wastewater treatment system before discharge off site.
Biodiversity			
MM25	Impact on Winter Bird Species	rEIAR Chapter	Any required significant maintenance works, such as track repairs or cutting of trees (as in 2018-19), were done outside of the bird breeding season so as to avoid disturbance to nesting birds.

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure
		6 Section 6.4.4.2.9	
			Land, Soils, and Geology
MM26	Mitigation of Stability Impacts	rEIAR Chapter 8 Section 8.6.2.3.1	***Instrumentation and Monitoring*** › Between 2006 and 2012 ESBI continued to monitor groundwater levels and movement in the peat at the clusters of electronic piezometers and tiltmeters installed near Turbines T2, T18, T34 and T49/50. › The instruments were decommissioned in 2014 as some of them showed signs of malfunction. It was considered that they had been in place for a sufficient period of time to ensure that they were exposed to a range of environmental conditions on the site, and they did not indicate any evidence of peat instability. › In May 2005, 7 No. monitoring points were established on the peat within the slide area for long-term monitoring of movement and settlement of the disturbed peat. The ITM coordinates and level of the monitoring points were recorded periodically by GPS surveys between 2005 and 2020. ***Geotechnical Supervision and Inspections*** › Gort Windfarms Ltd. (GWL) appointed a site manager who was responsible for coordinating and managing the operation of the wind farm and the maintenance of the turbines and site infrastructure. His responsibilities included regular site inspections and managing health and safety for the operation and maintenance of the wind farm, including co-ordinating and supervising access to the turbines for the large mobile cranes. › ESBI engineers carried out regular periodic geotechnical inspections of the site between 2005 and 2020 to assess maintenance requirements for short and long-term stability. The majority of the recommendations in the reports relate to maintenance works on the site access roads and site drainage which were incorporated into the maintenance programme for the site. AGL Consulting were appointed by ESB International to provide geotechnical support services periodically over the operation and maintenance phase of the project between 2011 and 2020, including: › Site inspections and walkover surveys by Senior Geotechnical Engineers and Geotechnical Directors (2011, 2014 & 2018). › Inspection and certification of full-scale proof load tests on the floating roads in 2011, 2014 and 2018.

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure
			› Geotechnical analysis and design services for the upgrade of the floating roads in 2014, including a site-wide Peat Stability Risk Assessment. › Site supervision and office-based technical support services during construction stage of the 2014 civil contract to upgrade the floating roads, including a review and certification of the Contractor's Method Statements. ***Maintenance and Repair of the Site Access Tracks*** The following design, construction & operational risk mitigation measures were implemented for the main roads upgrade contract in 2014, which accounts for the majority of the works that were carried out on the floating roads on the site between 2006 and 2020. › In 2011 all of the site access tracks were inspected by a geotechnical engineer from AGL Consulting and full-scale proof load tests were carried out on the floating roads to assess the nature and extent of the upgrade works that would be required, and to verify the capacity and stability of the floating roads under the design crane load prior to designing the upgrade works. › For continuity of geotechnical risk management, the geotechnical engineer for AGL Consulting who carried out the 2011 inspections and the design for the 2014 upgrade works was the same person who evaluated the design and stability of the roads for the Contractor after the peat slide during the construction stage of the project in 2003/2004 – Mr. Conor O'Donnell. › To minimise the additional load on the peat where the floating roads were upgraded: ○ The roads were reinforced with an additional layer of geogrid to reduce the thickness of granular capping material required; ○ The thickness of the capping material was limited to 150 mm; and ○ The coarse granular capping material was surfaced with a nominal 20 mm thick blinding layer of fine gravel in lieu of a thicker layer of granular subbase material (Clause 804) that would normally be used. › The additional dead load on the floating roads was designed to be within the factor applied to the live load surcharge in the stability analyses [i.e. <30% of characteristic (unfactored) live load surcharge]. › Stability analyses were carried out to demonstrate that the additional load had only a minor impact on the factor of safety against bearing capacity or shear failure in the peat under the roads, and that the difference (<5-10%) was proportional to the

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure
			increase in undrained shear strength that would have already occurred in the underlying peat as it consolidated (compressed) under the weight of the roads since they were constructed in 2003-2005; › The construction stage traffic and live load surcharges were also restricted so that the combination of the temporary live load surcharge and the increased dead load on the road did not exceed the design live load surcharge for the floating roads. › A Peat Stability Risk Assessment (PSRA) was carried out in advance of construction in accordance with industry best practice guidelines to characterise the risk of peat instability across the site during the 2014 road upgrade works. › Construction stage risk mitigation measures were incorporated into the Geotechnical Risk Register for the works on site, including: ○ Designated access routes for construction plant and machinery. ○ Limits on the maximum size of plant that could be used on the roads, particularly in areas where there was a higher risk of peat instability. ○ A requirement to stockpiling granular fill materials in the crane hardstanding areas to avoid concentrated loading on the floating roads. ○ Restrictions on the way in which the fill was tipped and spread on the roads to minimise dynamic impact loads and to avoid concentrated static loads from temporary piles of rockfill that exceeded the design surcharge load of the road. ○ Compaction by static rolling only. › During construction full-time supervision of the works was carried out jointly by geotechnical engineers from AGL Consulting and ESB International to ensure that the works complied with the specification and that the specified risk mitigation measures were implemented on site. › A certification procedure was implemented for the review and approval of the Contractor's method statements to certify that reasonable skill and care was taken in ensuring that appropriate measures were implemented to mitigate against the risk of peat instability during construction. The Geotechnical Approval Certificates were issued by AGL Consulting and signed by a Director of the company. › On completion of the works, full scale proof load tests were successfully carried out on the upgraded roads, to verify the capacity of the roads under the design crane load using a mobile crane loaded with additional ballast. ***Maintenance/repair of turbines*** › The following design, construction & operational risk mitigation measures were implemented for the maintenance and repair of the turbines on the site:

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure
			› All heavy lifting operations involving mobile cranes were carried out from the hardstanding areas adjacent to the turbines so that the loads were adequately supported on the glacial till and rock below the peat. › Steel bearing plates were used to reduce the bearing pressure under the crane outrigger pads to prevent any localised bearing failure on the hardstanding areas. › The capacity of the floating roads to support the design load for the mobile cranes carrying out maintenance at the turbines was verified by full-scale proof loading at the end of the construction period in 2005, after the roads were upgraded in 2014, and again in 2018, when the narrow turbary road was also re-tested. › The comprehensive upgrade programme that was carried out on the floating roads in 2014 improved the condition and performance of the sections of roads that had deteriorated significantly since they were constructed in 2005. › The number of crane mobilisations to site during the operation and maintenance period between October 2005 and Q2 2020 was minimised by combining maintenance work on turbines, wherever possible. › The smallest size and of mobile crane with sufficient capacity for the required maintenance lifting loads was mobilised to the site; for example, based on an audit of crane movements between 2005 and 2018, which is representative of the typical operations on site to date: ○ Approximately 80% of the 86 No. crane operations on the site were carried out using a 100-tonne crane (e.g. the Liebherr LTM 1100-5.2 which is 2.75 m wide and has a total travelling weight of 60 tonnes on 5 axles, with a maximum axle load of 12 tonnes/axle). ○ All but one of the remaining operations were carried out using a 130-tonne crane (e.g. the Liebherr LTM 1130-5.1 which is also 2.75 m wide and has a total travelling weight of 60 tonnes on 5 axles, with a maximum axle load of 12 tonnes/axle). ○ 1 No. operation at Turbine T17 in July 2018 required the larger 200 tonne Liebherr LTM 1200-5.1 mobile crane, which is 3.0 m wide and has a total travelling weight of 60 tonnes on 5 axles, with a maximum axle load of 12 tonnes/axle. ○ In comparison, the design crane load for the floating roads is the 300 tonne Grove GMK6300 All-Terrain crane, which is 3.0 m wide and has a total travelling weight of 72 tonnes on 6 axles with a maximum axle load of 12 tonnes/axle. › All of the cranes were stripped of any unnecessary additional ballast when travelling across the floating roads to the turbine sites. › The cranes were transported across the site under the direct supervision of the ESB site maintenance manager.

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure
			› The cranes were driven directly to the required turbine using the shortest route across the floating roads, avoiding unnecessary turns at tight junctions where there was a risk of going off the road, or sections of floating roads that were in poor condition prior to the 2014 roads upgrade programme. › The mobile cranes were driven slowly and steadily across the floating roads within the specified site speed limit of 5 km/hr. All intermediate stopping points were on crane hardstandings adjacent to turbines, not on the roads. › Where necessary, steel plates were placed along on the edges of the floating roads to facilitate access around tight bends where there was a risk of excessive deflection on a soft verge. › Strict restrictions were placed on access for cranes along the narrow 3.0-3.5 m wide turbary road between Turbines T25 and T45. ***Maintenance/repair of Derrybrien substation and control building*** The following design, construction & operational risk mitigation measures were implemented for the maintenance and repair of the substation and control building: › All maintenance operations were carried out from the hardstanding area around the substation and control building which was designed to support the loads from the vehicles and equipment on the glacial till below the peat. › All of the vehicles and equipment were driven directly to the substation site across the minimum length of floating road. › The dead weight and axle loads of the vehicles and equipment was kept to a minimum and the loads were within the design crane load that was verified by the proof load tests that were carried out on the floating roads. › Trucks that were used to bring materials or large equipment such to the substation were escorted along the roads by the ESB site maintenance manager. › The vehicles were driven slowly and steadily across the floating roads within the specified site speed limit of 15 km/hr. ***Drainage Improvements*** The primary negative impact of the drainage improvements was the occasional localised temporary loading on the peat slopes by mechanical excavators used to clear out, deepen or realign existing drains. The following risk mitigation measures were implemented to mitigate the effect of the loading on the stability of the peat:

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure
			› Wherever possible, minor maintenance works and drain clearing was carried out by hand to avoid machine or equipment loading on the peat. › Where mechanical excavators were required the works were carried out using wide-tracked low ground bearing pressure 10-13 tonne excavators suitable for working directly on the peat. › Where significant excavations were required the excavated peat and mineral soil was removed to a secure material disposal area to avoid side-casting the material on the peat adjacent to the drain. › Where culverts were widened at road crossings all of the peat was excavated out from under the rockfill used to widen the road to avoid surcharge loading on the peat. › The inspections used to assess the requirements for maintenance and improvement works to the drainage network were typically carried out over the wetter months in winter or early spring when groundwater levels on the site were higher and drainage issues would have been more apparent. › The drainage improvement works were prioritised so that: ○ Only priority work to improve the drainage at the turbine foundations was carried out urgently in the winter or early spring. ○ All other general maintenance and drainage improvement works on the site were carried out during the drier summer months when there would be a lower risk of peat instability on the site. › Poor drainage is a recognised contributory risk factor for peat slides. Therefore, as such, the drainage improvement would in itself be a significant risk mitigation measure for site stability during the operation and maintenance of the wind farm. ***Cable Ducting*** The main work that was carried out on the cables and ducting on the site of the wind farm between October 2005 and Q2 2020 was the installation of the new ducting and fibre-optic cables for the upgrade of the turbine control systems in September 2017. The following risk mitigation measures were implemented for the works: › The length of new cable ducts that had to be installed on the site was minimised by optimising the layout of the ducts to combine clusters of fibre-optic cables on different circuits into the same duct. In this way it was possible to reduce the total length of new ducts to 2.55 km to house 7.6 km of fibre-optic cables.

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure
			› The alignment of each of the ducts follows the shortest, most direct route across the site to the control building and the number of road crossings was minimised. › The ducts were installed using a mole-plough capable of installing the ducts directly into the peat without the need for open-trench excavation and backfilling. › The mole-plough was a low ground-bearing tracked machine suitable for working directly on the peat. › To minimise the impact of the road crossings on the floating roads the new ducts were pushed horizontally through the peat under the roads to avoid having to open up a trench across the road, which would cut through the geogrid reinforcement. › The manholes were constructed on the glacial till below the peat to avoid any loading on the peat. › The works were carried out by personnel that were experienced with similar work for wind farms on upland peat bogs in Ireland. ***Forestry – Tree Topping*** › No commercial forestry planting or felling was permitted on the wind farm site during the operation and maintenance period between October 2005 and Q2 2020. › In September/October 2018, tree topping was carried out for a distance of 10 m either side of the access track in selected areas around the site. The following risk mitigation measures were implemented for the works: › The tree-topping works were limited to clearing small trees (typically conifers <4-5 m high) and shrubs that had re-grown naturally within areas that had been cleared during the construction of the wind farm. › The tree topping was carried out using a light 10 tonne wide-tracked excavator with a saw head attachment, which is a specialist low-ground bearing pressure forestry machine suitable for working directly on the peat. › All of the trimmed vegetation was cut and left in place on the peat slopes with no additional handling, which minimises machine movements and loading on the peat. › The works were carried out at the end of the drier summer months when the risk of peat instability on the site is lower. › The tree topping works were scheduled on a priority basis as part of a multi-year annual maintenance plan under the supervision of the ESB site maintenance manager. No unscheduled works were carried out.

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure
			Forestry – Timber Stockpiling In the 2017, Geotechnical Inspection Report by ESBI it was noted that stockpiles of timber that had been felled outside the wind farm site had been stockpiled on the peat near Turbine T6. Therefore, the following measures were implemented to mitigate the impact of the live load surcharge on the peat: › The timber stockpile was removed shortly after it had been reported. › No further timber stockpiling was permitted on the site.
MM27	Grid Connection: Operation & Maintenance Phase (2006-2022)	rEIAR Chapter 8 Section 8.6.3.2.1	***Maintenance/repair of Agannygal substation and control building*** The following design, construction & operational risk mitigation measures were implemented for the maintenance and repair of the substation and control building: › All maintenance operations were carried out from the hardstanding area around the substation and control building which was designed to support the loads from the vehicles and equipment on the glacial till below the peat. ***Forestry – Tree Topping*** In 2018 and 2019, tree topping was carried out along the route of the OHL to trim back some of the small trees that had re-established naturally on the slopes where clear felling had taken place. The following risk mitigation measures were implemented for the works: › The tree-topping works were limited to clearing small trees (typically conifers <4-5 m high) and shrubs that had re-grown naturally within areas that had been cleared during the construction of the grid connection. › The tree topping was carried out using a light 10 tonne wide-tracked excavator with a saw head attachment, which is a specialist low-ground bearing pressure forestry machine suitable for working directly on the peat. › All of the trimmed vegetation was cut and left in place on the peat slopes with no additional handling, which minimises machine movements and loading on the peat.

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure
MM28	Peat Slide and Response Works: Operation & Maintenance Phase (2006-2022)	rEIAR Chapter 8 Section 8.6.4.2.1	The following design, construction & operational risk mitigation measures were implemented for the maintenance of barrages 1 and 2: › All maintenance operations were carried out from the access tracks adjacent to the barrages which were designed to support the loads from the vehicles and equipment on the glacial till below the peat.
Hydrology and Hydrogeology			
MM29	Drainage Issues	rEIAR Chapter 9 Section 9.4.2.1.2	Regular maintenance has been carried out as necessary since commissioning of the wind farm. Drainage inspections are carried out monthly and following heavy rainfall or snow events. In addition to this, periodic geotechnical inspections have identified drainage maintenance issues which generally involve localised clearing out and maintaining sections of site drains.
MM30	Water Quality - Hydrocarbons	rEIAR Chapter 9 Section 9.4.2.1.3	The released hydrocarbons would have the potential to percolate to ground or contaminate surface water runoff from the substation if not properly managed. To mitigate this hydrological risk, a pump sump is provided with a float switch outside the transformer bund. This is a proprietary pump that only allows water discharge to take place when no oil is detected. This is connected to a BMS (Butler Manufacturing Services) Ltd. PIF Class 1 Full Retention Oil Separator which discharges to a wind farm drain outside the substation boundary. This provides an adequate treatment prior to discharge to the wind farm drainage network. Regular inspections are carried out to ensure this system is in correct working order.
Air and Climate			

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure
MM31	Operation and Maintenance Phase Impacts (2006-2022)	rEIAR Chapter 10 Section 10.2.6.3	Ensure that all maintenance and monitoring vehicles will be maintained in good operational order while onsite, and, when stationary, be required to turn off engines thereby minimising any emissions that arise.
			Major Accidents and Natural Disasters
MM32	Operational Phase Mitigation	rEIAR Chapter 15 Section 15.4.6.2	***Peat Stability*** › Mitigation for the peat stability for the Derrybrien Wind Farm site are detailed in Chapter 8. Detailed peat stability risk assessments in relation to each activity and the combined activities which have occurred to date during project operation have been undertaken. › Effective and proven risk mitigation measures are in place at the project site to reduce the likelihood of a peat slide to a low or negligible level as detailed in Chapter 8- Soils, Geology and Land. ***Forest/Gorse Fire*** › The mitigation measures comprise: a. Restrictions apply to burning of vegetation and DAFM national warning systems b. The use of firebreaks Restrictions apply to burning of vegetation. Under Section 39(1) of the Wildlife Act, 1976, it is an offence to cut, grub, burn or otherwise destroy any vegetation growing on any land not then cultivated between 1st March and 31st August in any year. Landowners wishing to carry out legally permitted prescribed burning must notify in writing all forest owners within one mile of the wood, and the local Garda station, between 7

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure
			and 35 days in advance of the burning operation. All burning operations are required to be notified to the Fire Service before burning commences. The Forest Service of the Department of Agriculture, Fisheries and Food (DAFM) has prepared a draft Code of Best Practice in relation to prescribed burning. A National Forest Fire Risk Warning System set out fire danger rating systems, and fire suppression tactics per fire risk condition. Fire suppression tactics are identified for forest risk conditions -ranging from non-intervention to aerial firefighting. Forest Fire Danger Notices are issued by DAFM during the main wildfire risk season from February through to September. These notices provide forest owners and managers with advance warning of high forest risk weather conditions and permit appropriate readiness measures to be taken in advance of fire outbreaks. Increasing levels of preparation and vigilance are required as the risk levels scale from Green through to Red. **Firebreaks** Gort Wind Farms Ltd has removed some of the flammable vegetation over a 5m wide strip around much of the perimeter of the site to form a firebreak. Emergency Management Plan: The hazards on site have been identified for the operational phase and procedures are in place to address them, as follows: › Accidents. › Fire in control room and/or switchgear room on electrical equipment. › Fire involving wood, paper in control room or in switchgear room. › Forest/gorse fire. › Fire in tower. › Landslide.
Ceased Operational Phase			

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure
			Population and Human Health
MM33	Health and Safety	rEIAR Chapter 5 Section 5.4.4.1	Derrybrien Wind Farm operates a Safety Management System (SMS) which meets the requirements of OHSAS 18001. Derrybrien Wind Farm operates an emergency procedure. This covers procedure in event of accidents, lone working, persons falling into water, forest/gorse fire, fire in wind turbine towers and procedure in event of landslide. Contact details are provided for emergency services, including the local authority and An Garda Síochána.
			Land, Soils, and Geology
MM34	Wind Farm Site: Ceased Operation Phase (2022-2024	rEIAR Chapter 8.6.2.4	Following the decision by An Bord Pleanála to refuse substitute consent for the wind farm in February 2022 there have been no commercial operations at the wind farm. This has had significant mitigating effects on the impact of the wind farm on soils, geology and land, i.e.: › The turbines were turned off to cease electricity generation and the blades were feathered to the wind to reduce the wind loads on the turbine and foundations. › Only essential maintenance has been carried out on the turbines with minimal loading from mobile cranes, trucks or commercial vehicles on the floating roads. › No other wind farm related activities have been carried out on the site.
MM35	Grid Connection: Ceased Operation Phase (2022-2024)	rEIAR Chapter 8 Section 8.6.3.3	***Maintenance/repair of Agannygal substation and control building*** › The following design, construction & operational risk mitigation measures were implemented for the maintenance and repair of the substation and control building: › All maintenance operations were carried out from the hardstanding area around the substation and control building which was designed to support the loads from the vehicles and equipment on the glacial till below the peat. ›
			Air and Climate

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure
MM36	Ceased Operation Phase Impacts (2022-Present)	rEIAR Chapter 10 Section 10.1.4.4	All site related traffic had speed restrictions on un-surfaced roads.

Table 6-2 Site Preparation and Mitigation Measures for Prospective Development

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure	Audit Result	Action Required
		Prospective Development			
MM1	Construction Management	CEMP (Table 6-2 MM1)	All site activities will be provided for in an Environmental Management Plan, prepared prior to the commencement of any operations onsite. The environmental management plan will set out all measures necessary to ensure works are carried out in accordance with the mitigation measures set out in the EIAR and will set out the monitoring and inspections procedures and frequencies.		
MM2	Construction Management	CEMP (Table 6-2 MM2)	A designated environmental manager will oversee the site works and implementation of the Environmental Management Plan and provide on-site advice on the mitigation measures as necessary to ensure the project proceeds as intended. The level, detail and frequency of reporting expected from the environmental manager for the project manager, and any Authorities or other Agencies, will be agreed by all parties prior to commencement of construction, and may be further adjusted as required during the course of the project.		

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure	Audit Result	Action Required
MM3	Resource and Waste Management	EIAR Chapter 16 (Section 16.1.5)	All waste generated on site during the decommissioning will be dealt with in accordance with the applicable provisions of the Waste Management Act 1996, as amended, and regulations made thereunder. A Resource & Waste Management Plan (RWMP) has been prepared to enable a comprehensive assessment of the decommissioning works and forms part of the application for permission. The mitigation measure included in the RWMP will be adhered to during the decommissioning of the Derrybrien Windfarm.		
MM4	Construction Management	CEMP (Table 6-2 MM7)	The procedures for the implementation of the mitigation measures outlined in such an EMP and their effectiveness and completion is typically audited by way of an Environmental Management Plan Audit Report. The EMP Audit Report effectively lists all mitigation measures prescribed in any of the planning documentation and any further mitigation measures proposed during the detailed design stage and allows them to be audited on a systematic and regular basis.		
Population and Human Health					

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure	Audit Result	Action Required
MM5	Human Health	EIAR Chapter 5 (Section 5.7.2.5.1)	The Prospective Development will be decommissioned in accordance with all relevant Health and Safety Legislation, including: › Safety, Health and Welfare at Work Act 2005 (No. 10 of 2005); › Safety, Health and Welfare at Work (General Application) Regulations 2007 (S.I. No. 299 of 2007), as amended; › Safety, Health and Welfare at Work (Construction) Regulations 2013 (S.I. 291 of 2013), as amended; and › Safety, Health and Welfare at Work (Work at Height) Regulations 2006 (S.I. No. 318 of 2006). During the Prospective Development, all staff will be made aware of and adhere to the Health & Safety Authority's 'Guidelines on the Procurement, Design and Management Requirements of the Safety, Health and Welfare at Work (Construction) Regulations 2006'. This will encompass the use of all necessary Personal Protective Equipment, Risk Assessment and Method Statements and adherence to the site Health and Safety Plan. Where necessary, fencing will be erected in areas of the Prospective Development site where uncontrolled access is not permitted. Appropriate health and safety signage will also be erected on this fencing and at locations around the Site. The Prospective Development comprises the decommissioning of the Derrybrien grid connection and Agannygal substation as well as reconnection of the 110kV Shannonbridge -Ennis transmission line. Health and safety guidelines for working within and around electrical substations and overhead lines will be adhered to on site.		

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure	Audit Result	Action Required
MM6	Human Health	EIAR Chapter 5 (Section 5.7.2.5.2)	Best practice measures for noise control will be adhered to onsite during the Prospective Development in order to mitigate the slight short-term negative impact associated with the Prospective Development. The measures include: › The hours of activity will be limited to avoid unsociable hours where possible. Operations shall generally be restricted to between 7:00hrs and 19:00hrs weekdays and between 7:00hrs and 14:00hrs on Saturdays. › Drivers of plant and vehicles will be instructed to avoid hooting at all times unless necessary. › Plant used onsite during the decommissioning works will be maintained in a satisfactory condition and in accordance with manufacturer recommendations. In particular, exhaust silencers will be fitted and operating correctly at all times. Defective silencers will be immediately replaced. › Queuing of trucks near offsite receptors will be prohibited. › Machinery not in active use will be shut down. › A site representative will be appointed as a liaison officer with the local community. › Complaints of noise received during the Prospective Development will be logged in a register and investigated immediately. Details of follow-up action will be included in the register. › Where it is proposed to import potentially noisy plant to the site, the potential impact of noise emissions will be assessed in advance. › Guidance set out in British Standard BS 5228-1:2009+A1:2014 Code Of Practice For Noise And Vibration Control On Construction And Open Sites – Part 1: Noise (2014) with respect to noise control will be applied throughout the Prospective Development. › The residents of the dwelling to the west of Agannygal Substation, where there may be noise level exceedances over several days, will be contacted by the site		

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure	Audit Result	Action Required
			representative in advance of these works in order to identify suitable working times so as to minimise disruption to the residents.		
MM7	Human Health	EIAR Chapter 5 (Section 5.7.2.5.3)	Truck wheels will be washed to remove mud and dirt before leaving the wind farm site. All plant and materials vehicles shall be stored in the compound area or other dedicated areas. Areas of excavation will be kept to a minimum, and stockpiling will be minimised by coordinating excavation, spreading and compaction. Traffic will be restricted to defined routes and a speed limit will be implemented. In periods of extended dry weather, dust suppression may be necessary along haul roads to ensure dust does not cause a nuisance. If necessary, water will be taken from the site's drainage system, and will be pumped into a bowser or water spreader to dampen down haul roads and the temporary site compound to prevent the generation of dust. Silty or oily water will not be used for dust suppression, because this would transfer the pollutants to the haul roads and generate polluted runoff or more dust. Water bowser movements will be carefully monitored, as the application of too much water may lead to increased runoff.		
MM8	Human Health	EIAR Chapter 5 (Section 5.7.2.5.4)	The decommissioning of the Wind Farm will be as per the Traffic Management Plan (TMP) prepared for this Prospective Development (Appendix 14-3). The TMP is a live document drafted during the planning stage and will be upgraded as the project progresses taking into account of any road improvements and changes to the network.		

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure	Audit Result	Action Required
Terrestrial Biodiversity					
MM9	Dedicated Nature Conservation Sites	EIAR Chapter 6 (section 6.4.2.1.2)	A pre-construction non-native invasive species survey will be carried out prior to decommissioning. If any problematic non-native plant species are recorded, an Invasive Species Management Plan (ISMP) will be prepared. The ISMP will include measures to avoid and/or control any non-native plant species that may be present, in accordance with The Management of Invasive Alien Plant Species on National Roads – Technical Guidance (TII, 2020). In addition, all machinery will be checked and cleaned for non-native invasive species prior to entering site to avoid any potential introduction and/or spread of such species.		
MM10	Terrestrial Habitats	EIAR Chapter 6 (Section 6.4.2.3.1)	› Cutting back of vegetation during the site enabling works should be done from the hard surfaced areas. Where it is necessary to work on soft terrain away from hard stand areas then manual tools should be used to eliminate any impacts associated with ground compaction and disturbance from plant machinery. › The project ecologist will undertake pre-construction verification surveys of turbine blade and rotor storage sites and advise on micro-siting to ensure minimal ecological impacts. › All plant machinery required for the works associated with widening the turning heads will operate on existing adjacent road surface. › All plant machinery required for the works associated with widening the turbary road will operate on existing adjacent road surface. › The use of bog mats, geotextile and stone will ensure that the peatland habitat in the footprint of the road widening will be reinstated following completion of decommissioning.		

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure	Audit Result	Action Required
			› In the event that turves are removed from the turbary area to facilitate widening the following will be implemented: ○ Turves will be stored in an appropriate location in the wider site. The condition of turves will be monitored regularly and watering will be implemented if deemed necessary. › In advance of works along the OHL route the project ecologist and project contractor will undertake a joint walkover survey to demarcate agreed access routes and agree detailed approach. This walkover will verify ground conditions at the time of work. This will help inform the approach to access to individual structures during decommissioning. The Project ecologist will liaise with the contractor to decide on the most appropriate ground protection measures (bog mats, EPDM, aluminium mats) taking into consideration the following: ○ Prevailing ground and weather conditions. ○ Number of journeys required by plant to complete the work. ○ The type of plant required to complete the work at individual structures.		
MM11	Birds	EIAR Chapter 6 (Section 6.4.2.4.3)	Best available evidence has been reviewed and it is suggested that these species could be disturbed by works at the following distances: › Hen harrier 1,000 m › Sparrowhawk 200 m › Merlin 500 m › Red Grouse 500 m › Snipe 400 m Should any of these species be recorded breeding within the given distances of the works area (as established through confirmatory surveys before and/or during		

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure	Audit Result	Action Required
			decommissioning – as described above), a buffer zone (using above distances) shall be established around the expected location of the nest (location will be identified as far as is possible without causing disturbance to the bird) and all works will be restricted within the zone until it can be demonstrated by an ornithologist that the species has completed the breeding cycle in the identified area. Any restricted area on site that is required to be set up will be marked clearly using hazard tape fencing and all site staff will be alerted through toolbox talks. The above mitigation, which will apply from March to August (inclusive), will ensure that the works will not have significant negative effects on bird species of conservation importance.		
MM12	Other Bird Species	EIAR Chapter 6 (Section 6.4.2.4.3)	Clearance of ground vegetation as required will take place outside of the bird breeding season (1st March – 31st August) to minimise the possibility of disturbance and destruction to occupied bird nests during the decommissioning. However, it is possible that some ground may still need to be cleared of vegetation during the breeding season or that previously cleared ground will have developed colonising vegetation (such as brambles) which could attract nesting birds such as wren. Such these occurrences arise, the following protocol will be followed: › The area will be surveyed by an ornithologist up to 5 days before any clearance. Should an active nest be located, the area will be restricted from works by a distance where it is considered that the works would not cause disturbance or abandonment of the nest. Such distances, which will vary according to species and local topography, will be determined by the ornithologist. The restriction will be maintained until it is established that any young birds present have fledged.		

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure	Audit Result	Action Required
			› Should an instance arise where the placement of a restriction would have significant implications for the time frame of the project, and where no alternative mitigation is available, the ornithologist will prepare a report (to include species, stage of breeding etc.) on the implications of removal of the nest in the context of the Wildlife Acts.		
MM13	Bats	EIAR Chapter 6 (Section 6.4.2.5)	It is proposed to construct pole-mounted bat boxes (three at Agannygal and one at Derrybrien) ahead of demolition of the substation buildings. This will be located on land owned by Gort Wind Farm Ltd close to Borrow Pit 3[1] and at the Agannygal substation. The precise locations of these will be informed by a site visit by a bat ecologist, and will be included in the licence application concerning the demolition of the sub-station buildings. To ensure legislative compliance during deconstruction there will need to be an initial thorough internal inspection of the substation buildings and bridges. The work with regard to the substations will need to be completed under a bat derogation licence obtained from the Wildlife Licencing Unit at NPWS (which will require a method statement), in which measures to ensure legislative compliance will be detailed. Deconstruction of the bridges is also likely to require an initial inspection but is likely to be completed under a precautionary working method statement. If nocturnal task lighting is required the works should take account of industry guidance (Institution of Lighting Professionals & Bat Conservation Trust, 2018). This will include consideration of the location of lighting, the type of lighting used and the design of a lighting scheme to minimise light spillage onto forest edge habitats.		

[1] Latitude / Longitude 53.099861 , -8.6011534

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure	Audit Result	Action Required
MM14	European Otter	EIAR Chapter 6 (Section 6.4.2.6.1)	As there will be no likely significant negative effects on otter at any geographic scale as a result of habitat loss, habitat severance, barrier effect and/or disturbance, no mitigation measures are required. However, it is recommended that a pre-construction otter survey is undertaken prior to the commencement of decommissioning in order to account for any changes that may occur in the baseline environment. The presence of any new holt/couch sites will be managed in accordance with the Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes (NRA, 2008).		
MM15	Other Mammals	EIAR Chapter 6 (Section 6.4.2.6.2)	Although the habitat within the footprint of the Prospective Development is considered to be of low suitability for breeding badger, a precautionary approach has been applied and as such it is recommended that a pre-construction mammal survey is undertaken prior to the commencement of decommissioning in order to account for any changes that may occur in the baseline environment. The presence of any badger setts will be managed in accordance with the Guidelines for the Treatment of Badgers during the Construction of National Road Schemes (NRA, 2006a).		
MM16	Other Fauna	EIAR Chapter 6 (Section 6.4.2.7)	Suitable common frog, smooth newt and common lizard breeding and resting habitat (albeit limited in extent) will be directly impacted by the Prospective Development. In consideration of the legal protection afforded to amphibians and common lizard under the Wildlife Acts, mitigation has been provided. If works are carried out in suitable amphibian habitat when frogspawn, tadpoles, adult newts, their eggs or larvae may be present (i.e. February to mid-summer in the case of common frog and mid-March to September in the case of smooth newt), a pre-construction survey will be undertaken to confirm if amphibians are present. If they are confirmed to be present, the individuals may be captured by a suitably qualified ecologist immediately prior to the works taking place and translocated to the nearest		

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure	Audit Result	Action Required
			available suitable habitat. The approach to capture and translocation should be agreed with National Parks and Wildlife Service (NPWS). With regards to common lizard, vegetation clearance works will take place outside the breeding bird season (i.e. outside the months of March to August inclusive), thereby avoiding the breeding season for common lizard of March to May. Any potential hibernacula for common lizard (e.g. log, brash, brick and/or rock piles) to be cleared will be removed during the active season under the supervision of a suitably qualified ecologist.		
Aquatic Ecology					
MM17	Windfarm Decommissioning	EIAR Chapter 7 (Section 7.4.2.3.1)	During the enabling works along Black Road wet or dry roadside drains will not be cleared of vegetation and any scraped material will be removed for licensed disposal.		

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure	Audit Result	Action Required
MM18	Windfarm Decommissioning	EIAR Chapter 7 (Section 7.4.2.3.2)	› An ecological clerk of works (ECoW) will be appointed at the outset of the decommissioning to oversee the implementation of mitigation measures and to ensure their continued efficacy. › Roadside drains taking surface run-off from the main entrance area, especially if this requires widening, will be furnished with a silt trap near the entrance and check dams going downhill to prevent solids washing east toward the works compound and into SC4, via the drain/flush referred to above. This latter channel will also be fitted with a silt trap, as it is the main outlet for surface water exiting from the road and the compound towards SC4. In addition, the existing perimeter ringing the northern edge of the compound will be sufficiently banked up (possibly with a low earthen berm) to prevent any surface run-off flowing directly over the edge from the compound into SC4. Regular visual observation of silt control measures, and any required maintenance to same will be undertaken immediately as required, given that the compound will be in operation for 24 months. Prevent/avoid hydrocarbons from entering watercourses by placing controls at all sources and pathways including, at a minimum, the following measures: › Ensuring all fuels and oils are stored in bunded trays at least 50 m from any watercourses or surface water feature. Trays will be bunded to 110% of the capacity of the fuel volume; › Refuelling activities to be restricted to designated, bunded areas, at least 50 m from any watercourse, drain or surface water feature; › All construction plant to be regularly maintained and checked for oil and fuel leaks; › Provision of spill kits and training of operatives in their use within the compound.		

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure	Audit Result	Action Required
MM19	Windfarm Decommissioning	EIAR Chapter 7 (Section 7.4.2.3.3)	› An ecological clerk of works (ECoW) will be appointed at the outset of the decommissioning to oversee the implementation of mitigation measures and to ensure their continued efficacy. › For Turbary Road Widening: › All vehicular traffic will be confined exclusively to hard stand areas, including tracks. › Where it proves absolutely necessary for vehicles to track onto the adjoining peat, bog mats or other suitable ground protection methods will be used. › Existing track-side drains will be kept free of blocking or damage during the widening works. › Check dams and silt traps will be installed at regular intervals along the track-side drains in order to slow the velocity of flow after heavy rainfall and to intercept any solids being washed into them from the road works. › Should it be necessary, check dams and silt traps will be regularly de-sludged in order to maintain their effectiveness (overseen by the ECoW). › Drains adjoining aggregate stockpiles and peat turve storage areas will be fitted with silt fences to contain any washed-out fines. › Drains adjoining areas where internal stone is sourced will be fitted with silt traps to retain any silt that is subsequently washed out from exposed ground following aggregate extraction.		
MM20	Windfarm Decommissioning	EIAR Chapter 7 (Section 7.4.2.3.4)	As a precaution, the existing low gradient drains in proximity to the four turning locations shall have silt traps installed within the first 5-10m near the works areas for the duration of the proposed works to capture any sediment escapement (although unlikely to occur). The following measures are classified as avoidance rather than mitigation per se:		

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure	Audit Result	Action Required
			› Vegetation removal at the 22 turbine sites must be undertaken by hand, i.e. without vehicles in order to avoid ground damage. › The ground layer of herbaceous vegetation must not be removed, i.e. the underlying peat must not be exposed, so that solids erosion can be avoided and the herb layer can continue to act as a natural filter for any solids generated. › Turbine blades will be set down carefully at the 22 sites where drains impinge directly on or immediately adjoin the proposed laydown areas in a manner that avoids damaging the drains and thereby accidently releasing peat solids. › Vehicles used to place the turbine blade must only work from the adjoining hardstand.		
MM21	Windfarm Decommissioning	EIAR Chapter 7 (Section 7.4.2.3.5)	The following mitigation measures are designed to remove more routine sources of contamination and impact i.e. from solids and trace hydrocarbon escapement. › All decommissioning work on the substation will be undertaken from hardstands with no tracking onto the adjoining heath/bogland without the use of bog mats. › All vehicle or plant refuelling will take place on level, preferably hardstand ground and accompanied with drip trays. › Drainage from the temporary works compound will be directed to the same outlet drain currently draining the substation. › The substation drain will be fitted with 3 silt traps, the first within no more than 5m of the head of the drain. › The ECoW will oversee the implementation of these mitigation measures and will ensure their continued efficacy through regular visual checks.		
MM22	Decommissioning of the Overhead	EIAR Chapter 7 (Section 7.4.2.4.1)	› Prior to OHL decommissioning, a pre-commencement survey, probably best undertaken using an all-terrain vehicle (ATV) due to the nature of the ground in some stretches of the OHL corridor, will be carried out to identify soft ground, especially in areas where there are steep gradients e.g. between SP1 and SP12,		

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure	Audit Result	Action Required
	Line (OHL) and Agannygal Substation		and especially in areas where the ground slopes steeply toward streams e.g. between PS23 and the proposed crossing point on SC7(a) in Alternative No. 2,. The pre-survey would also plot the exact locations of drains impinging on the decommissioning routes. The pre-commencement survey will recommend (i) suitable ground protection for the soft ground areas and (ii) that any drains crossing the path would be traversed using steel plates of log bridges to prevent or at least minimise damage to these and to minimise any associated solids release. › For Alternative No. 1, do a detailed pre-commencement survey of the detour route between PS16 and PS17will be undertaken in order to identify soft and wet ground especially on steeper slopes. › Use bog mats on any soft ground identified especially on the steep ground between the SC7(c) crossing and point B in Figure 7.5). › Insert silt fences parallel to and downslope of the new track, especially if the track is through soft or wet ground e.g. between the SC7(b) stream and the SC7(c) stream crossing. › The track side drains at the points of departure and return to the Coillte track for the detour will be piped and capped in order to allow free drainage while the detour is in place. Check dams will be installed in the drains downslope from these access points to prevent solids reaching SC7(b) downslope. › Following agreement with the project ecologist the method of tree and scrub removal will be chosen to minimise ground damage. › The crossing points of stream SC7(d) at ITM 561421, 701723, which has low banks and is shallow and therefore feasible to be forded, will be protected with heavy steel plates spanning the width of the crossing corridor (7-9m) to protect the stream bed from damage from vehicles. This approach is contrary to IFI advice (IFI, 2016) which stipulates that streams should not be forded. The reasoning for going against this advice is that this stream has low banks, the channel is shallow, and the work will be undertaken between July and September, i.e., outside the trout spawning period. Moreover, the number of vehicle crossings will be small relative to a major construction project for example, and will be designed to		

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure	Audit Result	Action Required
			minimise the number of crossings required. Finally, steel plates will be used to protect the stream bed from rutting. Given these site attributes and the mitigation measures being recommended, it is suggested that the alternative of constructing a bridging structure here would give rise to greater impacts, because on the width of the stream, which probably rules out a clear span structure or laying large pipes and back filling to place a running track over them. These latter options would potentially introduce more fine sediment into the system than the managed fording approach being suggested. › The upslope approaches to both streams (i.e., from both banks) will be fitted with bog mats or equivalent materials to prevent ground damage, especially during heavy rainfall, thereby reducing to an absolute minimum the amount of solids washing into these two streams. › The stream crossings for Alternative No. 1, and the Owendalulleegh crossing will be undertaken between July and September (inclusive). › On the sloping approach to the Owendalulleegh crossing in advance of the removal of PS23, AM 24 and PS25, if there is evidence of ground damage leading to solids washout during heavy rainfall, a french drain will be set diagonally into the Coillte track 5m north of the crossing point, in order to direct any silt contaminated run-off into the ditch at the side of the track so that it isn't flushed into the river. › In order to minimise the potential for fish mortalities, immediately in advance of crossings on the Owendalulleegh, the channel for 15m upstream and downstream of the centre line of the crossing point, the channel will be electrofished (3 repeats) and the fish obtained will be removed in oxygenated water in a large plastic bin and poured back into the river about 1km downstream i.e. just below the confluence of the SC7(d) stream with the main channel. › In Alternative No. 1, fish rescue is not recommended from stream SC7(b) or SC7(c), (i) because the densities are so low but mainly (ii) because bailey bridge type crossing structures are being installed at these crossings and as such no adverse impact on fisheries is anticipated.		

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure	Audit Result	Action Required
			› The narrowest feasible corridor across the Owendalulleegh will be delineated by the project ecologist using red and white tape and all works vehicles instructed to remain within that crossing corridor. › The crossing corridor will be furnished with steel plates to protect the riverbed habitat from damage, and these will be removed after the operation is completed. › This segment of the OHL decommissioning will be designed and managed to minimise the time and the number of vehicle movements required to complete, and will reduce the scale of any residual fish mortalities.		
MM23	Decommissioning of the Overhead Line (OHL) and Agannygal Substation	EIAR Chapter 7 (Section 7.4.2.4.2)	› Silt traps will be installed on the surface drain emanating from the substation at present to intercept any solids arising from the substation decommissioning. › Refuelling will always be supervised and always undertaken on level hardstand areas. › Mobile plant such as generators will be supplied with drip trays. › Any fuel storage tanks will be provided with a bund capable of containing its full contents with freeboard for rainfall.		
MM24	Decommissioning of the Overhead Line (OHL) and Agannygal Substation	EIAR Chapter 7 (Section 7.4.2.4.3)	› Undertake a walkover survey of the access route to the poles sets in advance of the works to locate any surface drains along or downslope of the route. › Provide suitable vehicle crossing measures (e.g. bog mats over or equivalent) in order to protect any drains from damage. › Employ low weight-bearing vehicles to undertake the work. › Use bog mats or other suitable protection if the ground is likely to be cut up during the work. › Monitor the works for solids escapement and take corrective measures, e.g. the installation of silt fences immediately downslope and across the full line of ground damage if it occurs.		

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure	Audit Result	Action Required
MM25	Decommissioning of the Overhead Line (OHL) and Agannygal Substation	EIAR Chapter 7 (Section 7.4.2.4.4)	› When upgrading the culvert on the haul road at the crossing of OHL 2A (western stream, the work will be undertaken during the period July to September (inclusive) as it would be considered instream works by Inland Fisheries Ireland (IFI). › Only undertake the work after several days of dry weather when flow in the stream would be low. › Use a pump-over method to keep the work area as dry as possible. This may not allow all the water to be over-pumped depending on the flow but it would reduce the rate of solids washout, nevertheless. › Carefully plan the method in advance and have all the necessary plant and materials to hand such that the culvert can be replaced in the shortest possible time which will reduce the quantity of solids potentially arising. › Provide drip trays for all generators and pumps. › Refuel vehicles off site whenever possible. › Remove any excess fill or other loose substrate arising from the works for licensed offsite disposal.		
MM26	Decommissioning of the Overhead Line (OHL) and Agannygal Substation	EIAR Chapter 7 (Section 7.4.2.4.5)	› Small tree and scrub removal to access the crossing point should ideally be undertaken by hand, i.e. without heavy machinery if feasible. › The access tracks to the stream crossing should be laid from opposite points first, i.e. from points B and D to the crossing point (near point C) before the crossing is inserted. › If it is feasible to alter the exact position of the crossing point somewhat, this should be considered in order to avoid parts of the embankment which already have a lot of willow or other trees growing on it, as these are currently stabilising the banks. › Any instream works must be confined to the period July to September. › The culvert pipe should be large enough to accommodate large flows to avoid excess velocities.		

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure	Audit Result	Action Required
			› If the culvert pipe is to remain in place permanently, its base should be inserted 30cm below the streambed to facilitate the two-way movement of any fish in the stretch.		
Land, Soils, and Geology					
MM27	Geotechnical Monitoring and Mitigation of Site Activities during Decommissioning	EIAR Chapter 8 Section 8.4.4	› The carriageway requirements for the large mobile crane that will be used to dismantle the of turbary road between Turbines T35 and T45 and between T43 and turbines along the narrow section T46 will be reviewed in advance of the works and the road will be widened, where necessary, to provide safe access to the turbines; › Where it is necessary to widen or extend the existing floating roads then: ○ Detailed design of the road improvements will be carried out by a suitably qualified geotechnical engineer; ○ Additional site investigations will be carried out, where necessary, to characterise the depth and strength of the peat and the composition of the existing floating road; ○ Stability analyses will be carried out in advance of the works on site in accordance to confirm that the stability of the widened road is acceptable in accordance with IS EN 1997-1: Eurocode 7 for Geotechnical Design, Part 1 – General Rules; and ○ The works on site will be supervised by a suitably qualified geotechnical engineer on behalf of Gort Windfarms Ltd. › The size, weight and axle load of the large mobile crane that is used to dismantle the turbines shall not exceed the design load for the floating roads (i.e. the 300 tonne Grove GMK6300 all-terrain mobile crane with a travelling weight of 72 tonnes on 6 axles – max 12 tonnes/axle);		

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure	Audit Result	Action Required
			› The size, weight and axle load of the low-loader transporter used to transport the transformer off the site shall not exceed the combined design load of the vehicle that was used to bring the transformer to the substation site during construction (i.e. a total combined load of 130 tonnes over 28.5m x 3.0m area with 12 axles and a maximum axle load of 12 tonnes); › The decommissioning works will be supervised by a suitably qualified engineer from ESB Engineering and Major Projects (ESB – E&MP); › A permit to work scheme will be implemented on the site for the works; and › The Contractors method statements will be reviewed and certified by a suitably qualified geotechnical engineer.		
MM28	Peat	EIAR Chapter 8 Section 8.4.5.5.7	The following mitigation measures have been implemented by Gort Wind Farms Ltd to reduce the likelihood of a peat failure occurring: › The peat stability risk assessment and the associated mitigation measures have been shared with the turbary rights holders whose plots have been or are proposed to be harvested by mechanical means, and the turbary rights holders have been made aware of the potential site stability risks associated with mechanical peat harvesting methods in the absence of mitigation; › Warning signs have been erected at the site by Gort Wind Farms Ltd. to raise awareness of the peat stability risks associated with mechanical peat harvesting in the turbary area and to highlight the recommended mitigation measures; › Where possible, communication has been established between the turbary plot owners, turf cutting contractors and the windfarm site manager for Gort Wind Farms Ltd. to give notice of mechanical peat harvesting activities and to report any peat instability on the site;		

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure	Audit Result	Action Required
			› Gort Wind Farms Ltd. have implemented the recommended remedial drainage works and survey monitoring in the failed area at the south end of Turbary Plot 161 to ensure that the peat there is stable. › Any further maintenance that is required to maintain the existing drainage network will only be carried out during the drier months of May to September; and › Periodic inspections of the mechanical peat harvesting are being carried out by the wind farm site manager for Gort Wind Farms Ltd.		
MM29	Mitigation Measures for Peat Harvesting	EIAR Chapter 8 Section 8.4.5.5.7	The following is a summary of the mitigation measures that are recommended in the AGL Report No. 11-147-R06 in Appendix 8-4 which specifically relate to mechanical peat harvesting in the turbary area and which are recommended to be implemented by the turbary rights holders: › No mechanical peat harvesting should be carried out by saw cutting in any of the turbary plots; › No mechanical peat harvesting should be carried out in the turbary plots where the likelihood of a peat failure without appropriate mitigation measures is interpreted as Very Possible to Likely (L=4.0 to 5.0). Manual turf cutting can be carried out but should be done during the drier months between May and September; › Where the likelihood of a peat failure without appropriate mitigation measures is interpreted as Possible to Very Possible (L=3.0 to 3.5) the limitations recommended in Section 6.0 of AGL Report No. 11-147-R06 on the type and size of equipment that can be used for mechanical peat harvesting in the turbary plots and on the maximum level of surcharge loading on the peat should be implemented; › The operational control measures recommended in Section 6.0 of AGL Report No. 11-147-R06 should be implemented by the turbary		

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure	Audit Result	Action Required
			plot owners and their turf cutting contractors to manage the stability of peat excavations and to prevent excessive damage to the integrity of the vegetated surface of the peat; › No mechanical peat harvesting should be carried out in the turbary area during Prospective Development works.		
			Hydrology and Hydrology		
MM30	Suspended Solids	EIAR Chapter 9 (Section 9.4.2.1)	Provision will be made for a combination of some or more all of the techniques listed below to minimise runoff of suspended solids during decommissioning operations – › Silt traps – these can be installed on either the inlet or outlet side of culverts and must be robust enough to allow for frequent clearing out of collected sediments. › Silt fencing – involves installation of some semi-permeable geotextile fabric, vertically held on simple timber posts, and is used primarily as an additional means of filtering out sediments from runoff water. These should be installed alongside any sensitive areas, e.g. watercourses, larges areas of stripped materials, or downstream from outlet ends of culverts, and can usually be arranged in a horse-shoe configuration to contain, and allow settlement of suspended sediments. › Straw bales – these can be used to filter out sediments from normal flows in drainage ditches, but their installation positions require careful consideration, and should allow for potential overtopping in periods of high flow. They should be pinned securely in position to avoid being washed down into larger watercourses. Bales can become saturated and can become very heavy to manually move, so a means of mechanical recovery and replacement also needs to be considered. As such, periodic replacement – once bales have become silt-laden and ineffective – needs to be considered along with their appropriate disposal. › Pumping - Where there is a significant build-up of water it may be required to pump this to avoid further build-up, or to allow works to progress in that area. Any required pumping should be planned to ensure that the discharge is either		

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure	Audit Result	Action Required
			entering a settlement lagoon or that it can discharge directly over an area of suitable vegetation, an appropriate distance away from watercourses and groundwater to filter out any suspended sediments. Proprietary equipment such as "Siltbuster" type tanks can also be used to assist with the reduction of suspended solids. It is important that the flows from the pumping operation do not cause erosion to the vegetation onto which it is discharging. The point of delivery should be alternated to various locations to ensure that potential for scouring is minimised. If the flows need to be redistributed more generally over vegetation, a connection to the hose end can be made to discharge the fluid in a spray over a much greater area. Monitoring and maintenance will include the following – Site water suspended solids will be monitored on a continuous basis at a reasonable frequency (e.g. daily), however the frequency of monitoring can gradually reduce thereafter – presuming there are no issues with the quality of discharging water at that point in time. It is recommended that continuous monitoring systems are put in place, particularly in principal surface water features draining the site, e.g. remote sensing, or telemetric monitoring sensors can be employed in this regard. It is recommended that a handheld turbidity meter is available to accurately measure the quality of water discharging from the Site. The meter should be maintained and calibrated frequently and will also be used to check and calibrate remote sensors if they are employed. It is recommended that quality thresholds are established for the purposes of escalating water quality issues as or if they arise (e.g. TSS limit of 25mg/l per S.I. no. 293 of 1988 – Salmonid Regulations). Surface water runoff control infrastructure will be checked and maintained on a regular basis and stilling ponds and check dams will be maintained (de-sludged/settled solids removed) on a regular basis during decommissioning. It is important to minimise the		

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure	Audit Result	Action Required
			agitation of solids during these works, otherwise it will likely lead to an acute significant loading of suspended solids in the local drainage network which could settle out downstream in the larger watercourses As part of the site-specific Outline EMP regular checking and maintenance of pollution control measures are required, with an immediate plan for repair or backup if any breaches of design occur. If established infrastructure and measures are failing to reduce suspended solids to an acceptable level, construction works will cease until remediation or upgrading works are completed		
MM31	Hydrocarbon Spills	EIAR Chapter 9 (Section 9.4.2.2)	› All plant and machinery to be serviced before being mobilised to site; › No plant maintenance completed on-site; any broken-down plant removed from site to be fixed; › Refuelling completed in a controlled manner using drip trays at all times; › Mobile bowsers, tanks and drums stored in secure, impermeable bunded storage areas away from open water and drainage features; › Only designated trained operators authorised to refuel plant on-site; › Spill mats and clean-up kits will be available on-site and trained personnel; › Procedures and contingency plans set up to deal with emergency accidents or spills; and, › Highest standards of site management maintained, and utmost care and vigilance followed to prevent accidental contamination or unnecessary disturbance to the site and surrounding environment during works. These mitigation measures are considered sufficient to reduce risk to ground/peat/soils and subsoils, and to groundwater and surface water quality. The oil separator will be emptied and flushed out prior to being backfilled with stone. All extracted liquids including that flushed through the separator will be disposed of to a licensed facility. The stone will be sourced from the site.		

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure	Audit Result	Action Required
MM32	Wastewater	EIAR Chapter 9 (Section 9.4.2.3)	The toilet block and temporary holding tank and Portaloos will be serviced and maintained on a regular basis during the decommissioning activities. All toilet facilities shall be sealed with no discharge to the surface water or groundwater environment adjacent to the site. The onsite toilet facilities and sewage treatment plants at Derrybrien and Agannygal will be emptied and flushed by licenced contractor and all out prior to being backfilled with stone. All extracted effluent and water flushed through the treatment plant will be disposed of to a licensed facility.		
Air and Climate					
MM33	Exhaust Emissions	EIAR Chapter 10 (Section 10.2.3.2.1 and 10.3.5.2.1)	› All construction vehicles and plant will be maintained in good operational order while onsite, thereby minimising any emissions that arise. › Turbines and construction materials will be transported from the site on specified routes only, unless otherwise agreed with the Planning Authority. › When stationary, delivery and on-site vehicles will be required to turn off engines. › Users of the site will be required to ensure that all plant and vehicles are suitably maintained to ensure that emissions of engine generated pollutants are kept to a minimum. › Aggregate materials required for enabling works will be obtained from local quarries. This will significantly reduce the length of journeys for delivery vehicles, thereby reducing the amount of emissions associated with vehicle movements › The Materials Recovery Facility (MRF) will be local to the Prospective Development site to reduce the amount of emissions associated with vehicle movements. The nearest licensed waste facility to the site is City Bin Co. recycling centre which is located approximately 28.6km to the northwest of the Prospective Development. A Waste Management Plan will be prepared to reduce waste from the site.		

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure	Audit Result	Action Required
MM34	Dust Emissions	EIAR Chapter 10 (Section 10.2.3.2.2)	› A wheel wash facility will be installed on site and will be used by vehicles before leaving site. › Dust suppression measures will be implemented on site to minimise the potential nuisance caused by dust at the nearest sensitive receptors and on sensitive eco systems. Water misting shall be used as required if particularly dusty activities are necessary on site during dry and/or windy conditions. › All site related traffic will have speed restrictions on un-surfaced roads to 30 kph. › Regular inspection of the site to examine dust measures and their effectiveness › All plant and materials vehicles shall be stored in dedicated areas (on site). › Turbines and construction materials will be transported away from the site on specified haul routes only. › The agreed haul route roads adjacent to the site will be regularly inspected for cleanliness and cleaned as necessary. › The Site access roads will be checked weekly for damage/potholes and repaired as necessary. › The transport of construction materials which may have the potential to generate dust will be undertaken with tarpaulin cover or similar, where necessary. › A Construction and Environmental Management Plan (CEMP) will be in place throughout the Prospective Development (see outline CEMP under separate cover). The CEMP includes these dust suppression measures.		
Noise and Vibration					
MM35	Noise	EIAR Chapter 11 (Section 11.4.2.4)	It follows that noise mitigation measures are not specifically warranted in relation to these receptors. However, a number of general measures are proposed in order to follow good construction practice:		

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure	Audit Result	Action Required
			› Construction operations will in general be confined to the period Monday-Friday 07:00-19:00 and Saturday 08:00-13:00. › Drivers of plant and vehicles will be instructed to avoid hooting at all times unless necessary. › Plant used onsite during the Prospective Development will be maintained in a satisfactory condition and in accordance with manufacturer recommendations. In particular, exhaust silencers will be fitted and operating correctly at all times. Defective silencers will be immediately replaced. › Queuing of trucks near offsite receptors will be prohibited. › Machinery not in active use will be shut down. › Complaints of noise received during the Prospective Development will be logged in a register and investigated immediately. Details of follow-up action will be included in the register. › Where it is proposed to import potentially noisy plant to the site, the potential impact of noise emissions will be assessed in advance. › Guidance set out in British Standard BS 5228-1:2009 with respect to noise control will be applied throughout the decommissioning works.		
Material Assets					
MM36	Traffic and Transport	EIAR Chapter 14 (Section 14.1.5.2.1)	The decommissioning of the Wind Farm will be as per the Traffic Management Plan (TMP) prepared for this project (Appendix 14-3). The TMP is a live document drafted during the planning stage and will be upgraded as the Prospective Development progresses, taking into account of any road improvements and changes to the network.		

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure	Audit Result	Action Required
			When the turbine blades are decommissioned, it is envisaged they will be removed intact. The large volume of aggregate material and concrete that was imported to site during construction will remain onsite. The principal expected volumes of traffic will be primarily associated with the transportation off-site of turbine components and significantly reduced volume of materials only (i.e. retention of wind farm access tracks, turbine foundations, hard stand areas, etc.).		
MM37	Materials assets	EIAR Chapter 14 (Section 14.2.4.2.2)	Work on decommissioning the Agannygal Substation and reinstatement of the existing 110kV Ennis – Shannonbridge OHL will take place under a planned outage. Under this circumstance there will be no loss of electricity services to end users.		
Major Accidents and Natural Disasters					
MM38	Major Accidents and Natural Disasters	EIAR Chapter 15 (Section 15.4.2)	The Prospective Development will be decommissioned in accordance with the best practice measures set out in this EIAR and the Decommissioning Management Plan for the project and, as such, mitigation against the risk of major accidents and/or disasters is embedded through the decommissioning approach. Informed by the Assessment of Alternatives Chapter, Mitigation by design was an integral part of the Prospective Development. The selection of which parts of the Derrybrien Wind Farm to remove as part and the Prospective Development and which parts to leave in-situ as part of the Retained Development were made with peat stability and other environmental factors as a the main concerns. As discussed, the works programme will take account of weather forecasts and work will be suspended in the case of extreme weather events effectively mitigation the risks associated with extreme		

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure	Audit Result	Action Required
			weather and flooding. Likewise, the traffic management plan for the Prospective Development will mitigate risks associated with traffic incidents.. As discussed, the application for the Prospective Development is accompanied by a CEMP which sets out details of the environmental controls to be implemented on site. The CEMP sets out the Emergency Response Procedure to be adopted in the event of an emergency including contamination, health and safety and environmental protection. The CEMP provides details on all mitigation and monitoring measures to be actioned prior to the Prospective Development works. The CEMP will be subject to ongoing review through regular environmental auditing and site inspections. This will confirm the efficacy and implementation of all mitigation measures and commitments identified in the application documentation. The CEMP includes an Emergency Response Plan (ERP). It provides details of procedures to be adopted in the event of an emergency relating to health & safety or environmental protection. The site ERP includes details on the response required and the responsibilities of all personnel in the event of an emergency. Please see Chapter 4 of the EIAR and Decommissioning Management Plan (Appendix 4-1) for details.		
Resource and Waste Management					
MM39	Waste Generation	EIAR Chapter 16 Section 16.5.2.1	› Extensive waste categorisation will be in place to ensure the highest possible quality of recycling of the respective categories and to prevent an accumulation of pollutants in the material cycle – it is anticipated that the following waste types, at a minimum, will be segregated: ○ Concrete rubble (including ceramics, tiles and bricks); ○ Lead Acid Batteries; ○ Electrical Waste		

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure	Audit Result	Action Required
			○ Plastics; ○ Oils; ○ Metals; ○ Glass; and ○ Timber. › To minimise the generation of waste and waste disposed to landfill, wastes will be managed in accordance with the waste hierarchy and relevant regulatory controls. › Waste will be clearly labelled and segregated on site. Measures will be taken to ensure that wastes cannot blow away. › Housekeeping measures will be followed for the storage of materials to ensure that materials are protected as much as possible. › All waste materials will be stored in skips or other suitable receptacles in designated areas of the site. › Any hazardous wastes generated (such as chemicals, fuels, oils, and creosote treated poles) will also be segregated and will be stored in appropriate receptacles (in suitably bunded areas, where required). › A waste manager will be appointed by the main contractor(s) to ensure effective management of waste during the decommissioning works. › All staff will be provided with training regarding the waste management procedures; › All waste leaving site will be reused, recycled or recovered where possible to avoid material designated for disposal. › All waste leaving the site will be transported by suitable permitted contractors and taken to suitably registered, permitted or licenced facilities; and › All waste leaving the site will be recorded and copies of relevant documentation maintained. As a minimum, the following waste management data will be provided:		

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure	Audit Result	Action Required
			○ Quantity of materials and waste removed from site by type in volume and weight. ○ Outcome of the materials and waste on and off site. ○ Waste transfer notes. ○ Hazardous waste consignment notes.		

Table 4-3 Proposed Mitigation Measures – Retained Development

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure	Audit Result	Action Required
Retained Development					
Land, Soils and Geology					
MM36	Wind Farm Site: Post-Decommissioning (The Retained Development)	rEIAR Chapter 8 Section 8.6.2.6	The primary mitigation measure that will be used to mitigate the post-decommissioning impact of the Retained Development is in the compilation and handover of the **Safety File** for the site to the landowner by Gort Windfarms Ltd. Among other information, the Safety File for the site will include: › Construction records from the decommissioning works to confirm compliance with the design and specifications for the works. › Design and as-built construction details for all the elements of the windfarm that have been left in place after decommissioning (the Retained Development), including:		

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure	Audit Result	Action Required
			○ The reinforced concrete bases for the turbines and anemometer masts. ○ All of the site access tracks including the floating roads on the peat. ○ The crane hardstanding areas adjacent to the turbines. ○ The hardstanding area for the substation and control building. ○ All of the de-energised and disconnected LV electrical cables and fibre-optic cables that are direct-buried in the peat between the turbines and in ducts below the roads. ○ The construction phase peat repository sites and material sidecast areas. ○ The construction phase borrow pits. ○ The site drainage network. › Records of significant maintenance works that have been carried out on the retained elements of the project, including the 2014 upgrade of the floating roads and the 2017 fibre-optic upgrade of the turbine control systems. › Reports on all the full-scale serviceability and proof load tests that have been carried out on the floating roads across the site, which includes the design criteria for the maximum axle loads and live load surcharges from the mobile cranes that govern the capacity of the roads. › Records of all the site investigation works and in-situ tests that were carried out for the project during construction and over the operational and maintenance phase of the project. › Results of stability analyses that have been carried out for the floating roads and peat repository sites.		

Ref. No.	Ref. Heading	Ref. Location	Mitigation Measure	Audit Result	Action Required
			› Geotechnical stability report for the wind farm site including the Peat Stability Risk Assessment (PSRA) for the site and design/construction mitigation measures that have been implemented to mitigate the risk of peat instability for the wind farm activities. › Peat Stability Risk Assessment for the turbary area on the east side of the site, including mitigation measures that have been recommended to manage the risk of peat instability due to mechanical peat harvesting in that part of the site.		
MM37	Wind Farm Site: Post-Decommissioning (The Retained Development)	rEIAR Chapter 8 Section 8.6.3.5	The primary mitigation measure that will be used to mitigate the post-decommissioning impact of the Retained Development is in the compilation and handover of the **Safety File** for the site to the landowner by Gort Windfarms Ltd.		
Material Assets					
MM38	Impacts of Retained Development	rEIAR Chapter 14 Section 14.1.4.4	During retained development personnel and any applicable material movements from site will only be undertaken between the hours of 7 am to 7 pm Monday to Saturday. Exceptional circumstances may exist where works outside these times are required, however these will only be undertaken with the prior agreement of GCC.		

7. MONITORING PROPOSALS

All monitoring proposals relating to the Prospective Development were set out in various sections of the EIAR and NIS prepared as part of the planning permission application to An Bord Pleanála.

This section of the Construction and Environment Management Plan groups together all of the monitoring proposals presented in the EIAR. The monitoring proposals are presented in the following pages.

By presenting the monitoring proposals in the below format, it is intended to provide an easy to audit list that can be reviewed and reported on during the project. The tabular format in which the below information is presented, can be further expanded upon during the course of the project to provide a reporting template for site compliance audits

Table 7-1 Monitoring Measures

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
Biodiversity (Terrestrial and Avian Ecology)						
MoM1	Bird Monitoring	EIAR Chapter 6	Prior to any works commencing during the bird breeding season (March-August inclusive) monitoring surveys within the area (wind farm and OHL corridor) will take place to a distance of 1 km from the Prospective Development. The purpose of the surveys is to confirm the locations of breeding territories of species identified as being prone to disturbance to ensure that mitigation is successfully implemented to avoid disturbance effects on breeding activities as a result of the works. The surveys will be undertaken by a competent ornithologist, with experience of upland breeding species. For hen harrier, the survey will follow the method of Ruddock *et al.* (2016) (as used in the 2022 and 2024 surveys). For red grouse, the bogs to the north-west of the site will be surveyed for breeding territories using the tape lure method (under licence).			
Aquatic Ecology and Fisheries						
MoM2	Providing Turning Heads and Accommodating Temporary Storage for Rotor Blades	EIAR Chapter 7	When providing turning heads and accommodating temporary storage for rotor blades, monitoring of the 4 turning locations during the proposed works will be implemented in case of sediment escape to drains and insert silt traps, if necessary.			

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
Hydrology and Hydrogeology						
MoM2	Suspended Solids	EIAR Chapter 9	Monitoring and maintenance will include the following – Site water suspended solids will be monitored on a continuous basis at a reasonable frequency (e.g. daily), however the frequency of monitoring can gradually reduce thereafter – presuming there are no issues with the quality of discharging water at that point in time. It is recommended that continuous monitoring systems are put in place, particularly in principal surface water features draining the site, e.g. remote sensing, or telemetric monitoring sensors can be employed in this regard. It is recommended that a handheld turbidity meter is available to accurately measure the quality of water discharging from the Site. The meter should be maintained and calibrated frequently and will also be used to check and calibrate remote sensors if they are employed. It is recommended that quality thresholds are established for the purposes of escalating water quality issues as or if they arise (e.g. TSS limit of 25mg/l per S.I. no. 293 of 1988 – Salmonid Regulations). Surface water runoff control infrastructure will be checked and maintained on a regular basis and stilling ponds and check dams will be maintained (de-sludged/settled solids removed) on a regular basis during decommissioning. It is important to minimise the agitation of solids during these works, otherwise it will likely lead to an acute significant loading of suspended			

Ref. No.	Reference Heading	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
			solids in the local drainage network which could settle out downstream in the larger watercourses As part of the site-specific Outline EMP regular checking and maintenance of pollution control measures are required, with an immediate plan for repair or backup if any breaches of design occur. If established infrastructure and measures are failing to reduce suspended solids to an acceptable level, construction works will cease until remediation or upgrading works are completed			

8. PROGRAM OF WORKS

8.1 Decommissioning Schedule

The Prospective Development will take approximately 18 – 24 months to complete from starting on site enabling works to the final removal of wind turbine components and removal of all ancillary infrastructure from the site.

Works during the Prospective Development will generally take place between 7 a.m. and 7 p.m. daily Monday to Friday and 8 a.m. to 1 p.m. on Saturdays. Abnormal load movements such as removal of transformers, turbine tower sections and blades will take place outside of peak traffic hours.

The phasing and scheduling of the main task items are outlined in Figure 8-1 below, where 1st January has been selected as an arbitrary start date for decommissioning activities.

ID	Task Name	Task Description	Q1 2026	Q2 2026	Q3 2026	Q4 2026	Q1 2027	Q2 2027	Q3 2027	Q4 2027
1	Site Health and Safety									
2	Site Enabling Works	Set compounds and repair access roads.								
3	Dismantling of Turbines	Removal of all turbines, masts, and burying of cables/foundations.								
4	Decommissioning of Substations	Removal of all substation components and demolition of substation structures.								
5	Decommissioning and Removal of OHL's	Removal of OHL's and associated infrastructure from site.								
6	Reinstatement of Ennis-Shannonbridge OHL									

Figure 8-1 Indicative Decommissioning Schedule

9. COMPLIANCE AND REVIEW

9.1 Site Inspections and Environmental Monitoring

Routine inspections of activities will be carried out on a daily and weekly basis by the ECoW and the Site Supervisor/Construction Manager to ensure all controls to prevent environmental impacts, relevant to the decommissioning activities taking place at the time, are in place.

Environmental inspections will ensure that the works are undertaken in compliance with this CEMP and all other planning application documents. Only suitably trained staff will undertake environmental site inspections.

9.2 Auditing

The Contractor will be responsible for implementing the mitigation and monitoring measures specified throughout the EIAR and compiled in Sections 6 and 7 of this CEMP. The Contractor will also be responsible for ensuring that all staff understand the importance of implementing the mitigation measures. The implementation of the mitigation measures will be overseen by the environmental clerk of works or supervising hydrogeologists, environmental scientists, ecologists or geotechnical engineers, depending on who is best placed to advise on the implementation.

Environmental audits will be carried out during the Prospective Development. In contrast to monitoring and inspection activities, audits are designed to highlight the underlying causes of non-compliance, and not merely detect the non-compliance itself. In addition, audits are the main means by which system and performance improvement opportunities may be identified. Environmental audits will be carried out by contractor staff or alternatively by external personnel acting on their behalf. It is important that an impartial and objective approach is adopted. Environmental audits will be conducted at planned intervals to determine whether the CEMP is being properly implemented and maintained. The results of environmental audits will be provided to project management personnel.

9.3 Environmental Compliance

The following definitions shall apply in relation to the classification of Environmental Occurrences during construction of the proposed renewable energy development:

Environmental Near Miss: An occurrence which if not controlled or due to its nature could lead to an Environmental Incident.

Environmental Incident: Any occurrence which has potential, due to its scale and nature, to migrate from source and have an environmental impact beyond the site boundary.

Environmental Exceedance Event: An environmental exceedance event occurs when monitoring results indicate that limits for a particular environmental parameter (as indicated in the Environmental Monitoring Programme) has been exceeded.

An exceedance will immediately trigger an investigation into the reason for the exceedance occurring and the application of suitable mitigation where necessary.

Exceedance events can be closed out on achieving a monitoring result below the assigned limit for a particular environmental parameter.

Environmental Non-Compliance: Non-fulfilment of a requirement and includes any deviations from established procedures, programs and other arrangements related to the EMP.

9.4 Corrective Action Procedure

A corrective action is implemented to rectify an environmental problem on-site. Corrective actions will be implemented by the Site Supervisor/Manager, as advised by the Site Environmental Clerk of Works. Corrective actions may be required as a result of the following;

- Environmental Audits;
- Environmental Inspections and Reviews;
- Environmental Monitoring;
- Environmental Incidents; and,
- Environmental Complaints.

A Corrective Action Notice will be used to communicate the details of the action required to the main contractor. A Corrective Action Notice is a form that describes the cause and effect of an environmental problem on site and the recommended corrective action that is required. The Corrective Action Notice, when completed, will include details of close out and follow up actions.

If an environmental problem occurs on site that requires immediate attention direct communications between the Site supervisor/Manager and the ECoW will be conducted. This in turn will be passed down to the site staff involved. A Corrective Action Notice will be completed at a later date.

9.5 Prospective Development Review

This CEMP will be updated and reviewed prior to commencement of decommissioning, and also every six months thereafter during the Prospective Development and will comply with the measures set out in the NIS, EIAR and any planning conditions.

APPENDIX 6-1

NATIONAL BIODIVERSITY IRELAND DATABASE RECORDS FOR PROTECTED FLORA AND FAUNA SPECIES WITHIN 10 KM SQUARES M50, M60 AND R69 OCCUPIED BY THE PROSPECTIVE DEVELOPMENT.

Appendix 6-1-1 National Biodiversity Ireland Database records for rare and protected flora and fauna species within the 10 km squares M50, M60 and R69 occupied by the Prospective Development

Grid Square	Species Name	Latin Name	Date(s) of Record(s)	Legal Protection / Red List (King *et al.*, 2011, Regan *et al.*, 2010, Marnell *et al.*, 2019) / Birds of Conservation Concern (Gilbert et al., 2020)
Amphibian				
M50, M60 and R69	Common Frog	*Rana temporaria*	2011, 2015, 2018	EU Habitats Directive Annex V, Wildlife Acts, Least Concern
M50, M60 and R69	Smooth Newt	*Lissotriton vulgaris*	2012,2019,2020	Wildlife Acts, Least Concern
Birds				
M50, M60 and R69	Barn Owl	*Tyto alba*	1972,2011,2015	Wildlife Acts, Red-listed
M50, M60 and R69	Barn Swallow	*Hirundo rustica*	2011,2015,2019	Wildlife Acts, Amber-listed
M50, M60 and R69	Eurasian Sparrowhawk	*Accipiter nisus*	2011	Wildlife Acts, Amber-Listed
M50, M60 and R69	Mistle Thrush	*Turdus viscivorus*	2011	Wildlife Acts, Amber-Listed
M50, M60 and R69	European Robin	*Erithacus rubecula*	2011	Wildlife Acts, Amber-Listed
M50, M60 and R69	Stonechat	*Saxicola torquata*	2011	Wildlife Acts, Amber-Listed
M50, M60 and R69	Goldcrest	*Regulus regulus*	2011,2022	Wildlife Acts, Amber-Listed
M50, M60 and R69	Grey Wagtail	*Motacilla cinerea*	2011,2017,2022	Wildlife Acts, Amber-Listed
M50, M60 and R69	Greenfinch	*Carduelis chloris*	2011	Wildlife Acts, Amber-Listed
M50, M60 and R69	Black-headed Gull	*Larus ridibundus*	1972,2011,1972	Wildlife Acts, Red-listed
M50,R69	Common Coot	*Fulica atra*	1984,1991	EU Birds Directive: Annex II, Section I Bird Species Annex III, Section II Bird Species Wildlife Acts, Amber-listed
R69	Common Goldeneye	*Bucephala clangula*	1984	EU Birds Directive: Annex II, Section II Bird Species Wildlife Acts, Amber-listed
M50, M60 and R69	Common Grasshopper Warbler	*Locustella naevia*	2011	Wildlife Acts, Amber-listed
M50, M60 and R69	Common Kestrel	*Falco tinnunculus*	2011,2015,2023	Wildlife Acts, Amber-listed
M50, M60 and R69	Common Kingfisher	*Alcedo atthis*	1972,2015	EU Birds Directive: Annex I Bird Species Wildlife Acts, Amber-listed

Grid Square	Species Name	Latin Name	Date(s) of Record(s)	Legal Protection / Red List (King *et al.*, 2011, Regan *et al.*, 2010, Marnell *et al.*, 2019) / Birds of Conservation Concern (Gilbert et al., 2020)
M50, M60 and R69	Common Linnet	*Carduelis cannabina*	2011	Wildlife Acts, Amber-listed
M50, M60 and R69	Common Pheasant	*Phasianus colchicus*	2011 ,2022	EU Birds Directive: Annex II, Section I Bird Species Annex III, Section I Bird Species Wildlife Acts
M50	Common Pochard	*Aythya ferina*	1984	EU Birds Directive: Annex II, Section I Bird Species Annex III, Section II Bird Species Wildlife Acts, Amber-listed
M60, R69	Common Redshank	*Tringa totanus*	1972,2011	Wildlife Acts, Red-listed
R69	Common Sandpiper	*Actitis hypoleucos*	2011	Wildlife Acts, Amber-listed
M50, M60 and R69	Common Snipe	*Gallinago gallinago*	2011,2015,2018	EU Birds Directive: Annex II, Section I Bird Species Annex III, Section III Bird Species Wildlife Acts, Amber-listed
M50, M60 and R69	Common Starling	*Sturnus vulgaris*	2011,2016	Wildlife Acts, Amber-listed
M50, M60 and R69	Common Swift	*Apus apus*	1991,2011	Wildlife Acts, Amber-listed
R69	Common Tern	*Sterna hirundo*	2011	EU Birds Directive: Annex I Bird Species Wildlife Acts, Amber-listed
M50, M60 and R69	Common Wood Pigeon	*Columba palumbus*	2011, 2015	EU Birds Directive: Annex II, Section I Bird Species Annex III, Section I Bird Species, Wildlife Acts
M50, M60 and R69	Corn Crake	*Crex crex*	1972	EU Birds Directive: Annex I Bird Species Wildlife Acts, Red-listed
M50, M60 and R69	Eurasian Curlew	*Numenius arquata*	2011	EU Birds Directive: Annex II, Section II Bird Species Wildlife Acts, Red-listed
M50, M60 and R69	Eurasian Teal	*Anas crecca*	2011	EU Birds Directive: Annex II, Section I Bird Species Annex III, Section II Bird Species Wildlife Acts, Amber-listed
M50, R69	Eurasian Wigeon	*Anas penelope*	2011	EU Birds Directive: Annex II, Section I Bird Species Annex III, Section II Bird Species Wildlife Acts, Amber-listed
M50, M60 and R69	Eurasian Woodcock	*Scolopax rusticola*	1972,2011	EU Birds Directive: Annex II, Section I Bird Species Annex III, Section III Bird Species Wildlife Acts, Amber-listed
M50, R69	European Golden Plover	*Pluvialis apricaria*	2011,2019	EU Birds Directive: Annex I Bird Species Annex II, Section II Bird Species Annex III, Section III Bird Species Wildlife Acts, Red-listed

Grid Square	Species Name	Latin Name	Date(s) of Record(s)	Legal Protection / Red List (King *et al.*, 2011, Regan *et al.*, 2010, Marnell *et al.*, 2019) / Birds of Conservation Concern (Gilbert et al., 2020)
R69	Great Cormorant	*Phalacrocorax carbo*	2011	Wildlife Acts, Amber-listed
R69	Great Crested Grebe	*Podiceps cristatus*	2011	Wildlife Acts, Amber-listed
R69	Greater White-fronted Goose	*Anser albifrons*	1984	Annex I Bird Species Annex II, Section II Bird Species Annex III, Section III Bird Species Wildlife Acts, Amber-listed
M50, M60 and R69	Hen Harrier	*Circus cyaneus*	2011,2021,2011	EU Birds Directive: Annex I Bird Species Wildlife Acts, Amber-listed
R69	Herring Gull	*Larus argentatus*	1991	Wildlife Acts, Red-listed
M50, M60 and R69	House Martin	*Delichon urbicum*	2011	Wildlife Acts, Amber-listed
M50, M60 and R69	House Sparrow	*Passer domesticus*	2011	Wildlife Acts, Amber-listed
M60, R69	Jack Snipe	*Lymnocryptes minimus*	2011,1984	EU Birds Directive: Annex II, Section I Bird Species Annex III, Section III Bird Species Wildlife Acts
R69	Lesser Black-backed Gull	*Larus fuscus*	2011	Wildlife Acts, Amber-listed
M50, R69	Little Grebe	*Tachybaptus ruficollis*	2011,1972	Wildlife Acts, Amber-listed
M50, M60 and R69	Mallard	*Anas platyrhynchos*	2011	EU Birds Directive: Annex II, Section I Bird Species Annex III, Section I Bird Species Wildlife Acts
M50, M60 and R69	Merlin	*Falco columbarius*	2011,1972	EU Birds Directive: Annex I Bird Species Wildlife Acts, Amber-listed
R69	Mew Gull	*Larus canus*	2011	Wildlife Acts, Amber-listed
M50, R69	Mute Swan	*Cygnus olor*	2011	Wildlife Acts, Amber-listed
M50, M60 and R69	Northern Lapwing	*Vanellus vanellus*	2011,1984	EU Birds Directive: Annex II, Section II Bird Species – Wildlife Acts, Red-listed
M50, R69	Northern Shoveler	*Anas clypeata*	2011,1984	EU Birds Directive: Annex II, Section I Bird Species Annex III, Section III Bird Species Wildlife Acts
M50	Northern Wheatear	*Oenanthe oenanthe*	2011	Wildlife Acts, Amber-listed
M50, M60 and R69	Red Grouse	*Lagopus lagopus*	2018,2017,2011	EU Birds Directive: Annex II, Section I Bird Species Annex III, Section I Bird Species Wildlife Acts, Red-listed

Grid Square	Species Name	Latin Name	Date(s) of Record(s)	Legal Protection / Red List (King *et al.*, 2011, Regan *et al.*, 2010, Marnell *et al.*, 2019) / Birds of Conservation Concern (Gilbert et al., 2020)
R69	Red-breasted Merganser	*Mergus serrator*	1972	EU Birds Directive: Annex II, Section II Bird Species Wildlife Acts
M60	Ring Ouzel	*Turdus torquatus*	2003	Wildlife Acts, Red-listed
R69	Ringed Plover	*Charadrius hiaticula*	1991	Wildlife Acts, Amber-listed
M50, M60 and R69	Sand Martin	*Riparia riparia*	2011 ,1991	Wildlife Acts, Amber-listed
M60, R69	Short-eared Owl	*Asio flammeus*	2011,1984	EU Birds Directive: Annex I Bird Species Wildlife Acts, Amber-listed
M50, M60 and R69	Sky Lark	*Alauda arvensis*	2011	Wildlife Acts, Amber-listed
M50, M60 and R69	Spotted Flycatcher	*Muscicapa striata*	2011	Wildlife Acts, Amber-listed
M50, M60	Stock Pigeon	*Columba oenas*	2011,1972	Wildlife Acts, Amber-listed
M50, R69	Tufted Duck	*Aythya fuligula*	2001,1984	EU Birds Directive: Annex II, Section I Bird Species Annex III, Section II Bird Species Wildlife Acts, Amber-listed
R69	Water Rail	*Rallus aquaticus*	2011	Wildlife Acts, Amber-listed
M60	Whinchat	*Saxicola rubetra*	1972	Wildlife Acts, Amber-listed
M50, R69	Whooper Swan	*Cygnus cygnus*	2018,2011	EU Birds Directive: Annex I Bird Species Wildlife Acts, Amber-listed
M50, M60 and R69	Yellowhammer	*Emberiza citrinella*	2011,1972	Wildlife Acts, Red-listed
Bony fish				
R69	*European Eel*	*Anguilla anguilla*	1996	Threatened Species: Critically Endangered
Crustacean				
M60	Freshwater White-clawed Crayfish	*Austropotamobius pallipes*	2017	EU Habitats Directive: Annex II Annex V Wildlife Acts
Lepidoptera Insects-Butterflies				
M50,M60 and R69	Marsh Fritillary	*Euphydryas aurinia*	2021,2019,2010	EU Habitats Directive: Annex II, Vulnerable
M50	White Cushion Moss	*Leucobryum glaucum*	1994	EU Habitats Directive: Annex IV, Least Concern
Reptile				

Grid Square	Species Name	Latin Name	Date(s) of Record(s)	Legal Protection / Red List (King *et al.*, 2011, Regan *et al.*, 2010, Marnell *et al.*, 2019) / Birds of Conservation Concern (Gilbert et al., 2020)
R69	Common Lizard	*Zootoca vivipara*	2020	Protected Species: Wildlife Acts, Least Concern
Terrestrial Mammal				
M50, M60 and R69	Eurasian Badger	*Meles meles*	2018,2015,2012	Protected Species: Wildlife Acts, Least Concern
R69	Eurasian Pygmy Shrew	*Sorex minutus*	2015	Protected Species: Wildlife Acts, Least Concern
M50, M60 and R69	Eurasian Red Squirrel	*Sciurus vulgaris*	2018,2017,2014	Protected Species: Wildlife Acts, Least Concern
M60, R69	European Otter	*Lutra lutra*	2015,2010	EU Habitats Directive: Annex II Annex IV Protected Species: Wildlife Acts, Least Concern
M50, M60, R69	Pine Marten	*Martes martes*	2021,2020	EU Habitats Directive: Annex V, Wildlife Acts, Least Concern
M50, M60 and R69	West European Hedgehog	*Erinaceus europaeus*	2023,2022,2017	Protected Species: Wildlife Acts, Least Concern
Terrestrial Mammals-Bats (Chiroptera)				
M50	Whiskered Bat	*Myotis mystacinus*	2018	EU Habitats Directive Annex IV, Wildlife Acts, Least Concern
M50, M60 and R69	Soprano Pipistrelle	*Pipistrellus pygmaeus*	2022,2018,2016	EU Habitats Directive: Annex IV, Wildlife Acts, Least Concern
M60	Common Pipistrelle	*Pipistrellus pipistrellus sensu lato*	2015	EU Habitats Directive: Annex IV, Wildlife Acts, Least Concern
M50, M60	Natterer's Bat	*Myotis nattereri*	2019,2016	EU Habitats Directive: Annex IV, Wildlife Acts, Least Concern
M50, M60, and R69	Lesser Noctule	*Nyctalus leisleri*	2018,2016,2009	EU Habitats Directive: Annex IV, Wildlife Acts, Least Concern
M50, M60 and R69	Daubenton's Bat	*Myotis daubentonii*	2017,2016,2007	EU Habitats Directive: Annex IV, Wildlife Acts, Least Concern
M50, R69	Brown Long-eared Bat	*Plecotus auritus*	2021,2019	EU Habitats Directive: Annex IV, Wildlife Acts, Least Concern
Flowering Plants				
R69	Common Cudweed	*Filago vulgaris*	2006	Vulnerable

Appendix 6-1-2 National Biodiversity Ireland Database records for invasive flora and fauna species within the 10 km squares M50, M60 and R69 occupied by the Prospective Development

Grid Square	Species Name	Latin Name	Date of Record(s)	Legal Status / Impact Invasive Species Level
M50	American Mink	*Mustela vison*	2011	High Impact Invasive Species
R69	bony fish	*Roach*	1996	Invasive Species: Regulation S.I. 477 (Ireland)
M50, R69	Brown Rat	*Rattus norvegicus*	2014,2015	High Impact Invasive Species
R69	Cherry Laurel	*Prunus laurocerasus*	2009	High Impact Invasive Species
M50, M60 and R69	Fallow Deer	*Dama dama*	2015,2014	High Impact Invasive Species
R69	House Mouse	*Mus musculus*	2015	High Impact Invasive Species
R69	Indian Balsam	*Impatiens glandulifera*	2009	High Impact Invasive Species
M50, M60 and R69	Japanese Knotweed	*Fallopia japonica*	2018,2020,1999	European Communities (Birds & Habitats): Third Schedule High Impact Invasive Species
M60, R69	Rhododendron	*Rhododendron ponticum*	2006,1999	Invasive Species: High Impact Invasive Species
M50, M60	Sika Deer	*Cervus nippon*	2015,2013	High Impact Invasive Species

APPENDIX 6-2

DERRYBRIEN WIND FARM
VANTAGE POINT WATCHES
2022 - 2024

APPENDIX 6-2-1 Summary of vantage point (VP) watch variables, Derrybrien Wind Farm, March to June 2022

Date	Season	VP no.	Duration (hrs)	Start Time	Weather conditions
29/03/2022	Breeding	1	3	10:00	Dry, good visibility, SW wind, F2-3
29/03/2022	Breeding	2	3	15:00	Dry, good visibility, SW wind, F3
30/03/2022	Breeding	1	3	08:15	Showers, good visibility, SW wind, F3
30/03/2022	Breeding	2	3	14.00	Dry, Good visibility, SW wind, F2
28/04/2022	Breeding	2	3	11:30	Dry, Good visibility, W wind, F1
28/04/2022	Breeding	1	3	15.00	Dry, Good visibility, W wind, F2
29/04/2022	Breeding	2	3	07.30	Dry, Good visibility, SW wind, F2
29/04/2022	Breeding	1	3	14.30	Showers, Good visibility, SW wind, F3
24/05/2022	Breeding	1	3	09.30	Dry, Good visibility, S wind, F1-2
24/05/2022	Breeding	2	3	15.00	Dry, Good visibility, S wind, F2
25/05/2022	Breeding	1	3	07:15	Dry, Good visibility, SW wind, F3
25/05/2022	Breeding	2	3	13:00	Dry, Good visibility, SW wind, F3
28/06/2022	Breeding	2	3	08:45	Dry, Good visibility, NW wind, F2
28/06/2022	Breeding	1	3	15.30	Dry, Good visibility, NW wind, F2
29/06/2022	Breeding	1	3	07.30	Dry, Good visibility, W wind, F2
29/06/2022	Breeding	2	3	12.30	Dry, Good visibility, W wind, F3

APPENDIX 6-2-2 Vantage Point raw data & flight activity, Derrybrien Wind Farm, March-June 2022

Date	VP No	Map Reference	Species	No.	Flight Time	Flight Duration (s)	Band 1 (0-25m)	Band 2 (25-175m)	Band 3 (175+m)	Comments
29/03/2022	1		Kestrel	1	10.54	180	100	80		Male hunting along edge of forest / track
29/03/2022	2		Red grouse	1+	17.17	0	0	0		1-2 birds heard calling from bog to NW of site over period of c.10 min. Heard again from T47 area after formal watch
30/03/2022	1									No target species 3 mistle thrushes flew across site; pair stonechats near VP; skylarks & pipits singing
30/03/2022	2									No target species. Grouse heard from bog later after watch (as yesterday evening)
28/04/2022	2		Sparrow hawk	2	13.08	180	0	180	0	Pair in display /circling over site (T54-55 area)
			Teal	2	14.10	30	30	0	0	Pair flew low between T10 and T11 area
28/04/2022	1									No target species
29/04/2022	2									No target species Several swallows over site
29/04/2022	1		Snipe	1	16.46	300	100	200	0	Snipe drumming etc over bog between T31 and T33
24/05/2022	1									No target species 2 cuckoos heard, one seen; swallows over site

Date	VP No	Map Reference	Species	No.	Flight Time	Flight Duration (s)	Band 1 (0-25m)	Band 2 (25-175m)	Band 3 (175+m)	Comments
24/05/2022	2									No target species
25/05/2022	1									
25/05/2022	2									No target species Cuckoo
28/06/2022	2		Kestrel	1	09.43	90	30	60	0	Hunting male near T66 Meadow pipit, skylark, willow warbler & stonechat with young
28/06/2022	1									No target species
29/06/2022	1									No target species
29/06/2022	2		Sparrow hawk		14.34					Heard crying from woods north of T54 area Mistle thrush family party
	2		Lesser black-backed gull	7	15.07	160	0	160	0	Loose party flew over site – at least 4-5 immature types

APPENDIX 6-2-3 Summary of vantage point (VP) watch variables, Derrybrien Wind Farm, April to June 2024

Date	Season	VP no.	Duration (hrs)	Start Time	Weather conditions
09/04/2024	Breeding	2	3	10:30	Dry, good visibility, W wind, F3
09/04/2024	Breeding	1	3	15:00	Dry, good visibility, W wind, F3
10/04/2024	Breeding	1	3	08:00	Dry, good visibility, SW wind, F3
10/04/2024	Breeding	2	3	13.00	Dry, good visibility, SW wind, F3
10/05/2024	Breeding	1	3	10:00	Dry, Good visibility, SW wind, F1
10/05/2024	Breeding	2	3	15.00	Dry, Good visibility, SW wind, F2
11/05/2024	Breeding	1	3	07.15	Dry, Good visibility, S wind, F2
11/05/2024	Breeding	2	3	12.30	Dry, Good visibility, S wind, F3
18/06/2024	Breeding	2	3	09:30	Dry, Good visibility, N wind, F3
18/06/2024	Breeding	1	3	14.30	Dry, Good visibility, N wind, F2
19/06/2024	Breeding	1	3	08.30	Dry, Good visibility, W wind, F3
19/06/2024	Breeding	2	3	12.30	Dry, Good visibility, W wind, F3

APPENDIX 6-2-4 Vantage Point raw data & flight activity, Derrybrien Wind Farm, April-June 2024

Date	VP No	Map Reference	Species	No.	Flight Time	Flight Duration (s)	Band 1 (0-25m)	Band 2 (25-175m)	Band 3 (175+m)	Comments
09/04/2024	1		Kestrel	1	12.05	220	140	80	0	Hunting near T33 and edge of bog - male
09/04/2024	2		Sparrow hawk	1	15.57	180	0	180	0	Circling bird over forest near T54-T55. Also, 3 Mistle thrushes flying between plantations
10/04/2024	1		Snipe	1	08.23	200	100	100	0	Drumming bird over bog south of T31 – T34. Also, pair stonechats near VP; skylarks & pipits singing
10/04/2024	2									No target species. 2 wheatears on track – probable migrants
10/05/2024	1		Kestrel	1	12.12	50	50	0	0	Kestrel flying low near T27 and site entrance. Cuckoo calling, swallows & several house martins over site
10/05/2024	2									No target species Willow warblers singing
11/05/2024	1									No target species 2 cuckoos active
11/05/2024	2		Sparrow hawk	1	15.13	20	20	0	0	Male hunting near T53
18/06/2024	2									No target species;

Date	VP No	Map Reference	Species	No.	Flight Time	Flight Duration (s)	Band 1 (0-25m)	Band 2 (25-175m)	Band 3 (175+m)	Comments
										12 mistle thrushes in area of VP, Meadow pipit, skylark, & willow warbler with young
18/06/2024	1									No target species; 20+ swallow & c.10 sand martins, Grey wagtail flew over VP towards quarry pond
19/06/2024	1		Snipe	1	09.16	30	30	0	0	Flew up and then back down onto bog near T31
19/06/2024	2									No target species; Mistle thrush numbers up to 16 y

APPENDIX 6-3

DERRYBRIEN WIND FARM TRANSECT SURVEYS 2022 & 2024

2022 SURVEY YEAR

Table 1: Transect No. 1 (T28-T37) survey results, 2022.

Species	26th May 2022	30th June 2022	Conservation Status
Mallard	2	0	A
Cuckoo	2	0	G
Raven	0	4	G
Skylark	6	8	A
Swallow	10+	20+	A
Willow warbler	5	8	A
Wren	2	3	G
Blackbird	0	1	G
Stonechat	3	4	G
Meadow pipit	10	16	R
Reed bunting	2	1	G

Conservation Status: R – Red; A – Amber; G – Green

Table 2: Transect No. 2 (T23-T70) survey results, 2022.

Species	26th May 2022	30th June 2022	Conservation Status
Woodpigeon	0	6	G
Cuckoo	1	0	G
Magpie	2	0	G
Goldcrest	2	3	A
Great tit	1	0	G
Coal tit	4	9	G
Swallow	0	10+	A
Willow warbler	7	11	A
Whitethroat	2	1	G
Wren	4	5	G

Species	26th May 2022	30th June 2022	Conservation Status
Blackbird	3	3	G
Song thrush	1	0	G
Robin	3	4	G
Stonechat	2	4	G
Meadow pipit	**6**	**9**	**R**
Chaffinch	4	6	G
Lesser redpoll	0	7	G

Conservation Status: R – Red; A – Amber; G – Green

Table 3: Transect No. 3 (T12-T15) survey results, 2022.

Species	26th May 2022	30th June 2022	Conservation Status
Mallard	**0**	**3**	**A**
Woodpigeon	8	0	G
Cuckoo	1	0	G
Hooded crow	2	4	G
Coal tit	3	0	G
Skylark	**8**	**11**	**A**
Swallow	**6**	**10+**	**A**
Willow warbler	**5**	**3**	**A**
Whitethroat	1	4	G
Wren	7	3	G
Blackbird	4	5	G
Robin	2	2	G
Stonechat	4	3	G
Meadow pipit	**12**	**10**	**R**
Chaffinch	3	1	G
Lesser redpoll	0	7	G

Conservation Status: **R – Red**; **A – Amber**; **G – Green**

Table 4: Transect No. 4 (T47-T50) survey results.

Species	26th May 2022	30th June 2022	Conservation Status
Sparrowhawk	0	1	G
Woodpigeon	4	13	G
Magpie	3	4	G
Jay	0	3	G
Goldcrest	3	1	A
Coal tit	7	12	G
Swallow	0	6	A
Willow warbler	9	4	A
Wren	2	5	G
Blackbird	6	10	G
Song thrush	3	1	G
Mistle thrush	4	6	G
Robin	3	4	G
Meadow pipit	1	3	R
Chaffinch	10+	8	G
Siskin	5	0	G
Lesser redpoll	6	3	G

Conservation Status: **R – Red**; **A – Amber**; **G – Green**

Table 5: Transect No. 5 (PS1-PS4) survey results, 2022.

Species	26th May 2022	30th June 2022	Conservation Status
Woodpigeon	4	7	G
Cuckoo	1	0	G

Species	26th May 2022	30th June 2022	Conservation Status
Coal tit	2	5	G
Swallow	10+	0	A
Willow warbler	8	12	A
Wren	4	2	G
Blackbird	5	5	G
Song thrush	2	1	G
Mistle thrush	1	4	G
Robin	1	0	G
Chaffinch	6	10	G
Lesser redpoll	0	7	G

Conservation Status: R – Red; A – Amber; G – Green

Table 6: Transect No. 6 (P10-P12) survey results, 2022.

Species	26th May 2022	30th June 2022	Conservation Status
Woodpigeon	0	3	G
Cuckoo	1	0	G
Goldcrest	2	0	A
Coal tit	5	2	G
Swallow	0	5	A
Willow warbler	6	4	A
Whitethroat	1	0	G
Wren	6	3	G
Blackbird	6	2	G
Song thrush	1	2	G
Robin	3	2	G
Stonechat	0	4	G

Species	26th May 2022	30th June 2022	Conservation Status
Meadow pipit	**2**	**0**	**R**
Chaffinch	9	5	**G**
Siskin	0	7	**G**

Conservation Status: R – Red; A – Amber; G – Green

Table 7: Transect No. 7 (Local road/PS36 to AM34) survey results, 2022.

Species	26th May 2022	30th June 2022	Conservation Status
Mallard	**0**	**2**	**A**
Kestrel	**1**	**0**	**R**
Cuckoo	2	0	**G**
Hooded crow	0	**5**	**G**
Skylark	**3**	**6**	**A**
Swallow	**20+**	**0**	**A**
Willow warbler	**2**	**1**	**A**
Whitethroat	2	3	**G**
Wren	4	1	**G**
Blackbird	2	0	**G**
Song thrush	1	2	**G**
Robin	2	0	**G**
Stonechat	3	5	**G**
Meadow pipit	**9**	**15**	**R**
Chaffinch	2	0	**G**
Reed bunting	2	3	**G**

Conservation Status: R – Red; A – Amber; G – Green

2024 SURVEY YEAR

Table 1: Transect No. 1 (T28-T37) survey results, 2024.

Species	9th May 2024	20th June 2024	Conservation Status
Mallard	0	0	A
Woodpigeon	0	7	G
Cuckoo	3	1	G
Raven	0	0	G
Skylark	4	9	A
House martin	2	0	A
Swallow	6	20+	A
Willow warbler	3	4	A
Wren	3	1	G
Blackbird	2	4	G
Stonechat	2	5	G
Meadow pipit	7	11	R
Reed bunting	1	3	G

Conservation Status: R – Red; A – Amber; G – Green

Table 2: Transect No. 2 (T23-T70) survey results, 2024.

Species	9th May 2024	20th June 2024	Conservation Status
Woodpigeon	2	4	G
Cuckoo	0	0	G
Magpie	0	0	G
Goldcrest	1	2	A
Great tit	2	2	G
Coal tit	7	4	G
Swallow	3	0	A
Willow warbler	4	3	A

Species	9th May 2024	20th June 2024	Conservation Status
Whitethroat	2	2	G
Wren	2	3	G
Blackbird	1	5	G
Song thrush	0	2	G
Robin	2	3	G
Stonechat	1	0	G
Meadow pipit	**2**	**5**	**R**
Chaffinch	6	9	G
Lesser redpoll	0	0	G

Conservation Status: R – Red; A – Amber; G – Green

Table 3: Transect No. 3 (T12-T15) survey results, 2024.

Species	9th May 2024	20th June 2024	Conservation Status
Mallard	**2**	**0**	**A**
Woodpigeon	0	0	G
Cuckoo	0	0	G
Hooded crow	2	1	G
Coal tit	0	0	G
Great tit	1	0	G
Skylark	**5**	**6**	**A**
Swallow	**10+**	**6**	**A**
Willow warbler	**7**	**5**	**A**
Whitethroat	2	3	G
Wren	4	5	G
Blackbird	2	1	G
Robin	3	3	G
Stonechat	3	6	G

Species	9th May 2024	20th June 2024	Conservation Status
Meadow pipit	**9**	**14**	**R**
Chaffinch	4	4	**G**
Lesser redpoll	6	4	**G**

Conservation Status: **R – Red**; **A – Amber**; **G – Green**

Table 4: Transect No. 4 (T47-T50) survey results, 2024

Species	9th May 2024	20th June 2024	Conservation Status
Sparrowhawk	0	0	**G**
Woodpigeon	9	14	**G**
Magpie	2	1	**G**
Jay	1+	2	**G**
Goldcrest	**2**	**2**	**A**
Coal tit	4	5	**G**
Swallow	**4**	**0**	**A**
Willow warbler	**6**	**5**	**A**
Wren	4	5	**G**
Blackbird	3	4	**G**
Song thrush	2	3	**G**
Mistle thrush	2	7	**G**
Robin	1	2	**G**
Meadow pipit	**0**	**2**	**R**
Chaffinch	13	7	**G**
Siskin	0	4	**G**
Lesser redpoll	12	0	**G**

Conservation Status: **R – Red**; **A – Amber**; **G – Green**

Table 5: Transect No. 5 (PS1-PS4) survey results, 2024.

Species	9th May 2024	20th June 2024	Conservation Status
Woodpigeon	2	5	G
Cuckoo	1	0	G
Goldcrest	1	0	A
Coal tit	5	4	G
Blue tit	2	0	G
Swallow	10+	10+	A
Willow warbler	5	6	A
Wren	2	5	G
Blackbird	3	4	G
Song thrush	1	0	G
Mistle thrush	2	0	G
Robin	3	3	G
Meadow pipit	4	2	R
Chaffinch	7	8	G
Lesser redpoll	2	0	G

Conservation Status: R – Red; A – Amber; G – Green

Table 6: Transect No. 6 (P10-P12) survey results, 2024.

Species	9th May 2024	20th June 2024	Conservation Status
Woodpigeon	4	2	G
Cuckoo	0	0	G
Goldcrest	0	1	A
Coal tit	2	6	G
Swallow	5	3	A
Willow warbler	7	5	A
Whitethroat	2	1	G

Species	9th May 2024	20th June 2024	Conservation Status
Wren	5	2	G
Blackbird	4	5	G
Song thrush	1	0	G
Robin	1	3	G
Stonechat	2	3	G
Meadow pipit	**3**	**5**	**R**
Chaffinch	6	7	G
Siskin	0	3	G

Conservation Status: R – Red; A – Amber; G – Green

Table 7: Transect No. 7 (Local road/PS36 to AM34) survey results, 2024.

Species	9th May 2024	20th June 2024	Conservation Status
Mallard	**0**	**0**	**A**
Kestrel	**0**	**0**	**R**
Cuckoo	1	0	G
Hooded crow	3	4	G
Skylark	**2**	**3**	**A**
Swallow	**12**	**4**	**A**
Willow warbler	**3**	**2**	**A**
Whitethroat	1	2	G
Wren	3	3	G
Blackbird	1	3	G
Song thrush	0	1	G
Robin	1	2	G
Stonechat	2	3	G
Meadow pipit	**6**	**8**	**R**

Species	9th May 2024	20th June 2024	Conservation Status
Chaffinch	3	1	G
Reed bunting	1	0	G

Conservation Status: R – Red; A – Amber; G – Green

APPENDIX 6-4

BAT MITIGATION REPORT OF THE BAT DEROGATION LICENCE

Derogation Number
DER-BAT-2025-170 (amended)

EUROPEAN COMMUNITIES (BIRDS AND NATURAL HABITATS) REGULATIONS, 2011 (S.I. No 477 of 2011)

DEROGATION

Granted under Regulation 54 of the European Communities (Birds and Natural Habitats) Regulations 2011, hereinafter referred to as "the Habitats Regulations".

The Minister for Housing, Local Government & Heritage, in exercise of the powers conferred on him by Regulation 54 of the Habitats Regulations hereby grants to **John Gartland** of **Gort Windfarms Ltd., 27 Fitzwilliam Street Lower, Dublin 2, D02 KT92** a derogation. It is stated that this derogation is issued:

A. In the interests of public health and public safety, or for other imperative reasons of overriding public interest, including those of a social or economic nature and beneficial consequences of primary importance for the environment
B. As there is no satisfactory alternative, and the action authorised by this derogation will not be detrimental to the maintenance of the population of **bats** referred to below at a favourable conservation status in their natural range.

This derogation authorises the following:

1. Roost disturbance
2. Actions authorised within the derogation

The derogation is issued in respect of the following **bat species**:

- **Brown Long-Eared Bat** **Plecotus Auritus**
- **Common Pipistrelle** **Pipistrellus Pipistrellus**
- **Soprano Pipistrelle** **Pipistrellus Pygmaeus**

Terms and Conditions

1. This derogation is granted solely to allow the activities specified in connection with the works located at **Derrybrien Wind Farm, Derrybrien North, Kylebrack, Loughrea, County Galway, H62 PE08**, for **John Gartland.**
2. All activities authorised by this derogation, and all equipment used in connection herewith, shall be carried out, constructed and maintained (as the case may be) so as to avoid unnecessary injury or distress to any species of **BAT**. Anything done other than in accordance with the terms of this derogation may constitute an offence
3. This derogation may be modified or revoked, for stated reasons, at any time.
4. The mitigation measures outlined in the application report (**Derrybrien Bat Survey and Mitigation Report_Final**), together with any changes or clarification agreed in correspondence between NPWS and the agent or applicant, are to be carried out. Strict adherence must be paid to all the proposed measures in the application.
5. The actions which this derogation authorise shall be completed between **26th February – 31st December 2025, inclusive.**
6. The works will be supervised by bat ecologists: **Kate-Marie O'Connor & David Daly**
7. If this derogation addresses works that are subject of a planning application, no such works permitted under this derogation can occur until planning permission is granted.
8. If this derogation expires prior to works permitted under this derogation commencing, a new application must be sought in advance, including the provision of any updated data or reports.
9. This derogation shall be produced for inspection on a request being made on that behalf by a member of An Garda Síochána or an authorised NPWS officer appointed under Regulation 4 of the Habitats Regulations.
10. The local **NPWS Regional Manager,** rebecca.teesdale@npws.gov.ie**,** must be contacted prior to the commencement of any activity, and if bats are detected on site during the course of the work, under the terms of this derogation.
11. On completion of the actions which this derogation authorises, all recordings of bat species affected will be made using the standardised data form provided below and must be submitted to the NPWS **within four weeks of the expiry date of this licence**. Included with the below returns form, a report will also be submitted to wildlife.reports@npws.gov.ie detailing results of works and success of mitigation. **Both documents must be submitted to constitute a derogation return.**

For the Minister for Housing, Local Government & Heritage

(an officer authorised by the Minister to sign on his behalf)

19 March 2025

Any query in relation to this derogation should be sent to reg54derogations@npws.gov.ie

Article 16 (Habitats Directive) - Returns Form

This returns form is for use in respect of:

Regulation 54 – Derogation to protect wild fauna and conserving natural habitats

1st January to 31st December 2025, inclusive

Derogation Number: DER-BAT-2025-170 (amended)
Derogation Holder: John Gartland

Species (English & Scientific)	No. of Individuals Affected	No. of Breeding Places	No. of Resting Places

Derogation Holder Signature: _____ Date: _____

Returns must be emailed to the following email address:

wildlife.reports@npws.gov.ie

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Derrybrien Wind Farm Development Decommissioning Project

Bat Survey and Mitigation Report

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Client	ESB
Project	Derrybrien Wind Farm Development Decommissioning Project, Bat Survey and Mitigation Report
Version	FINAL
Project number	P22-408

	Name	**Position**	**Date**
Originated	Daniel Foster	Principal Ecologist BSG Ecology	18 September 2023
Reviewed	Rachel Potter	Principal Ecologist BSG Ecology	09 January 2024
Reviewed	Kate-Marie O'Connor	Senior Ecologist ESB	20 September 2024
Issued	Rachel Potter	Principal Ecologist BSG Ecology	25 September 2024

Disclaimer

This report is issued to the client for their sole use and for the intended purpose as stated in the agreement between the client and BSG Ecology under which this work was completed, or else as set out within this report. This report may not be relied upon by any other party without the express written agreement of BSG Ecology. The use of this report by unauthorised third parties is at their own risk and BSG Ecology accepts no duty of care to any such third party.

BSG Ecology has exercised due care in preparing this report. It has not, unless specifically stated, independently verified information provided by others. No other warranty, express or implied, is made in relation to the content of this report and BSG Ecology assumes no liability for any loss resulting from errors, omissions or misrepresentation made by others.

Any recommendation, opinion or finding stated in this report is based on circumstances and facts as they existed at the time that BSG Ecology performed the work. The content of this report has been provided in accordance with the provisions of the CIEEM Code of Professional Conduct. BSG Ecology works where appropriate to the scope of our brief, to the principles and requirements of British Standard BS42020.

Nothing in this report constitutes legal opinion. If legal opinion is required the advice of a qualified legal professional should be secured. Observations relating to the state of built structures or trees have been made from an ecological point of view and, unless stated otherwise, do not constitute structural or arboricultural advice.

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1 B Introduction

B1 Background to activity [location, ownership, type of and need for the proposed development, planning history, land allocation in Local Plan (or equivalent), etc]

Existing Derrybrien Wind Farm - Site Context

1.1 Derrybrien Wind Farm is owned and operated by Gort Windfarms Ltd, a wholly owned subsidiary company of ESB. The wind farm site is leased from a private landowner.

1.2 Construction of the Derrybrien Wind Farm Development was completed in 2006 and the wind farm had been generating renewable wind energy until early 2022.

1.3 Derrybrien Wind Farm is in County Galway in the northern part of the Slieve Aughty Mountains approximately 11 km due south of Loughrea, 12.7 km north northeast of Gort and 24 km west of Portumna. Galway City lies some 35 km to the northwest of the wind farm site. The wind farm site is in the south of the county approximately 4.6 km from the border with County Clare and 21 km from the border with County Tipperary in the southeast.

1.4 As illustrated in **Figure B1**, the existing Derrybrien Wind Farm Development includes the Derrybrien Wind Farm (including Derrybrien 110 kV substation), the Derrybrien to Agannygal 110 kV Overhead Line (OHL) and the Agannygal 110 kV Substation. A summary of these is provided below.

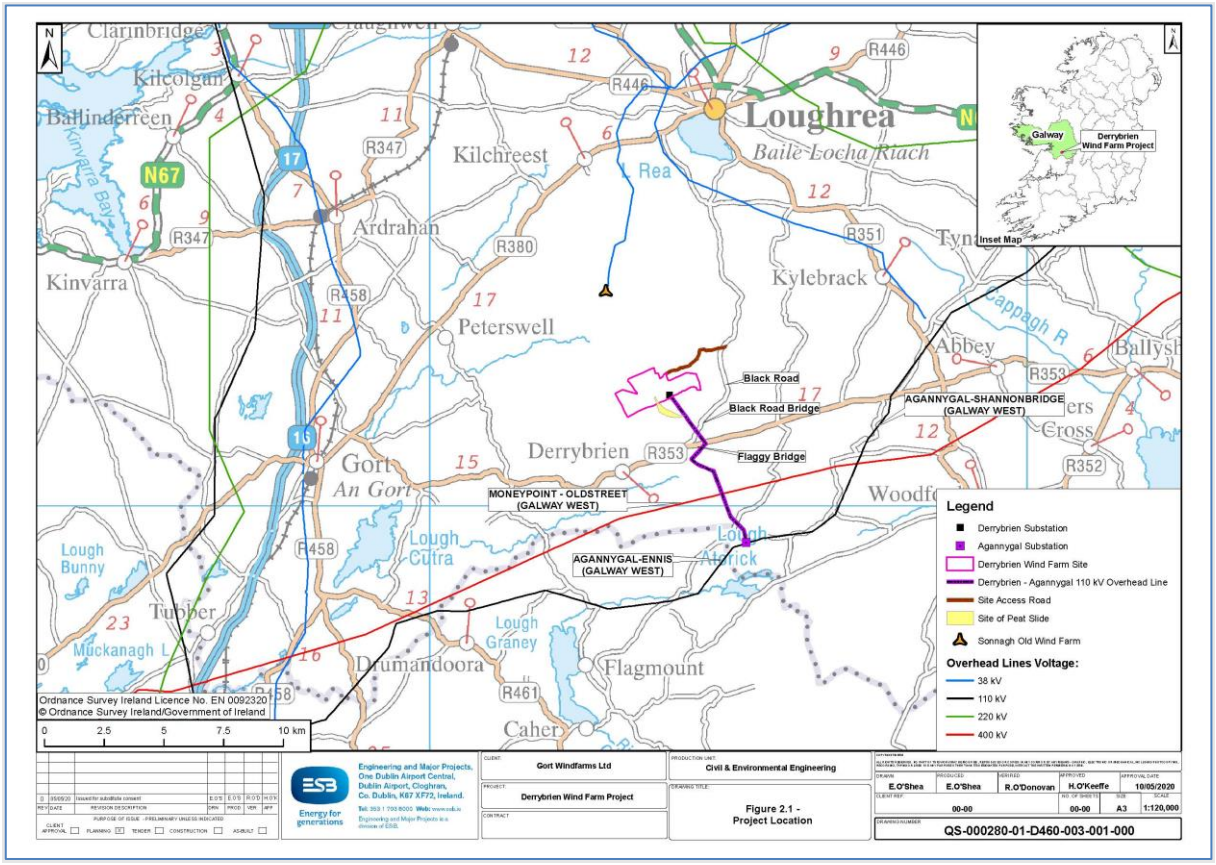

Figure B1 Site Location of Derrybrien Wind Farm

1.5 **Derrybrien Wind Farm Site:** The overall area of the wind farm site is approximately 344.5 ha, but the wind farm infrastructure occupies only a small proportion of this area (31.1 ha - approximately 9% of site). The wind farm site is accessed from a Coillte access road via a minor public road known as the Black Road (approximately 3.1 km from the wind farm to the Black Road/Coillte junction).

1.6 The main wind farm infrastructure comprises 70 turbines, crane hard standings, 17.5 km of access tracks within the site (including 14.6km of floating access tracks), drainage channels, borrow pits/quarries, on site material storage, the Derrybrien110 kV substation (including the control building), direct buried electric cables and anemometer masts.

1.7 **Derrybrien to Agannygal 110 kV Overhead Line:** The Derrybrien to Agannygal 110 kV Overhead Line (OHL) is the grid connection constructed for exporting the electricity generated at the wind farm to the national grid. It begins at the Derrybrien Substation (located within the Derrybrien wind farm site, ITM 559916E, 704736N) and ends at the Agannygal Substation (located to the south-east of the windfarm site, ITM 563118E, 698593N).

1.8 The grid connection comprises of c. 7.8 km 110 kV conductor, 34 no. double wood pole structures, 2 no. end masts, 5 no. angle masts and 1 no. intermediate mast. The OHL connects into the Ennis – Shannonbridge line at the Agannygal 110kV Substation. The Agannygal 110kV substation splits this line into two circuits: Agannygal - Shannonbridge (Galway West) and Agannygal - Ennis (Galway West).

1.9 **Agannygal 110 kV Substation:** The Agannygal 110kV substation (including the control building) is located within the townland of Loughatorick North and the approximate centre point of Agannygal Substation is at ITM co-ordinates 563118E, 698593N. The site is owned by Gort Windfarms Ltd.

1.10 The nearest villages to Agannygal 110kV substation are the following: Derrybrien – 5 km to the northwest of the site, Ballynakill – 8.7 km to the northeast, Woodford – 10 km to the east and Flagmount – 8.4 km to the southwest.

1.11 Access to the Agannygal 110kV substation and overhead line structures is from nearby roads and forestry tracks. The substation site is located within the townland of Loughatorick North.

Project Need

1.12 In 2019, pursuant to proceedings before the Court of Justice of the European Union (Case C-261-18), Ireland was found to have failed to take measures necessary to fulfil a number of obligations arising from the Environmental Impact Assessment (EIA) Directive.

1.13 On foot of that judgment and the legislative provisions set out under section 177B of the 2000 Act, on 23rd July 2020, Galway County Council directed Gort Windfarms Ltd to seek substitute consent for the development, described in the relevant notice as: '*the development of a windfarm, including ancillary development which includes service roadways, control house, transformer compounds and anemometer mast and associated development of a grid connection at Derrybrien West, Derrybrien East, Derrybrien North, Toormacnevin, Bohaboy, Caheranearl and Boleyneendorrish, all in the County of Galway, more particularly described in the grant of planning permission as set out in Schedule 2*', with Schedule 2 specifying the relevant Galway County Council planning references as 973470, 973652, 992377, 004581, 023560, 035637, 05317 and 05316.

1.14 Accordingly, an application was submitted to An Bord Pleanála (ABP) in August 2020 for substitute consent (reg. ref. ABP-308019-20) – relating to the retention and continued operation of the subject development, until its eventual decommissioning.

1.15 In February 2022, ABP refused the application for substitute consent made by Gort Windfarms Ltd in relation to the Derrybrien Wind Farm Development. As a consequence of the refusal of substitute consent, the development is now deemed to be unauthorised development,

1.16 On 29th August 2024 an enforcement notice was issued by Galway County Council requiring Gort Windfarms Ltd to '[decommission] and where appropriate in terms of possible environmental impacts on the environment at this location, [to remove] the unauthorised windfarm and associated ancillary structures'.

1.17 If the decommissioning works do not proceed it would not be possible for Gort Windfarms Ltd to comply with the stated requirements of Galway County Council as set out in the enforcement notice

EN23/235 – namely to decommission and, where appropriate in terms of possible environmental impacts on the environment at this location, remove the unauthorised windfarm and associated ancillary structures, subject to the applicable consent(s) / permissions(s) from the appropriate authority or authorities.

Alternatives Considered as part of the EIA Process

1.18 In relation to the Derrybrien Wind Farm Development, An Bord Pleanála have refused an application for substitute consent which would have authorised the continued operation of the windfarm and ancillary development (ABP-308019-20). The development is now unauthorised and is the subject of an enforcement notice that requires the decommissioning and removal of the unauthorised wind farm and unauthorised ancillary structures.

1.19 The only alternatives that can be considered relate only to its decommissioning and removal. The 'decommissioning alternatives' that have been considered are listed and summarised below:

- Alternative 1 - "Do-Nothing"
- Alternative 2 – Remove all development associated with the Derrybrien Wind Farm Development.
- Alternative 3 – 'Practicable Restoration' i.e. remove and alter existing structures on the site and, restore the site in so far as is practicable, while minimising risks to safety and the environment.

1.20 Alternative 1 "Do-Nothing" whereby all features associated with the existing Derrybrien Wind Farm Development would remain in situ in their current state – i.e., an unauthorised windfarm development that ceased commercial electricity generation in February 2022.

Alternative 1 does not facilitate the removal of the unauthorised windfarm and associated ancillary structures and is therefore in direct contravention of the enforcement notice. If the steps specified in the Enforcement Notice are not taken within a period of 36 months from the date of service of the Enforcement Notice, or an extended period as the planning authority may allow, Galway County Council may enter on the land and take such steps, including the removal, demolition, or alteration of any structure, and recover the expenses it has incurred from Gort Windfarms Ltd. Under section 156 of the 2000 Act it is an offence not to comply with an enforcement notice. Due to these legal ramifications for Gort Windfarms Ltd, the Do-Nothing scenario is not a feasible alternative.

1.21 Alternative 2 includes the total removal of all development at the Derrybrien Wind Farm Development. A breakdown of the works included in Alternative 2 is included below:

Derrybrien Windfarm including the Derrybrien 110kV Substation

- Controlled dismantling and removal of 70no. wind turbines (blades, nacelle, and tower) including their reinforced concrete foundations. Backfilling of the open excavations with suitable source of glacial till and peat to blend the area into the surrounding blanket bog.
- Controlled dismantling and removal of Derrybrien 110kV Substation including any reinforced concrete foundations within the substation compound. Backfilling of the open excavations with suitable source of glacial till and peat to blend the area into the surrounding blanket bog.
- Controlled dismantling and removal of 2no. anemometer masts including their reinforced concrete foundations and backfilling of the open excavations with suitable source of glacial till and peat to blend the area into the surrounding blanket bog.
- Removal of de-energised underground Electrical and communication cables. Note: It is physically possible to remove the underground cables by excavating open trenches along the cable routes using low ground bearing pressure tracked excavators working directly on the peat. However, this is considered a high-risk activity with regards to peat stability.
- Excavation and removal of c.17.5km access tracks network within the Derrybrien Wind Farm Site including those reconstructed after the peat slide (T68 and between T23-T70). Subsequent landscaping to match adjoining areas.

- Excavation and removal of 70no. hardstand areas and re-profiling of the adjacent areas and covering with 0.5 -1.0m of vegetated peat to blend into the surrounding blanket bog.
- Removal of naturalised peat repositories area.
- Reinstatement of the 3no. Borrow Pits / queries through infilling with material from removed access tracks and hardstands.
- Site restoration works, subsequent landscaping and bog rehabilitation measures through active drain blocking (where feasible) is also included.

Derrybrien to Agannygal 110 kV OHL and Agannygal 110kV Substation

- Destringing of the overhead line conductor
- Removal of the overhead line infrastructure (34 no. double wood pole structures and 8 no. masts)
- Controlled removal of Agannygal substation and demolition of control building
- Controlled removal of standby generator (bunded) and diesel tank, external lighting poles, lightning mast
- Removal of palisade fencing
- Removal and reinstatement of the reinforced concrete foundations for the control building and compound hardstand areas.
- Removal and reinstatement of hardcore surfaced access track
- Reinstatement of the Ennis-Shannonbridge 110kV Line.

Off-site Features constructed in response to the peat slide

- Extensive vegetation clearance and the construction of new haul routes to enable access to each offsite feature. Construction of temporary compound for the duration of the works.
- In-stream works to remove Barrage No.1 and Coillte forestry access track followed by riverbank reinstatement works.
- Infilling of minor borrow pit adjacent to Barrage No. 1 through using material removed from Barrage No.1 and other imported material if required.
- In-stream works to remove Barrage No.2 and Coillte forestry access track followed by riverbank reinstatement works.
- Removal of naturalised peat repository area adjacent to Barrage No. 2 and offsite disposal of material.
- In-stream works to remove Barrage No. 3 followed by riverbank reinstatement works.
- Removal of naturalised peat repository area adjacent to Barrage No. 3 and offsite disposal of material.
- In-stream works to remove Barrage No. 4 followed by riverbank reinstatement works.
- Removal of naturalised peat repository area at the Black Road Bridge adjacent to Barrage No. 3 and offsite disposal of material.
- Reinstatement of naturalised drainage diversion works.
- Repair works to Black Road Bridge, Flaggy Bridge and Unnamed Bridge C would remain in-situ.
- Removal of temporary haul routes and temporary compounds followed by ground reinstatement.

This alternative would involve significant civil engineering works to remove roads, reinforced turbine foundations, demolition and removal of the concrete foundations and surface buildings, etc. The works would likely be carried out mechanically using hydraulic excavators, rock breakers and earthmoving transport vehicles similar to the equipment that was used during the project construction phase.

This alternative complies with the enforcement notice as it achieves the removal of the unauthorised structures within the Derrybrien Wind Farm Development. However, it carries significant environmental, geotechnical and safety risks. For example, the intensive earthworks operations, large excavations in the peat and glacial subsoils, hydraulic breaking of reinforced concrete and the movements of fully laden heavy earthmoving trucks across access tracks – of a similar level to the original construction have the potential to give rise to peat instability increasing the risk of a future peat slide. Due to these significant risks, Alternative 2 is not a feasible alternative.

1.22 Alternative 3 'Practicable Restoration' includes the removal of the above ground structures only, leaving below ground features in situ. Alternative 3 includes the removal of the 70 turbines structure, the Derrybrien substation, the overhead line and the Agannygal Substation. The following below ground structures would remain in situ:

Derrybrien Windfarm including the Derrybrien 110kV Substation

- Reinforced concrete foundations for 70no. wind turbines.
- Reinforced concrete foundations of structures within the Derrybrien Substation compound.
- Reinforced concrete foundations of 2no. Anemometer masts.
- Approx. 17.5km of access tracks and 70no. hardstand areas
- Underground Electrical and communications cabling.
- 3no. Borrow Pits / Quarries
- Naturalised Peat Repository areas
- Onsite Drainage Infrastructure.

Derrybrien to Agannygal 110 kV OHL and Agannygal 110kV Substation

- Concrete foundations for 34no. double wooden pole sets.
- Reinforced concrete foundations for 2no. end masts.
- Reinforced concrete foundations for 5no. angle masts.
- Reinforced concrete foundations for 1no. intermediate mast.
- Reinforced concrete foundations of structures within the Agannygal Substation compound.

Off-site Features constructed in response to the peat slide

- Barrage 1 and Coillte Access Track.
- Barrage 2 and Repository Area.
- Barrage 3 and Repository Area.
- Barrage 4.
- Repository Area at the Black Road Bridge.
- Minor repairs work to instream structures/bridges – at Black Road Bridge, Flaggy Bridge, the Farmer's Track / Culvert, Crooked Bridge and Stepping Stones.
- Minor borrow pits used to source material.
- Drainage works.

The alternative complies with the enforcement notice as it achieves the removal of the unauthorised structures within the Derrybrien Wind Farm Development and significant reduces the level of ground disturbance as a means of lowering the geotechnical risk and potential impacts to the environment in general. As such it is considered to be the only feasible alternative.

Derrybrien Wind Farm Development Decommissioning Project

1.23 To comply with the enforcement notice and to minimise environmental risks on the site, Gort Windfarm Ltd are proceeding with Alternative 3 which includes the following:

Derrybrien Wind Farm (including the Derrybrien 110kV substation)

All above ground structures will be removed, leaving the wind turbine foundations, underground LV cables, meteorological mast foundations and substation foundations in situ. Any protruding foundations or structures will be cut to below ground level and infilled and levelled to match adjoining areas. Works would be confined to areas within the control of Gort Windfarms Ltd.

Derrybrien to Agannygal 110 kV Overhead Line (OHL) and Agannygal 110kV Substation

All overhead line pole sets and masts will be cut at c.300mm below ground level and removed from site. The reinforced concrete bases for angle masts would be left in situ. All above ground structures would be removed from the Agannygal 110kV substation. The palisade fencing surrounding the substation would be dismantled and removed from site. The reinforced concrete base and the platform for the substation would be left in-situ. Once the Derrybrien-Agannygal 110 kV OHL and Agannygal substation is removed, the Ennis-Shannonbridge 110kV OHL would be reinstated.

Work Area Offsite ancillary works associated with peat slide (2003)

No development works would be carried out to decommission the offsite ancillary works associated with the peat slide in 2003. All features associated with the peat slide 2003 (Barrages 1 – 4, peat repositories and the minor borrow pit adjacent to Barrage 1) which have naturalised and become heavily vegetated over the past 20 years and are virtually imperceptible today, will remain in situ. There will be no requirement for vegetation clearance, construction of temporary compounds and haul routes to access the works areas and there be no requirement for instream works to remove any items.

1.24 In order to comply with the enforcement notice, Gort Windfarms Ltd are seeking Prospective Development Consent and Substitute Consent for the decommissioning of the Derrybrien Wind Farm Development

- "Prospective Development" - the carrying out of decommissioning works to remove the majority of above-ground features from the site – including all turbines, masts, electrical plant, overhead lines etc; and enable the final decommissioning of the site (the "prospective development" and "prospective works"); and

- "Retained Development" - the 'retention' in situ and in perpetuity of part of the existing development – including at-ground and below-ground structures such as turbine and other foundations; and development associated with historic peat slide events that occurred during construction such as barrages, peat repositories, on-site borrow pits / quarries etc.

1.25 The "Prospective Development" planning application will be submitted along with its Environmental Impact Assessment Report, while the "Retained Development" substitute consent application will be submitted along with its remedial Environmental Impact Assessment Report.

Land allocation in Local Plan (or equivalent).

The lands are un-zoned.

B2 Full details of proposed works on site that are to be covered by the licence (including a site plan at Section E7). The site may be inspected by an NPWS representative, so the details given should clearly reflect the extent of the project and leave no room for doubt. This information will be used to compare site conditions with the Method Statement.

1.26 Derrybrien Substation supports a day roost of common pipistrelle *Pipistrellus pipistrellus* bat. Agannygal Substation supports day roosts of common pipistrelle, soprano pipistrelle *Pipistrellus pygmaeus* and brown long-eared *Plecotus auritus* bats. As already noted, the enforcement notice issued by Galway County Council requires the removal of the unauthorised windfarm and associated ancillary structures'. This includes both substation buildings which will result in the destruction of the bat roosts.

1.27 Prior to demolition works commencing bat boxes will be installed in two locations (near Derrybrien Wind Farm substation and near Agannygal Substation). These will act as receptor sites to relocate any bats found during works, and as long-term mitigation for the destroyed roosts. The confirmed roosts, and other potential roost areas on the buildings, will be carefully dismantled by hand under ecological supervision. Bats encountered during this work will be captured and transported from these roosts to the bat boxes.

2 C Survey and site assessment

C1 Pre-existing information on species at survey site

2.1 Bat surveys were undertaken between 2011 and 2023 within the wider Derrybrien Wind Farm site. All work completed during and after 2016 has been completed by BSG Ecology. This work included nocturnal activity surveys (driven transects and static bat detectors) and bat fatality searches using specialist search dogs. Species recorded during the activity surveys within the wider Derrybrien Wind Farm include common pipistrelle, soprano pipistrelle *Pipistrellus pygmaeus*, Nathusius's pipistrelle *Pipistrellus nathusii*, *Myotis* species, brown long-eared bat and Leisler's bat *Nyctalus leisleri*. Roost records obtained during this work are reported separately within Sections C2 – C10 of this document.

C2 Status of the species in the local/regional area

2.2 Bat Conservation Ireland (BCI) data was initially obtained for a 10 km search area around the Derrybrien Wind Farm site in 2012 (Wilson, 2012). Two lesser horseshoe *Rhinolophus hipposideros* bat roosts were identified at Thor Ballylee and Cloonbeg (both in County Galway) 9.3 km and 10 km west of the site respectively. In addition, roosts of brown long-eared bat, soprano pipistrelle and *Myotis* species were identified at a location approximately 10 km to the east of the site.

2.3 Updated data from BCI was obtained for a 10 km search area around the site in 2024. This included an additional brown long-eared and Natterer's bat roost approximately 3.1 km south west of the site, and a second brown long-eared roost approximately 7.1 km south west of the site.

2.4 A review of bat records from the National Biodiversity Data Centre and BCI data from 2024 indicates that common pipistrelle, soprano pipistrelle, Nathusius's pipistrelle, lesser horseshoe bat, Leisler's bat, brown long-eared bat, Daubenton's bat *Myotis daubentonii*, whiskered bat *Myotis mystacinus*, and Natterer's bat *Myotis nattereri* have been recorded within 10km of the site. The information obtained from BCI (Wilson, 2012) reflects these findings, with no other species recorded.

C3 Objective(s) of survey

2.5 The objectives of the bat survey work at Derrybrien Substation and Agannygal Substation were to determine the presence / likely absence of roosting bats, and characterise the roosts present.

C4 Survey area

2.6 The majority of bat survey work at the Derrybrien Wind Farm Site has been completed since 2016. Initially surveys were conducted to inform the remedial EIAR for the Site, and latterly (following refusal of the application) the decommissioning EIAR. The purpose of the surveys was originally to inform the Remedial EIA by characterising the bat community of the Site, assessing the impacts of the construction and operation of the wind farm, and subsequently to inform the decommissioning of the non-operational wind farm.

2.7 As part of an initial appraisal, habitats at the turbine locations and their proximity to features (such as pools and forest edge) were categorised. This informed the scope of sampling using static detectors; representative locations were selected and sampling undertaken over several years. Initially (in 2016) driven transects with stopping points were also completed; however subsequent changes in guidance removed the need for transect survey. Dog searching for bat carcasses was also completed at varying intensity prior to and post the implementation of a curtailment regime. Latterly, to inform the decommissioning EIAR, assessments were made of the potential of trees and buildings within and close to the project footprint to support roosting bats.

2.8 Derrybrien Substation is located within Derrybrien Wind Farm, close to its southern boundary at ITM 559915 704730. Agannygal Substation is located approximately 6.8 km south of the main Derrybrien Wind Farm at Irish Grid Reference ITM 563095 698604.

C5 Habitat description [based on daytime visit(s); to include the roost and surrounding area for context]

Derrybrien Substation (Photographs 1 to 4)

2.9 Derrybrien Substation comprises a hardstanding area approximately 70 m by 40 m in size. The substation infrastructure is located on the hardstanding and includes a control building, and various electrical transformers enclosed by a metal security fence. The substation control building is constructed from concrete rendered blocks, is approximately 25 m long by 10 m wide, and is single-storey up to 4.5 m in height at the ridge. There are external security flood lights fitted to the building. The roof is pitched with gables and covered with slate tiles which are in good condition with no potential bat access points observed. The roof eaves are overhanging and boxed with uPVC soffits, fascia and barge boards; these are typically well-sealed although there are small gaps under the gable apexes at the soffits. The roof is supported on modern timber trusses that form a cluttered loft void up to 2 m in height to the ridge. The roof tiles are underlined with type 1F bituminous underfelt which is in good condition. During the internal / external building surveys, no evidence of roosting bats was recorded. The building was considered to have low potential for roosting bats.

2.10 The habitat surrounding Derrybrien Substation offers suitable bat foraging and commuting habitats 75 m west and 90 m south where there are extensive areas of coniferous woodland, and 85 m east where there are sparser areas of coniferous trees. Habitats to the north of the substation are more open with few trees and are considered to be of limited value for foraging or commuting bats.

2.11 There are wind turbines located to the north, west and east of the building; the nearest is 97 m southwest.

Agannygal Substation (Photographs 5 to 7)

2.12 Agannygal Substation comprises a hardstanding area approximately 70 m by 50 m. The substation infrastructure is located on the hardstanding and includes a control building, and various electrical transformers which are enclosed by a metal security fence.

2.13 The substation control building is constructed from concrete rendered blocks, is approximately 15 m long by 10 m wide, and is single-storey up to 4.5 m in height at the ridge. There are external security flood lights fitted to the building. The roof is pitched with gables and covered with slate tiles which are in good condition with no potential bat access points observed. The roof eaves are overhanging and boxed with uPVC soffits, fascia and barge boards; these are typically well-sealed although there are small gaps under the gable apexes at the soffits. The roof is supported on modern timber trusses that form a cluttered loft void up to 2 m in height to the ridge. The roof tiles are underlined with type 1F bituminous underfelt which is in good condition. Approximately 15 bat droppings were found in the loft space of Agannygal Substation during the internal survey on 16 August 2022; the building was therefore noted to be a confirmed bat roost.

2.14 The habitat surrounding Agannygal Substation offers suitable bat foraging and commuting habitats 180 m south where there are extensive areas of coniferous woodland, and 85 m east where there are sparser areas of coniferous trees with woodland blocks beyond further east. Habitats to the north and west of the substation are more open with few trees and are considered to be of limited value for foraging or commuting bats.

C6 Field survey (including methods, timings, weather conditions, personnel)

2.15 Survey work was managed by Rachel Potter (Principal Ecologist at BSG Ecology) and comprised personnel as shown in Tables 1 and 2. Surveyors marked with a * hold a current National Parks & Wildlife Service bat survey licence. Surveys were undertaken with reference to Bat Conservation Trust survey guidance (Collins, 2016), which were the most up to date guidance at the time of the surveys. All surveyors are experienced in undertaking bat surveys and an Irish licenced surveyor (Caroline Shiel) was present during all surveys.

Preliminary bat roost assessment

2.16 To determine the suitability of buildings for roosting bats, a preliminary ground-level assessment of all buildings at the Derrybrien Wind Farm, including those at Derrybrien and Agannygal Substations was undertaken. Table 1 below presents a summary of the survey details.

2.17 During this survey, the interior and exteriors of the buildings at Derrybrien and Agannygal Substations were inspected for evidence of bats and to identify potential bat access points.

2.18 Externally, a search was made for potential roost features suitable for roosting bats or those giving access into the interior of the structure, such as gaps at the roof tiles, weep holes, cracks / cavities in the exterior walls, and gaps within the roof structure or between roof structure and walls. External evidence of roosting bats such as droppings, staining or feeding remains was also searched for.

2.19 To further determine the suitability of the buildings for roosting bats and search for evidence of roosts, an internal inspection of the buildings was undertaken. Where safe access allowed, the roof space of the buildings was accessed and a search made for potential roost features, and also for any evidence of roosting including live or dead bats, feeding remains, droppings, and staining.

2.20 Binoculars, torches and an endoscope were used to aid this survey as necessary, and a note was made of any signs that might indicate the presence of bats.

Table 1: Details of the preliminary bat roost assessment bat survey timings and personnel

Date	Survey type	Buildings surveyed	Survey personnel
15/08/22	Internal and external building inspection	Derrybrien Substation	Caroline Shiel* (survey licence reference DER/BAT 2023-35), Rachel Potter
16/08/22	Internal and external building inspection	Agannygal Substation	Caroline Shiel*, Rachel Potter
19/07/23	External building inspection	Agannygal Substation	Caroline Shiel*, Maurice Connolly
20/07/23	External building inspection	Derrybrien Substation	Caroline Shiel*, Maurice Connolly

Nocturnal bat survey

2.21 Nocturnal bat surveys were undertaken on the buildings at Derrybrien and Agannygal Substations to determine the presence / likely absence of roosting bats, and characterise the roosts present.

2.22 During the nocturnal surveys, surveyors were positioned so that full visual coverage could be gained of the target building and, in particular, any potential bat roost access points, which had been previously identified.

2.23 The dusk emergence bat surveys were started 15 to 30 minutes prior to sunset in order to ensure that early emerging bat species (Collins, 2016 Table 3.3), such as pipistrelle species, were detected. The surveys were generally undertaken up to 1.5 hours after sunset in order to ensure that later emerging bat species, such as brown long-eared *Plecotus auritus* bats and *Myotis* bat species were detected. The dawn roost re-entry surveys commenced from 2 hours prior to sunrise until 10 minutes following sunrise.

2.24 Echometer Touch Pro and Pettersson D240X bat detectors were used to aid bat identification in the field and record bat calls. Both surveyors recorded calls so that species could later be confirmed by studying sonograms with appropriate computer software. A Guide Pro 19 thermal imaging scope was used as a night vision aid to identify bat roost locations and roost counts.

Table 2: Details of nocturnal bat survey timings, personnel and weather conditions

Date	Survey type	Buildings surveyed	Survey times (local sunset / sunrise time)	Weather during survey	Survey personnel
15/08/22	Dusk emergence	Derrybrien Substation	20:50 to 22:35 (21:05)	Rain: none Cloud: 8/8 oktas Wind: 2 Beaufort Temp: 15°C	Caroline Shiel*, Rachel Potter
16/08/22	Dusk emergence	Agannygal Substation	20:48 to 22:33 (21:03)	Rain: none Cloud: 2/8 oktas Wind: 1-2 Beaufort Temp: 14°C dropping to 13°C	Caroline Shiel*, Rachel Potter
08/09/22	Dusk emergence	Agannygal Substation	19:40 to 21:45 (20:05)	Rain: none Cloud: 7/8 oktas clearing to 1/8 by the end of survey. Wind: 2 Beaufort Temp: 14°C	Caroline Shiel*, Maurice Connolly
09/09/22	Dawn re-entry	Derrybrien Substation	05:30 to 07:10 (06:58)	Rain: none Cloud: 8/8 oktas, foggy. Wind: 1 Beaufort Temp: 10°C	Caroline Shiel*, Maurice Connolly
26/09/22	Dusk emergence	Derrybrien Substation	19:40 to 21:45 (20:05)	Rain: none Cloud: 8/8 oktas Wind: 3-4 Beaufort Temp: 11°C dropping to 10°C	Caroline Shiel*, Maurice Connolly
19/07/23	Dusk emergence	Agannygal Substation	21:20 to 23:00 (21:47)	Rain: none Cloud: 8/8 oktas Wind: 1 Beaufort Temp: 16°C	Caroline Shiel*, Maurice Connolly
20/07/23	Dawn re-entry	Derrybrien Substation	04:00 to 05:55 (05:31)	Rain: none Cloud: 3/8 oktas Wind: 1 Beaufort Temp: 10°C	Caroline Shiel*, Maurice Connolly

Limitations to method

2.25 There were no perceived limitations to the surveys.

C7 Results (to include raw data, any processed or aggregated data, and negative results as appropriate)

Derrybrien Substation

Preliminary bat roost assessment

2.26 No evidence of roosting bats was recorded internally or externally at the Derrybrien Substation building during any of the surveys.

Nocturnal surveys

2.27 The nocturnal surveys recorded one bat roost at the Derrybrien Substation building; this was a single common pipistrelle bat roosting at the gable apex on the east building elevation. The roost location is presented on **Figure C9b**. Table 3 provides a summary of the nocturnal survey results.

Table 3: Derrybrien Substation nocturnal survey results summary

Date	Roosting bats recorded	Non-roosting bats recorded
15/08/22 (dusk)	One common pipistrelle emerged from a gap at the gable apex of the east elevation (roost reference R1).	No other bat activity was recorded.
09/09/22 (dawn)	No bat activity recorded.	
26/09/22 (dusk)	No bat activity recorded.	
20/07/23 (dawn)	One common pipistrelle returned to roost at the gable apex of the east elevation (roost reference R1).	No other bat activity was recorded.

Agannygal Substation

Preliminary bat roost assessment

2.28 Approximately 10-15 common pipistrelle and brown long-eared bat droppings (confirmed by DNA analysis - see Appendix 1) were found in the loft space of Agannygal Substation building (roost reference R4). No external evidence of roosting bats was recorded during the survey.

Nocturnal surveys

2.29 The nocturnal surveys recorded two species of bat roosting at the Agannygal Substation building; common pipistrelle bats (peak count on one survey of seven bats) roosting at the gable apexes on the northern and southern building elevations and one soprano pipistrelle bat roosting at the southern elevation gable apex. The roost location is presented on **Figure C9d**. Table 4 provides a summary of the nocturnal survey results.

Table 4: Agannygal Substation nocturnal survey results summary

Date	Roosting bats recorded	Non-roosting bats recorded
16/08/22 (dusk)	Two common pipistrelle bats emerged from a gap at the gable apex of the northern elevation (roost reference R2).	One common pipistrelle was recorded briefly at 22:18, but the bat was not seen.
08/09/22 (dusk)	Four common pipistrelle bats emerged from a gap at the gable apex of the northern elevation (roost reference R2). Three common pipistrelle bats emerged from a gap at the gable apex of the southern elevation (roost reference R3).	No other bat activity was recorded.
19/07/23 (dusk)	Seven common pipistrelle bats emerged from a gap at the gable apex of the northern elevation (roost reference R2). One soprano pipistrelle bat emerged from a gap at the gable apex of the southern elevation (roost reference R3).	No other bat activity was recorded.

Other structures associated with the Derrybrien Wind Farm

2.30 Three stone bridges are present near the Derrybrien Wind Farm. These were inspected in August 2022 and found to support very limited roosting features and capacity to support bats. All features could be fully inspected, and no bats or evidence of bat use was recorded. Each of the bridges has low roost potential, and no further survey is recommended (the features were fully inspected and absence of bats was confirmed).

C8 Interpretation and evaluation (including presence/absence, population size class assessment, site status assessment and factors influencing survey results)

2.31 Preliminary bat roost assessment and nocturnal bat surveys have confirmed bat roosts within two buildings at the Derrybrien Wind Farm site, within a building at Derrybrien Substation and a building at Agannygal Substation. Table 5 presents a summary of the bat roosts recorded, an assessment of the roost type and their conservation significance.

Table 5: Interpretation / evaluation of survey results

Roost ref.	Bat roost evidence and interpretation	Roost type[1]	Conservation significance	Consideration of seasonal use
Derrybrien Substation				
R1	Common pipistrelle bat: one bat recorded during two of the four survey occasions (15/08/22 and 20/07/23) roosting in a small crevice at the gable apex on the eastern elevation of the building (Photograph 4). Roost likely used by non-breeding individual / small numbers of bats on an occasional basis.	Day	Low	Occasional use throughout active season. Low suitability for hibernation.
Agannygal Substation				
R2	Common pipistrelle bat: between two and seven bats recorded roosting in this location during each of the three nocturnal surveys, The roost location is in a small crevice at the gable apex on the northern elevation of the building (Photograph 5). Roost likely used by non-breeding individual / small numbers of bats on an occasional basis.	Day	Low	Occasional use throughout active season. Low suitability for hibernation.
R3	Common pipistrelle: three bats recorded roosting during one of the three survey occasions (08/09/22) in a gap at the gable apex on the southern elevation of the building (Photograph 6). Likely used by individual / small numbers of bats on an occasional basis.	Day	Low	Occasional use throughout active season. Low suitability for hibernation.
	Soprano pipistrelle: one bat recorded roosting during one of the three survey occasions (19/07/23) in a gap at the gable apex on the southern elevation of the building (Photograph 6). Likely used by individual / small numbers of bats on an occasional basis.	Day	Low	Occasional use throughout active season. Low suitability for hibernation.
R4	Brown long-eared bat: 10-15 brown long-eared bat droppings recorded within the loft void (Photograph 7) of the building (confirmed by DNA analysis). No brown long-eared bats recorded roosting during nocturnal surveys. Likely used by individual / small numbers of bats on an occasional basis.	Day	Low	Occasional use throughout active season. Low suitability for hibernation.

2.36 The buildings have some intrinsic / low suitability for individual / low numbers of hibernating bats within the roof structure tiles. Hibernation surveys have not been undertaken as it would not be practical or effective to inspect the crevices that could be potentially used without dismantling them. The works with the greatest likelihood of encountering bats will be completed outside of the hibernation period and the risk of encountering hibernating bats is considered to be low. Specific hibernation survey is considered to be unnecessary.

[1] With reference to
Collins, J. (ed.) (2023*) Bat Surveys for Professional Ecologists: Good Practice Guidelines* (4th edition).
The Bat Conservation Trust, London.

2.37 The surveys undertaken have recorded small numbers of common pipistrelle bats roosting at Derrybrien Substitution and small numbers of common pipistrelle, soprano pipistrelle and brown long-eared bat (based on the presence of small numbers of droppings only) at Agannygal Substation. The surveys have been undertaken at an optimal time of year, and with no significant limitations, which has allowed a robust characterisation of the roosts to be made.

C9 Map(s) of survey area (with habitat description, marking structures or features examined; summary of survey results marked on map if appropriate. Map should show area on an Ordnance Survey (or similar) base-map)

2.38 Refer to Section 8 of this report for all figures.

C10 Cross-referenced photographs of key features (if appropriate)

2.39 Refer to Section 10 of this report for all photographs.

3 D Impact assessment

D1 Pre- and mid-activity impacts

3.1 Any bats present during the works could be disturbed, injured or killed. There are a number of elements of the work that could lead to short / mid-term (the duration of the works) impacts on bats if such impacts are not mitigated, as follows:

- An increase in noise, vibration and dust and increased human presence at the roost buildings may disturb bats in proximity to the works. This is likely to result in a minor negative impact at site level.
- Removal of roof tiles may disturb bats if either uncovered or roosting in adjacent areas during the strip. This is likely to result in a major negative impact at site level.

D2 Long-term impacts [roost or habitat loss, modification, fragmentation, etc.]

3.2 Common pipistrelles are common in Ireland, and together with soprano pipistrelles are the most frequently recorded species (Schofield & Mitchell-Jones, 2011). The population in Ireland is thought to be stable and is estimated to comprise 1-2 million mature individuals (Marnell *et al.*, 2019). Results from Bat Conservation Ireland's car-based bat monitoring scheme suggests populations of common pipistrelle increased between 2003 and 2009 (Roche *et al*., 2011). The mammal red list for Ireland 2019 lists the species as of 'least concern' in Ireland (Marnell *et al.*, 2019). Common pipistrelle feed in a wide range of habitats including woodland, hedgerows, grassland, farmland, suburban and urban areas (Dietz *et al*., 2009; Schofield & Mitchell-Jones, 2011, Dietz & Keifer, 2016). Maternity roosts are mainly found in buildings, with males roosting in buildings and trees during the summer (Collins, 2016). Common pipistrelle bats have also been recorded roosting in bridges in Ireland (Masterson *et al.*, 2008). The relative abundance of common pipistrelle is considered to be **Common** in Ireland.

3.3 Soprano pipistrelles are common in Ireland, and together with common pipistrelles are the most frequently recorded species (Schofield & Mitchell-Jones, 2011). The population in Ireland is thought to be stable, and is estimated to comprise 0.54-1.2 million mature individuals (Marnell et al., 2019). Results from Bat Conservation Ireland's car-based bat monitoring scheme suggest populations of soprano pipistrelle species increased between 2003 and 2009 (Roche et al., 2011). The mammal red list for Ireland 2019 lists the species as of 'least concern' in Ireland (Marnell *et al*., 2019). Soprano pipistrelles typically feed in wetland habitats, for example over lakes and rivers, but also occur around woodland edge, along tree lines and hedgerows, and in suburban gardens and parks (Dietz *et al.,* 2009; Schofield & Mitchell-Jones, 2011; Dietz & Keifer, 2016). Soprano pipistrelle maternity roosts are mainly found in buildings (typically forming larger roosts than common pipistrelle), with males roosting in buildings and trees during the summer (Collins, 2016). Soprano pipistrelles have also been recorded roosting in bridges in Ireland (Masterson *et al.,* 2008). The relative abundance of soprano pipistrelle is considered to be **Common** in Ireland.

3.4 Brown long-eared bats are common and widespread in Ireland (Schofield & Mitchell-Jones, 2011). The population is thought to be stable, and is estimated to comprise 64,000-115,000 mature individuals (Marnell *et al.,* 2019). Results from Bat Conservation Ireland's Brown Long-eared Bat Roost Monitoring Scheme also suggest the population in Ireland is stable (Aughney *et al.,* 2011; BCI, 2019a). The mammal red list for Ireland 2019 lists the species as of 'least concern' (Marnell *et al*., 2009). Brown long-eared bats typically forage in woodlands, and roost in buildings and trees (Schofield & Mitchell-Jones, 2011). They have also been recorded roosting in bridges (BCI, 2010). Studies suggest that brown long-eared bats spend most of their time foraging within 500 m to 1 km of their roosts, and flight distances are typically under 10 km (Dietz *et al.,* 2009, Hundt *et al*., 2012). The relative abundance of brown long-eared bats is considered to be **Rarer** in Ireland.

3.5 The demolition of the building at Derrybrien Substation will result in the loss of one non-breeding roost of common pipistrelle bat. The demolition of the building at Agannygal Substation will result in the loss of non-breeding roosts of common pipistrelle, soprano pipistrelle and brown long-eared bats.

3.6 Taking account of all of the above, the following impact assessment has been made:

- The demolition of the building at Derrybrien Substation will result in the loss of one non-breeding roost of common pipistrelle bat (R1) which, without mitigation, could result in injury or killing of individual / small numbers of common pipistrelle bat. There are few other suitable roost buildings or trees within the wider wind farm site, or nearby, that could provide alternative roosts for displaced bats.
- The demolition of the building at Agannygal Substation will result in the loss of two non-breeding roost of common pipistrelle bat (R2 and R3), one non-breeding roost of soprano pipistrelle bat (R3) and one non-breeding roost of brown long-eared bat (R4) which, without mitigation, could result in injury or killing of individual / small numbers of these bat species. There are few other suitable roost buildings or trees within the wider wind farm site, or nearby, that could provide alternative roosts for displaced bats.
- The demolition of the two substations has the potential to result in a significant impact on common pipistrelle, soprano pipistrelle and brown long-eared bat at the local level. There are very limited roosting opportunities on site, and use of habitats around the substations by foraging common pipistrelle in the late summer and autumn, and by brown long-eared bat over their active season may decrease as a result.

3.7 However, given the low number of non-breeding bats roosting at Derrybrien and Agannygal Substations, the demolition works are unlikely to result in an adverse effect on the favourable conservation status of common pipistrelle, soprano pipistrelle or brown long-eared bats.

3.8 There will be no roost modification and the roosts will be destroyed.

3.9 Fragmentation impacts are not anticipated. Direct loss or degradation of foraging habitat will be temporary and localised in nature. Where working areas around turbines are required for decommissioning, these will be allowed to revegetate following work being completed. Localised clearance of conifers in a dynamic, commercially-managed landscape is typical of what is already occurring on a large scale. Effects will be temporary in nature and are unlikely to be significant at the site level for any bat species.

3.10 The above considered, the actions permitted by a derogation licence would not be detrimental to the maintenance of the populations of the species to which the Habitats Directive relates at a favourable conservation status in their natural range as is required under Section 54(2) of the European Communities (Birds and Natural Habitats) Regulations 2011, as amended.

D3 Post-activity interference impacts [disturbance etc.]

3.11 There are no impacts expected in the absence of mitigation as the substations will be cleared and no lighting or other potential sources of interference proposed.

D4 Other impacts

3.12 Not applicable.

D5 Summary of impacts at the site level

3.13 Refer to D2 above.

D6 Summary of impacts in a wider context

3.14 Refer to D2 above.

D7 Plans or maps to show impacts (clear indication of which areas would be affected and how)

3.15 Refer to Section 8 of this report for all figures.

4 E Alternative solutions examined

E1 List of alternative solutions examined.

4.1 A summary of the 'decommissioning alternatives' that have been considered for the Derrybrien Wind Farm Development Decommissioning Project as part of the EIA process are included in Section B of this report. As outlined above the rationale for retaining certain at and below ground structures is a means of reducing the significant environmental, geotechnical and safety risks that are associated with peat stability and potential peat slides. As no such rationale exists for retaining the substation buildings at Derrybrien and Agannygal, the only alternative that can be considered for the purposes of this derogation licence application is Alternative 1 Do-Nothing. Under the Do-nothing scenario, all features associated with the wind farm (including the Agannygal and Derrybrien substations) would remain in situ in their current state – i.e., an unauthorised windfarm development that ceased commercial electricity generation in February 2022.

E2 details of each alternative and how it addresses the impacts described in Section D. Include any residual impacts which the solution does not address

4.2 Under Alternative 1 "Do Nothing", no decommissioning works would be undertaken. All features associated with the Derrybrien Wind Farm Development would remain in-situ in their current condition. The infrastructure would continue to degrade over time. Under Alternative 1 the existing bat roosts (as described in Section C7) remain unaffected.

E3 Feasibility of each alternative in the context of the overall development

4.3 Alternative 1 Do-Nothing: As described above in section B1, the Derrybrien Wind Farm Decommissioning Project (including the two control buildings where the bat roosts are located) is an unauthorised development under section 177O(5) of the PDA. In August 2024 an enforcement notice was issued by Galway County Council under section 154 of the PDA requiring Gort Windfarms Ltd. to decommission the unauthorised Derrybrien Wind Farm and associated ancillary structures subject to the applicable consent(s)/ permission(s) from the appropriate competent authority or authorities. Under the "Do Nothing" scenario, the two unauthorised substation buildings would remain in place and thereby Gort Windfarms Limited would be acting in direct contravention of the enforcement notice. If the steps specified in the Enforcement Notice are not taken within a period of 36 months from the date of service of the Enforcement Notice, or an extended period as the planning authority may allow, Galway County Council may enter on the land and take such steps, including the removal, demolition or alteration of any structure, and recover the expenses it has incurred from Gort Windfarms Ltd. Under section 156 of the 2000 Act it is an offence not to comply with an enforcement notice. Due to these legal ramifications for Gort Wind Farms Ltd, the Do-Nothing scenario is not a feasible option.

E4 Reasons for accepting/rejecting each alternative solution

4.4 The "Do Nothing" scenario is rejected because the two substation buildings are unauthorised development and if they were to remain in place, Gort Windfarms Ltd would be acting in contravention of the enforcement notice, and committing an offence under section 156 of the PDA. As such, there are no satisfactory alternative solutions to the proposed demolition of the two substation buildings.

4.5 This bat derogation licence application qualifies under Regulation 54(2)(c) of the European Communities (Birds and Natural Habitats) Regulations 2011, as amended as set out below:

In the interests of public health and public safety, or for other imperative reasons of overriding public interest, including those of a social or economic nature and beneficial consequences of primary importance for the environment

4.6 It is of overriding public interest that the 2000 Act, as amended, and the enforcement notice issued by Galway County Council under it is abided by.

5 F Mitigation

F1 Mitigation strategy (overview of how the impacts will be addressed in order to ensure no detriment to the maintenance of the population at a favourable conservation status)

5.1 The following method statement addresses potential impacts on bats to ensure that the favourable conservation status of the bat species at site level is maintained. This will ensure that no bats are injured or killed during demolition works, and that compensatory roost locations are provided to replace those lost.

F2 Replacement roost site selection (including existing species status; location, ownership and status; and habitat description, size, boundaries)

5.2 Two locations have been selected to install roost replacement features:

- The Derrybrien Substation roost replacement will be located at approximately ITM 559779 705609 which is 890 m to the north of the existing roost. A pole mounted bat roost box will be installed at this location prior to the commencement of demolition / roost destruction works. This will provide mitigation for the loss of the common pipistrelle day roost (R1). The box will be placed at a height of at least 5m from the ground and will be of this specification or an available equivalent (Pole Mounted Bat Box | The Nestbox Company or Shop - Eire Ecology). This location is adjacent to suitable bat foraging / commuting habitat with a waterbody immediately to the south, and extensive areas of woodland within 200 m to the east.
- The Agannygal Substation roost replacements will be located at approximately ITM 563072 698604, which is within 10 m to the west of the existing roost . Three pole mounted bat roost boxes will be installed at this location prior to the commencement of demolition / roost destruction works. These will provide mitigation for the loss of the common pipistrelle day roosts, soprano pipistrelle day roost and brown long-eared bat day roosts (R2, R3 and R4). The boxes will be placed at a height of at least 5 m from the ground and will be of this specification or an available equivalent (Pole Mounted Bat Box | The Nestbox Company or Shop - Eire Ecology)

5.3 The bat boxes are to be located in areas of high foraging suitability with good habitat connectivity. Irish bat mitigation guidelines (Marnell *et al*., 2022) suggest that bat boxes may be used as suitable compensation for roosts of low compensation significance, where the species affected are known to use bat boxes. Common and soprano pipistrelles are accepted as using crevice and hollow type bat boxes. Brown long-eared bats are accepted as using hollow type bat boxes. The pole mounted boxes provided above will include suitable box types for all species, on a variety of aspects (to allow for roost movement with changing weather conditions / season.

5.4 There are few potential roost locations in the local area due to the absence of suitable buildings, and because coniferous tree species present do not typically develop natural roost cavities on a regular basis. It is therefore considered that there is a high likelihood of bats roosting within the bat boxes.

5.5 Gort Windfarms Ltd. will own and be responsible for the bat boxes and their maintenance.

F3 Habitat creation, restoration and/or enhancement (as appropriate)

5.6 Not applicable.

F4 Capture and exclusion

F4.1 Timing, effort, methods, capture/exclusion methods

5.7 Prior to works being undertaken which will affect the existing roosts within Derrybrien and Agannygal Substations, the pole-mounted bat boxes will be installed as detailed in section F2, to relocate any bats found during works in to and provide long-term mitigation for the loss of the roosts.

5.8 Works to render the Derrybrien and Agannygal Substation buildings unsuitable for roosting bats are proposed to be undertaken upon receipt of the licence and following erection of the bat boxes. The

buildings are not considered to support a maternity roost and therefore works, if undertaken during the spring / summer / autumn, will not impact upon pregnant females or dependant young or hibernating bats.

5.9 Prior to the commencement of works, all site contractors will be inducted by a licenced bat ecologist to make them aware of the potential presence of bats and the correct working methods to be employed. Copies of the method statement and good practice works will be clearly displayed on site and summary documents will be supplied to each contractor detailing the programme of works. Once the licenced ecologist is satisfied that contractors are suitably briefed, works may commence.

5.10 A thorough internal inspection by a licenced bat worker / named ecologist will be undertaken each day of bat related works.

5.11 Following the tool-box talk and the internal inspection, the first stage of demolition will be completed which will comprise the careful removal, by hand, of the tiles on all buildings with identified roosts. This will be directly supervised by a licenced bat ecologist. Works will require removal of the ridge tiles and 1m of roof tiles down from the ridge and removal of tiles from the eaves (including the gable apexes and verges) and 1m up from the eaves. Each tile must be checked both sides for attached bats. The areas of tile removal will be extended if considered appropriate by the supervising ecologist. Any other suitable areas such as soffits, barge boards or fascias or flashing which form a potential access point will also be removed by hand as carefully as possible and any material removed will be checked prior to disposal. Any bat found will be moved into the bat boxes by the licensed ecologist.

5.12 Safe and suitable access to the roof must be provided in order to carry this process out both safely and with consideration to removing the tiles as carefully as possible. Suitable access may include scaffolding or mechanical platforms (cherry picker or MEWP).

5.13 Once all of the tiles/other features are removed, the timber roof frame and top wall plates will be checked by the ecologist to confirm no bats are present. If bats are found within these it may not be possible to remove them by hand. In this instance works will stop immediately and the animal(s) will be allowed to disperse naturally over a period of 24 hours. At this stage roosting conditions should be unsuitable which will encourage the animal(s) to disperse. After the 24 hour period has elapsed, given that all bat roost sites will have been removed in the previous operations, this demolition will not require ecologist supervision.

5.14 In the unlikely event that a bat is discovered during unsupervised works, all operations should cease on that building and the licensed ecologist contacted for further advice. Such advice would include carefully replacing the removed roost feature if it is feasible without potential injury to the bat. Contractors would not be advised to capture the bat.

5.15 If a non-licensed species is encountered during works, demolition of the relevant building will be delayed until a licence amendment is sought and approved.

F5 Post-development site safeguard

F5.1 Roost management and maintenance (either set out details here, or if complex then give outline here and give details as an annexed stand-alone plan)

5.16 The roost will be owned and maintained by Gort Windfarms Ltd. Checks will be made annually for 10 years to ensure that the box remains in position and suitable for use by bats. Checks for presence of bats will not be completed.

F5.2 Population monitoring

5.17 Given the low conservation significance of the roosts to be affected, no post-works monitoring is proposed, this is in line with guidance given in Bat Mitigation Guidelines for Ireland – V2 (Marnell, *et al.*,2022)

F5.3 Mechanism for ensuring delivery (who will undertake the work and reporting details)

5.18 Delivery will be conditioned as part of planning permission. Gort Windfarms Ltd. will be responsible for commissioning a suitable consultant to supervise demolition works and bat box placement. Gort Windfarms Ltd. will be responsible for reporting actions undertaken under the licence and the annual maintenance survey of the bat boxes.

F6 Timetable of works (phasing diagram to include all works associated within section F and to indicate construction works timing)

5.19 The proposed demolition works will be carried out from the 1st July 2027 to the 31st December 2027, subject to planning permission.

F7 Site plan to show all work covered by the licence

5.20 Refer to Section 8 of this report for all figures.

F8 Map to show the extent of each parties interest on site (if appropriate)

5.21 Not applicable.

F9 Map to show location of receptor site in relation to development site

5.22 Refer to Section 8 of this report for all figures.

F10 Map to show habitat creation, restoration and/or enhancement

5.23 Not applicable.

F11 Map to show post activity management (if appropriate)

5.24 Not applicable.

F12 Diagram to show exclusion apparatus (only required if non-standard techniques are proposed)

5.25 Not applicable.

6 G Summary

G1 Summary of development and mitigation (NB to include overall consideration of the three main licensing criteria: effect on conservation status, purpose, and alternatives)

6.1 The project is the decommissioning of Derrybrien Wind Farm. This existing Derrybrien Wind Farm Project includes the Derrybrien Wind Farm (including Derrybrien 110 kV substation), Derrybrien to Agannygal 110 kV Overhead Line (OHL) and the Agannygal Substation.

6.2 Derrybrien Wind Farm Site comprises 70 turbines, crane hard standings, 17.5 km of access tracks within the site (including 14.6km of floating access tracks), drainage channels, borrow pits/quarries, on site material storage, the Derrybrien110 kV substation (including the control building), direct buried electric cables and anemometer masts. Derrybrien to Agannygal 110 kV Overhead Line exports the electricity generated at the wind farm to the national grid. Agannygal Substation splits this line into two circuits before connecting into the grid and includes a control building.

6.3 Survey completed as part of the Derrybrien Wind Farm Development Decommissioning Project identified that bats were roosting in both Derrybrien Substation and the Agannygal Substation. At Derrybrien Substation a single common pipistrelle was recorded roosting in the eastern gable end of the substation. At Agannygal Substation three species were recorded; brown long-eared bats (dropping only), soprano pipistrelle (one bat from gable end) and seven common pipistrelle (from both gable ends during the same survey).

6.4 The only alternative to the removal of the bat roosts is the “Do Nothing”. Under this alternative no decommissioning works would be undertaken and all features associated with the Derrybrien Wind Farm Development (including the two unauthorised substation buildings) would remain in-situ in their current condition. Under this alternative Gort Windfarms Limited would be acting in direct contravention of the enforcement notice. Under section 156 of the 2000 Act it is an offence not to comply with an enforcement notice. Due to these legal ramification for Gort Wind Farms Ltd, the Do-Nothing alternative is not a feasible option.

6.5 Given the low number of non-breeding bats roosting at Derrybrien and Agannygal Substations, the demolition works are unlikely to result in an adverse effect on the favourable conservation status of common pipistrelle, soprano pipistrelle or brown long-eared bats.

6.6 Four pole mounted roost boxes will be installed. One box will be near to the substation location and high quality foraging habitat on the Derrybrien Wind Farm Site, and three will be installed in good quality foraging habitat near Aganygal substation. Irish bat mitigation guidelines (Marnell *et al*., 2022) suggest that bat boxes may be used as suitable compensation for roosts of low compensation significance, where the species affected are known to use bat boxes. Common and soprano pipistrelles are accepted as using crevice and hollow type bat boxes. Brown long-eared bats are accepted as using hollow type bat boxes. The pole mounted boxes provided above will include suitable box types for all species, on a variety of aspects (to allow for roost movement with changing weather conditions / season).

6.7 Works will be completed under a method statement, with a qualified bat ecologist on site during works to areas that bats could roost in. This safeguards against the unintentional killing or injuring of bats.

6.8 Given the low conservation significance of the roosts to be affected, no post-works monitoring is proposed, this is in line with guidance given in Bat Mitigation Guidelines for Ireland – V2 (Marnell, *et al*.,2022)

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8 J Annexes

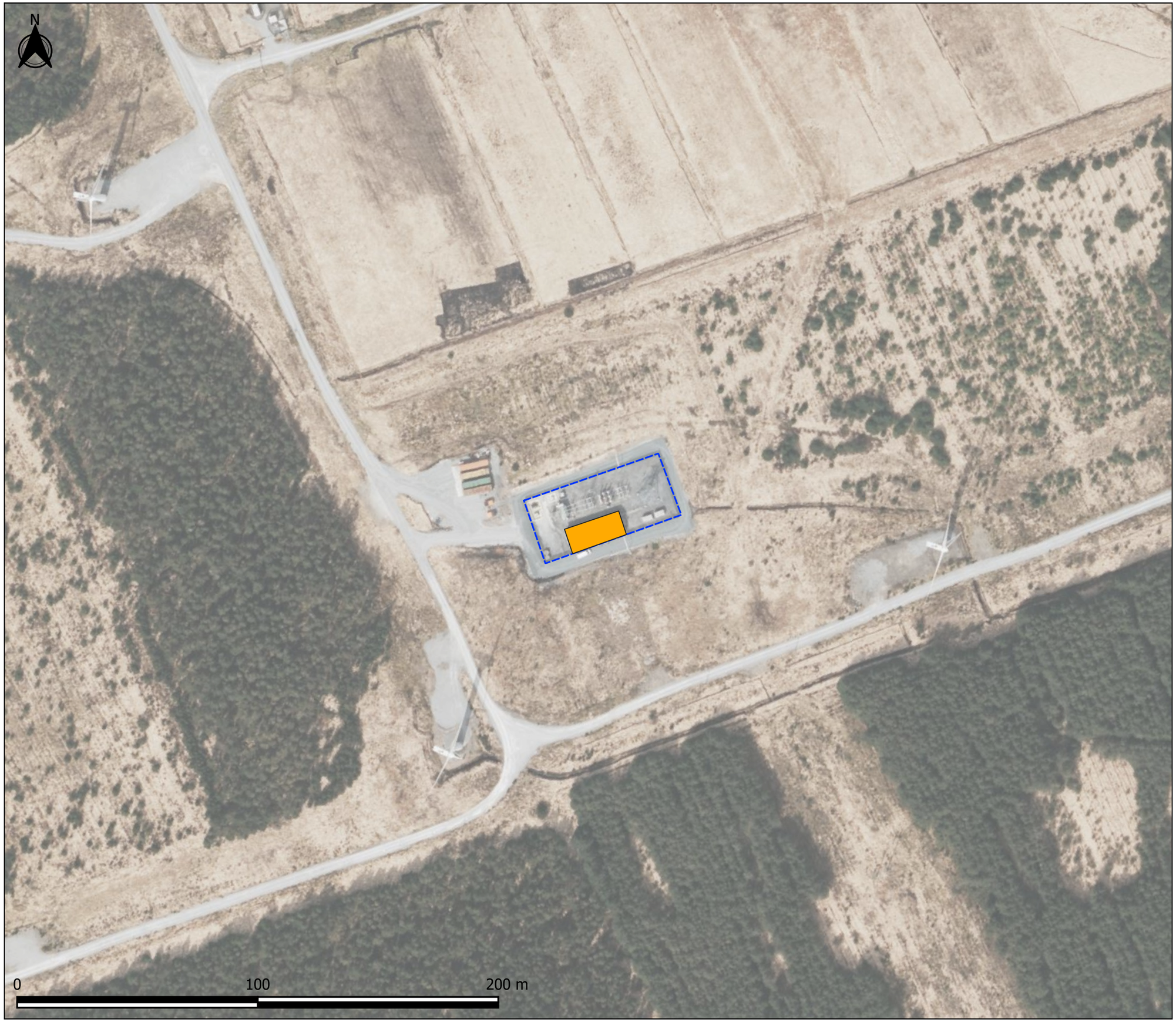
J1 Management and maintenance plan

8.1 Annual maintenance of bat boxes for 10 years.

J2 Pre-existing survey report(s)

9 Figures

(overleaf)



Legend

- Substation building
- Substation boundary

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PROJECT TITLE

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Figure C9a: Derrybrien Substation Survey Area

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DRAWN: CS APPROVED: DF VERSION:1.0

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Legend

- Substation building
- Substation boundary

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Figure C9b: Derrybrien Substation Summary Results

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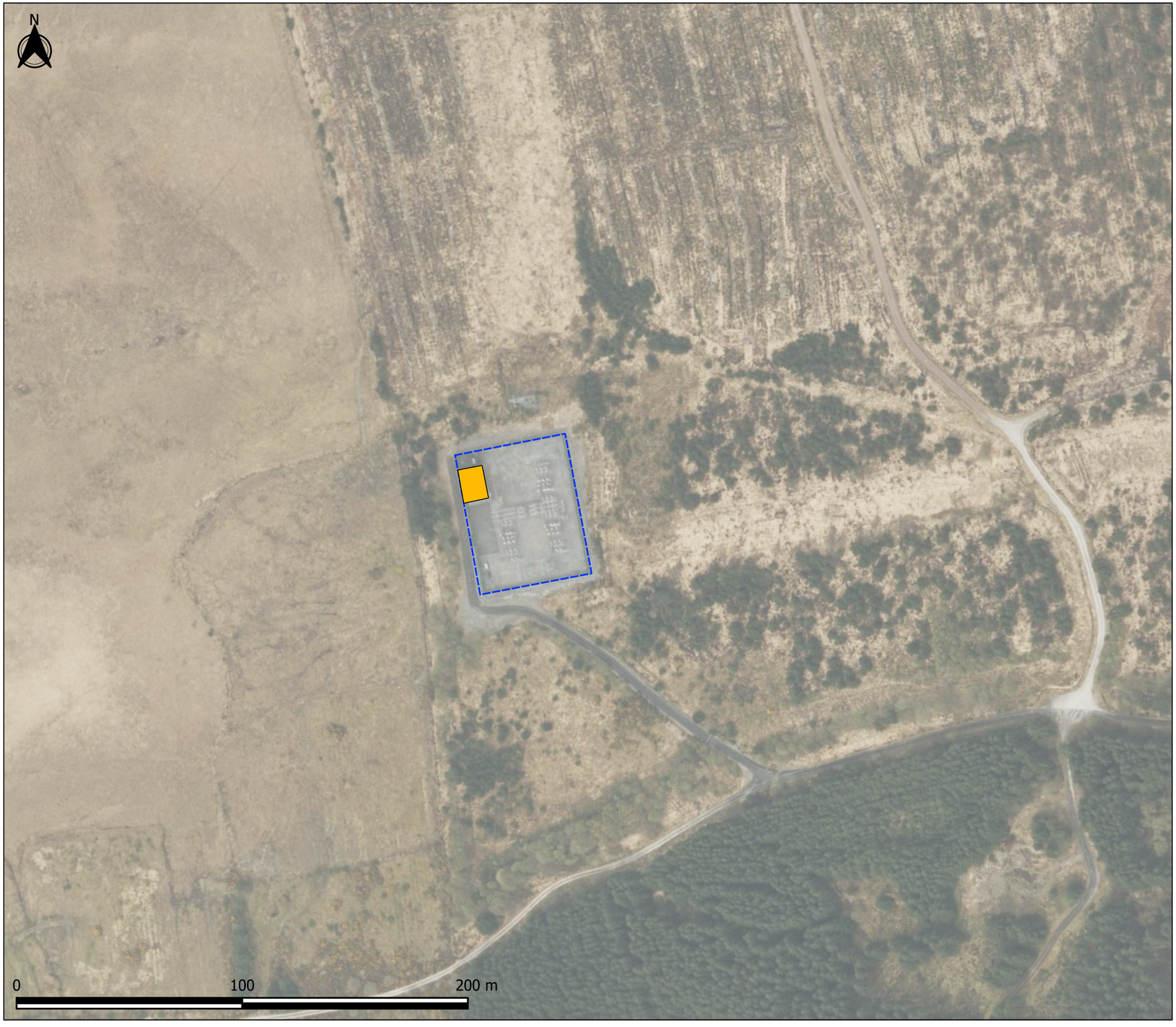

Legend

- Substation building
- Substation boundary

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PROJECT TITLE

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Figure C9c: Agannygal Substation Survey Area

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Legend

- Substation building
- Substation boundary

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PROJECT TITLE

DERRYBRIEN WIND FARM DECOMMISSIONING PROJECT

DRAWING TITLE

Figure C9d: Agannygal Substation Summary Results

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Legend

- Substation building
- Substation boundary
- Common pipistrelle bat day roost to be destoyed

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PROJECT TITLE

DERRYBRIEN WIND FARM DECOMMISSIONING PROJECT

DRAWING TITLE

Figure Da: Derrybrien Substation Impacts Plan

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Legend

- Substation building
- Substation boundary
- Common / soprano pipistrelle day roost to be destroyed
- Brown Long-eared bat day roost to be destroyed

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PROJECT TITLE

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Figure Db: Agannygal Substation Impacts Plan

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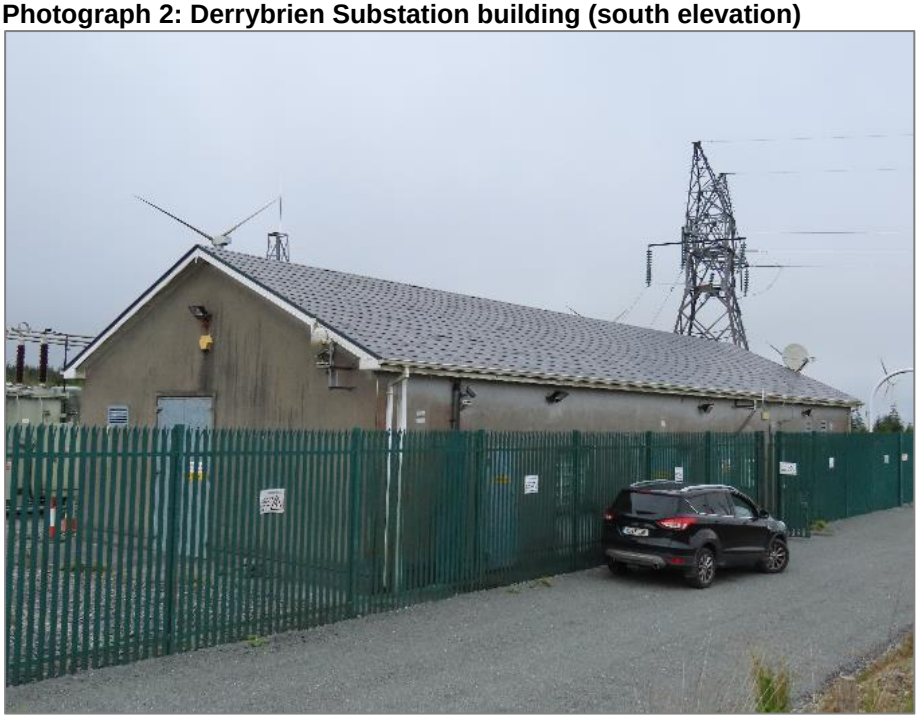
10 Photographs

Photograph 1: Derrybrien Substation showing building and transformers (west elevation)

Photograph 2: Derrybrien Substation building (south elevation)

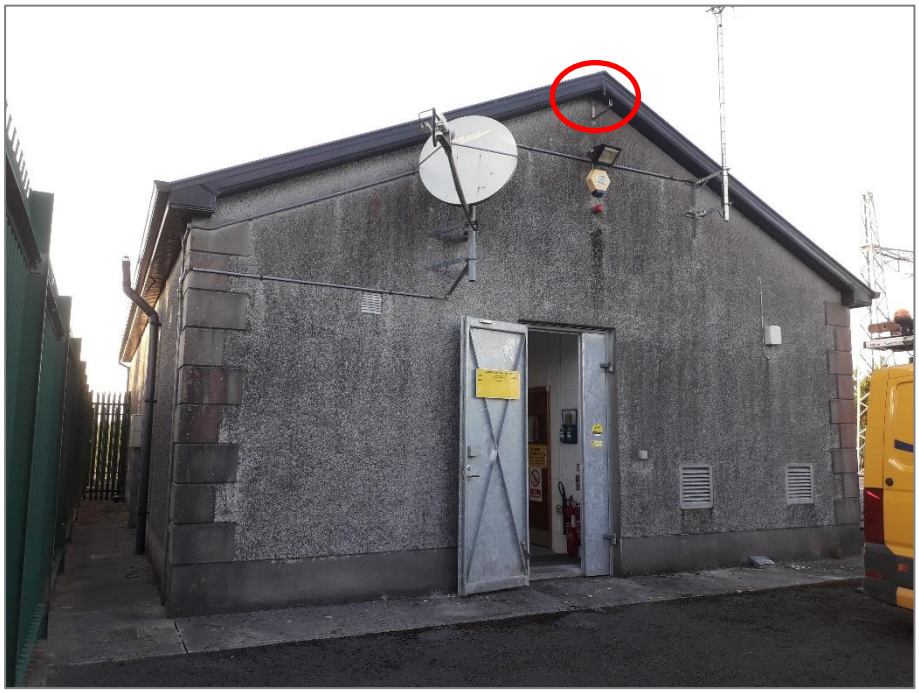


Photograph 3: Loft space within the Derrybrien Substation building

Photograph 4: Roost R1 (common pipistrelle day roost) location at Derrybrien Substation. The bat access point is highlight by the red arrow.

Photograph 5: Agannygal Substation building (north elevation). Roost R2 (common pipistrelle day roost) location circled red.

Photograph 6: Agannygal Substation building (south elevation). Roost R3 (common pipistrelle and soprano pipistrelle day roosts) location circled red.



Photograph 7: Loft space within the Agannygal Substation building. Roost R4 (brown long eared and common pipistrelle day roosts) are present within the loft.

11 Appendix 1 – eDNA results

Order Number: 1493 Swift Ecology R.Potter@bsg-ecology.com

Samples submitted

Sample Code	Multi-species?	Sample Type	Date Sample Found	Species Group	Site postcode/ post town /grid ref	Site description / comments (Optional)	Suspected identity of species
SEL-1493-1	Yes	Faecal	16/08/2022	Bats	Newport		Common pipistrelle (Pipi)

Analysis Results

Sample Code	DNA Extraction Code	Species Identified	ID Method	Ct value	% match
SEL-1493-1	EG-2022-0949	Pipistrellus pipistrellus (Common pipistrelle bat) and Plecotus auritus (Brown long-eared bat)	qPCR	21/20	

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11.1

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What do my results mean?

DNA extraction code - this identifies the DNA extraction sample within our laboratory so that it can be revisited if necessary. We keep these extractions for a minimum of 3 months.

ID method: *qPCR* - These results are obtained using species specific qPCR tests. A positive result indicates the presence of DNA from the species reported.

ID method: *DNA sequencing* - where qPCR fails or is not possible, standard DNA sequencing will be performed. Sequences are then matched against a database.

Ct value - This is a relative measurement of the amount of species DNA in the sample, derived from the qPCR data. The lower the value the more DNA present in the reaction. This helps to predict the abundance of one species relative to another **in the sample**. Note: this relative abundance is not directly transferable to the site the samples were collected from.

% match - this value is the percentage match of sequences derived from DNA sequencing compared to the database. Due to differences in DNA sequence between individuals within a species this match may not always be exactly 100%.

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11.2 f

APPENDIX 7-1

2022 MACROINVERTEBRATE RESULTS

Table 7.A1 Macroinvertebrate results from 2022 kick-samples at 13 sites

2019/2020	EPA CLASS	B4	B1A	D1A	O1	O3A	O4	O5	O5A	O8A	O8B	O9A2	OHL1	O6A
MAY FLIES (Ephemeroptera)														
Heptageniidae:														
Rhithrogena semicolorata	**A**		+/F			+/F			+		+/F			F/C
Ecdyonurus sp.	**A**		F/C			N/D		F	+		F			C
Heptagania sp.	**A**					F					+			+
Siphonlurus lacustris	**A**				+	+/F	+		+					
Leptophlebia sp	**B**												+	
Seratella ignita	**C**	C	C/N			F	+	F			F			F
Baetis	**C**	F/C	F/C	F/C	E	F/C	D/E	C/N	C	C/N	N/D		N	C
STONE FLIES (Plecoptera)														
Chloroperla sp.	**A**			+				F						
Isoperla sp.	**A**							F	F					
Nemouridae:	**A**	+										+		
Leuctra spp.	**B**	F/C	+/F	+/F	+		+/F	F/C	F/C	C	+/F		C/N	F
CADDIS FLIES (Trichoptera)														
Goeridae	**B**	F				+	F	+/F	+/F	+				
Sericostoma personatum	**B**					+								
Rhyacophilidae	**C**	+	F/C	F/C	F	+	+/F	F	F/C	+	F	C	+/F	F
Hydropsychidae	**C**	+	F	F/C		+		+			F			F/C
Glossosomatidae	**C**													C
Polycentropidae	**C**	C		F	F	F		+	C	C	F	F		
Philopomatidae	**C**										F/C			

TRUE FLIES (Diptera)														
Dicranota sp.	**C**		+/F			+/F	+	F			+		F	
Chironomidae	**C**	+/F	+	+	F	+	+	F	+/F				C	F
Simuliidae	**C**		F/C	C	F		F	C	C	N			C	F/C
BEETLES (Coleoptera)														
Elmidae	**C**	N/D	C/N	N		F		C	C	C		N/D	C	C
WATER MITES - Hydracarina	**C**													F/C
F/W SHRIMPS (Crustacea)														
Gammarus sp.	**C**		N	N						C	F/C			+/F
HYDRACARINA (mites)		F/C												
SNAILS (Mollusca)														
Ancyclus fluviatilis	**C**			C		+/F								
Hirudinae (Leeches)														
Erpobdellidae	**D**												+	+
WORMS (Annelida)														
Oligochaets	**E**	+	+/F											
Q-Value	**E**	**Q3-4**	**Q4**	**Q4 (Q3-4)**	**Q3-4**	**Q4-5**	**Q3-4**	**Q4 (Q4-5)**	**Q4**	**Q3-4 (Q3)**	**Q4 (Q3-4)**	**Q3-4**	**Q3-4**	**Q4**

+ = Present (one or two individuals), F = Few (5%), C = Common (6-20%), N = Numerous (21-50%), D = Dominant (51-75%) E = Excessive (>75%)

APPENDIX 7-2

WATER FRAMEWORK DIRECTIVE COMPLIANCE ASSESSMENT

Planning and Environmental Consultants

Appendix 7-2 WFD Compliance Assessment

Environmental Impact Assessment Report

DOCUMENT DETAILS

Client:	**Gort Windfarms Ltd.**
Project Title:	**Environmental Impact Assessment Report**
Project Number:	**220437**
Document Title:	**Appendix 7-2 WFD Compliance Assessment**
Document File Name:	**Derrybrien EIAR_Appendix 7-2 WFD Assessment_F_2024.04.25_240450**
Prepared By:	**MKO** **Tuam Road** **Galway** **Ireland** **H91 VW84**

Planning and Environmental Consultants

Rev	Status	Date	Author(s)	Approved By
01	Final	25/04/2025	LW	TB

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1. WATER FRAMEWORK DIRECTIVE COMPLIANCE ASSESSMENT

1.1 Introduction

Under Article 4(1) of the Water Framework Directive (WFD) (2000/60/EC), Ireland has obligations to protect, enhance and restore all bodies of surface and groundwater water to achieve at least good status (within certain timeframes as set out in the directive) and prevent deterioration in water bodies that are already in good (or better) status.

With respect to the Derrybrien Wind Farm Development Decommissioning Project and the retention *in situ,* in perpetuity, of certain features of the existing development (i.e. the 'Retained Development') is examined within this document to ascertain, by way of a structured assessment, whether the Prospective Development and final stages of the Retained Development could affect WFD Article 4(1) objectives through:

1. *Causing or contributing to deterioration of water body status, or*
2. *Jeopardising the achievement of at least 'good' status or better (i.e., where there is a 'high' status objective) in any receiving water body.*

The elements to be retained *in situ* are listed in Chapter 7, Section 7.4.1 according to the proposed decommissioning plan. The WFD Assessment for the Retained Development includes consideration of the following phases of the Project:

- Construction Phase (2003-2006).
- Operation and Maintenance Phase (2006-2022).
- Ceased Operation Phase (2022 – Present).
- Prospective Development.
- Retained Development (noting that this includes all of the above phases, plus the Prospective Development and retention of certain elements post-decommissioning).

1.2 Methodology and Sources of Information

1.2.1 Resources

The following resources were consulted to inform this assessment:

- Water Framework Directive (2000/60/EC) full text.
- WFD Common Implementation Strategy (CIS) Guidance documents (EC 2005, 2006, 2009, 2017).
- Water Action Plan 2024: A River Basin Management Plan (RBMP) for Ireland (DHLGH, 2024).
- European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003), as amended, give legal effect in Ireland to the WFD.
- European Communities Environmental Objectives (Surface Waters) Regulations (S.I. No. 272 of 2009), as amended (S.I. 77 of 2019), establishing legally binding water quality objectives for all surface waters and environmental quality standards for pollutants.
- Relevant Litigation relating to WFD, e.g., Case C-461/13 Bund für Umwelt und Naturschutz Deutschland ECLI:EU:C:2015:433 (the *Weser* case).
- Environmental Protection Agency (EPA) maps and data: https://www.catchments.ie/
- Historical OSI maps: https://www.geohive.ie.
- Published scientific literature and journals (where required).

- Chapter 7 (Biodiversity – Aquatic Ecology and Fisheries) of the EIAR and rEIAR.
- Chapter 8 (Land Soils and Geology) of the EIAR and rEIAR.
- Chapter 9 (Hydrology and Hydrogeology) of the EIAR and rEIAR.

1.2.2 Key Information for WFD Compliance Assessment

The WFD compliance assessment uses current EPA assigned water body status classifications (2016-2021) as the baseline against which any effects of the scheme are assessed. These are the most recent formal status classifications reported to Europe going into the RBMP 3rd cycle (2022-2027). This approach is in line with case law from the Irish High Court Sweetman v An Bord Pleanála [2021] IEHC 16, known as the *Bradán Beo* case, which established that EPA assigned status is the only legal baseline against which potential changes to water body status can be evaluated.

Effects of the Prospective and Retained Developments on water body status are underpinned by detailed information provided in the Derrybrien Wind Farm Development Decommissioning Project EIAR and the rEIAR pertaining to impacts and effects on surface water and groundwater quality and instream habitats supporting the biological quality elements that define surface water body status under the WFD. This document relies on the information and conclusions from relevant Chapters as listed in Section 1.2.1, above.

1.2.3 Meaning of Deterioration in Status

With regards to physical changes to water bodies, a key decision in the European Court of Justice (CJEU) concerning hydromorphological impact on water body status came from the *Weser* case, establishing that:

> *"Member States are required – unless a derogation is granted – to refuse authorisation for an individual project where it may cause a deterioration of the status of a body of surface water or where it jeopardises the attainment of good surface water status ... by the date laid down by the directive."*

The concept of "deterioration" of water body status is not defined in the WFD. The *Weser* decision also provided the following clarifications on the interpretation of "deterioration" in the context of WFD compliance:

- Deterioration in water body status occurs when the status of at least one of the quality elements, within the meaning of Annex V to the directive, falls by one class, even if this does not result in a fall in the overall classification of the water body.
- If the quality element is already in the lowest class (bad status), any deterioration of that element represents a deterioration of the status within the meaning of WFD Article 4(1)(a)(i).

With regards to WFD assessments the following are also important to note:

- Temporary short-term effects, for example, during the construction or maintenance phase do not constitute "deterioration of status" and are not required to be addressed so long as there are no long-term adverse consequences and no delayed deterioration in the status of the defining quality elements expected in the water body thereafter (EC, 2017).
- Mitigation measures within the proposed project are taken into account in the Article 4(7) Applicability Assessment as they form an inherent element of the design and implementation of a project (EC, 2017).

1.2.4 Approach to WFD Compliance Assessment

The Retained Development at Derrybrien involves features that may be considered to represent new modifications to the physical characteristics of a surface water body' (e.g., Barrages 1, 2 3 and 4) and/or possible 'alteration to the level of bodies of groundwater' (drainage features), and (2) potential effects on 'high' status water bodies (Owendalulleegh, Boleyneendoorish) as a result of 'new sustainable human development activities'.

WFD Article 4(7) states Member States will not be in breach of the Directive when:

> *- failure to achieve good groundwater status [or] good ecological status ... or to prevent deterioration in the status of a body of surface water or groundwater is the result of new modifications to the physical characteristics of a surface water body or alterations to the level of bodies of groundwater, or*
>
> *- failure to prevent deterioration from high status to good status of a body of surface water is the result of new sustainable human development activities.*

But only when all four of the following conditions are met: (1) all practicable steps are taken to mitigate the impacts; (2) the reasons for the modifications and alterations are clearly set out in the RBMP; (3) the reasons are of overriding public interest and benefits outweigh the environmental outcomes; and (4) the benefits cannot be achieved by other means for reasons of technical feasibility or disproportionate cost.

The process for determining whether new modification(s) to the physical characteristics of a body of surface water / alterations to the level of bodies of groundwater might lead to deterioration / non-achievement of good status, or new sustainable human development activity might lead to deterioration from high status to good status, is called the Article 4(7) Applicability Assessment. The approach is set out in *CIS Guidance No. 36: Exemptions to the Environmental Objectives according to Article 4(7) New modifications to the physical characteristics of surface water bodies, alterations to the level of groundwater, or new sustainable human development activities* (EC 2017).

Whether or not the Retained Development falls under Article 4(7) or not, the Article 4(7) Applicability Assessment set out in EC (2017) provides a formal, published framework for determining whether a project has potential to cause deterioration / non-achievement of good status (or better), hence the approach is used to conduct the water status impact assessment for the Retained Development in this report.

1.2.5 WFD Article 4(7) Applicability Assessment

The first step in the "Article 4(7) Applicability Assessment" evaluates how a proposed project is expected to impact on environmental objectives for each water body, to answer the questions:

3. *Does the proposal lead to deterioration of water body status? Or,*
4. *Does the proposal prevent attainment of good status (or high status in the case of high-status objective water bodies)?*

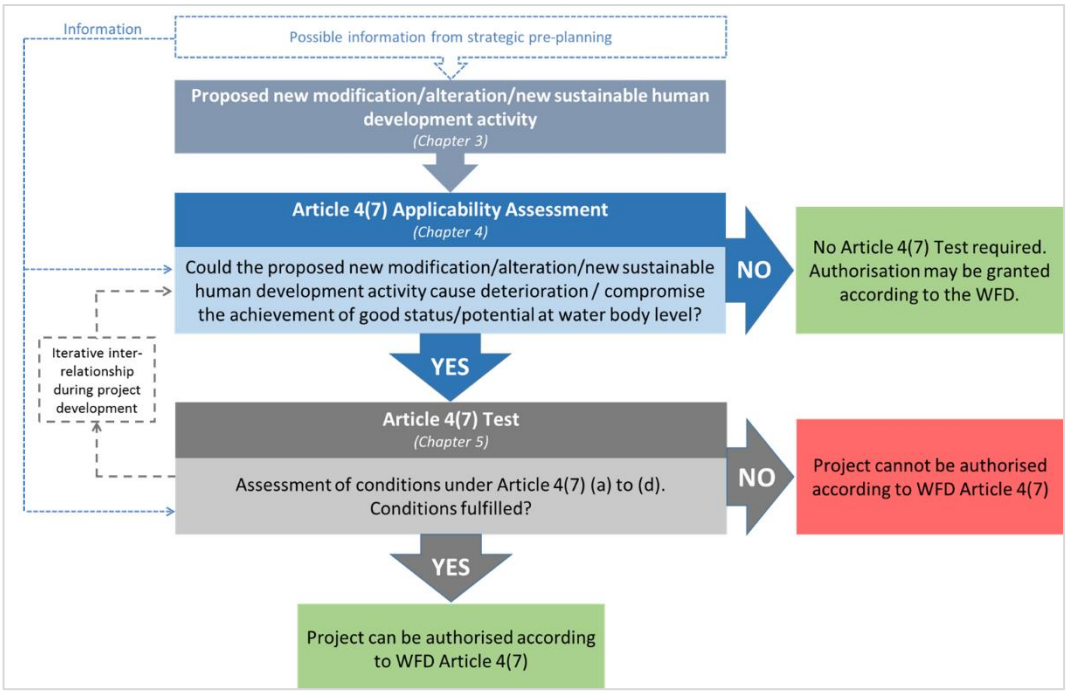

Figure 1-1 Relationship between Article 4(7) Applicability Assessment and Test (reproduced from EC 2017)

As illustrated in Figure 1-1, if the answer to either question is "No" the project is compliant with WFD Article 4(1) objectives and can be authorised under the WFD. If the answer to either question is "Yes" the project must first be 'tested' (i.e., the 'Article 4(7) Test') as to whether it meets strict conditions set out within Article 4(7) of the Directive (see Section 1.2.3, above) and may then be authorised under derogation.

To inform the Competent Authority in assessing compliance of the proposed Retained Development with WFD Article 4(1) objectives, the effects of the proposals on water body status are therefore examined in this document using a structured approach that is in line with: (i) EU CIS Guidance on the Article 4(7) Applicability Assessment, (ii) Relevant case law pertaining to WFD interpretation and application, and (iii) Goals of the Water Action Plan 2024 (RBMP).

1.2.6 Zone of Influence

Derrybrien Wind Farm and Substation, the Overhead Line (OHL), and Agannygal Substation are located in the headwaters of the Boleyneendorrish, Owendalulleegh, Duniry and Bleach catchments. The three main river catchments draining the Derrybrien Wind Farm site receive the following proportion of drainage (by area): 66.2% to the Owendalulleegh River catchment, 33.4% to the Boleyneendorrish and just 0.4% in the Duniry River catchment. All but a tiny portion of the OHL also drains to the Owendalulleegh. Agannygal Substation and a small portion of the OHL drain towards the Lough Atorick / Bleach catchment.

For this assessment, the relevant river water bodies (RWBs) are taken to be those within which the Project is located, i.e., 'directly affected RWBs'. In the case of the Owendalulleegh which receives the bulk of the drainage (66.2%), and was affected by the peat slide in 2003, adjoining downstream RWBs and Lough Cutra Lake Water Body (LWB) are also evaluated in this report. As a precaution, in the case of the Boleyneendorrish (33.4% of drainage from wind farm site) the next adjoining RWB downstream (Boleyneendoorish_020) is also considered. See Figure 1-3 for the RWBs scoped into the assessment.

The relevant Groundwater Bodies (GWBs) are those directly underlying the Project. The wind farm site and most of the OHL route is located in the GWDTE -Caherglassaun Turlough GWB. A very small

portion of the eastern wind farm site is within the Tynagh GWB. The southern end of the OHL route and Agannygal substation are in the Lough Graney GWB. See Figure 1-4 for the GWBs scoped into the assessment.

1.3 Water body Status Classification

Water quality and overall status of surface waters under WFD in Ireland is based primarily on survey data collected by the EPA as part of the National WFD Monitoring Programme. Fish status data is collected by Inland Fisheries Ireland (IFI). For surface waters, the Biological Quality Elements (BQEs) are surveyed approximately every three years, e.g., macroinvertebrate Q-value, algae, fish, and the results are converted to a metric - the Ecological Quality Ratio (EQR) - which represents the relationship between the values of the biological parameters observed for a given body of surface water and the values for these parameters in reference (pristine) conditions applicable to that body.

The EQR classifies sites according to ecological quality status as required by river basin management planning under the WFD. It is expressed as a numerical value between 0 and 1, with high ecological status represented by values close to '1' and bad ecological status by values close to '0'. This allows comparison of water quality status across the European Union since each member state has a comparable EQR value for 'High'; 'Good', 'Moderate', 'Bad' and 'Poor', based on an intercalibration of boundaries between water quality categories (McGarrigle & Lucey, 2009). Overall status of a surface water body is then assigned (in Ireland by the EPA) as a combination of ecological and chemical status. For a water body to be in overall 'good' status or better, both its ecological (or quantitative in the case of groundwater) and its chemical status must achieve at least 'good' status. In the case of 'high' status surface waters, the hydromorphological quality element (which "supports" the BQEs) must also be 'high' status.

Overall status assigned is determined by the status of the poorest quality element. This is sometimes referred to as 'one-out-all-out' principle. Furthermore, each quality element is made up of a series of sub-elements set out in Annex V of the Directive that describe the make-up of that quality element, and in many cases have defined quantitative standards that need to be met for a certain class to be assigned to that quality element.

For surface waters, including rivers and lakes referred to in this assessment, the WFD classification scheme includes five status classes: high; good; moderate; poor and bad, which are denoted by the colour scheme as shown in Figure 1-2. Ground waters are classified as either 'good' or 'poor'.

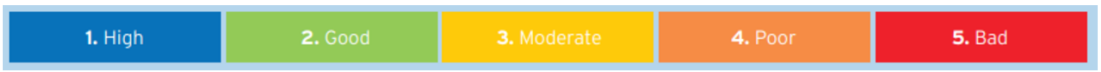

Figure 1-2 WFD Quality Classes and Colour Codes [EPA]

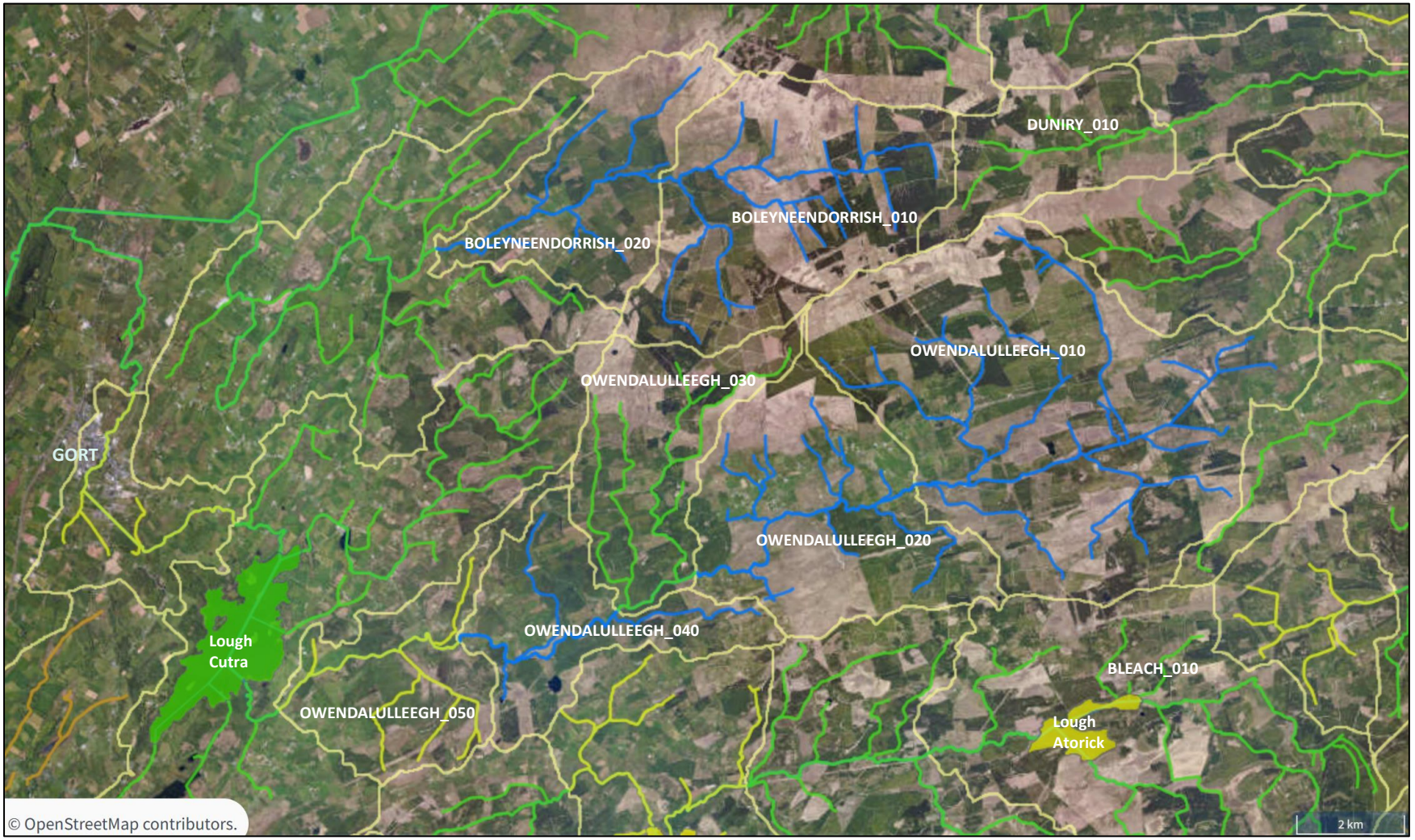

Figure 1-3 Relevant River Water Bodies in relation to Derrybrien Wind Farm Project (EPA status 2016-2021 indicated by WFD colour code)

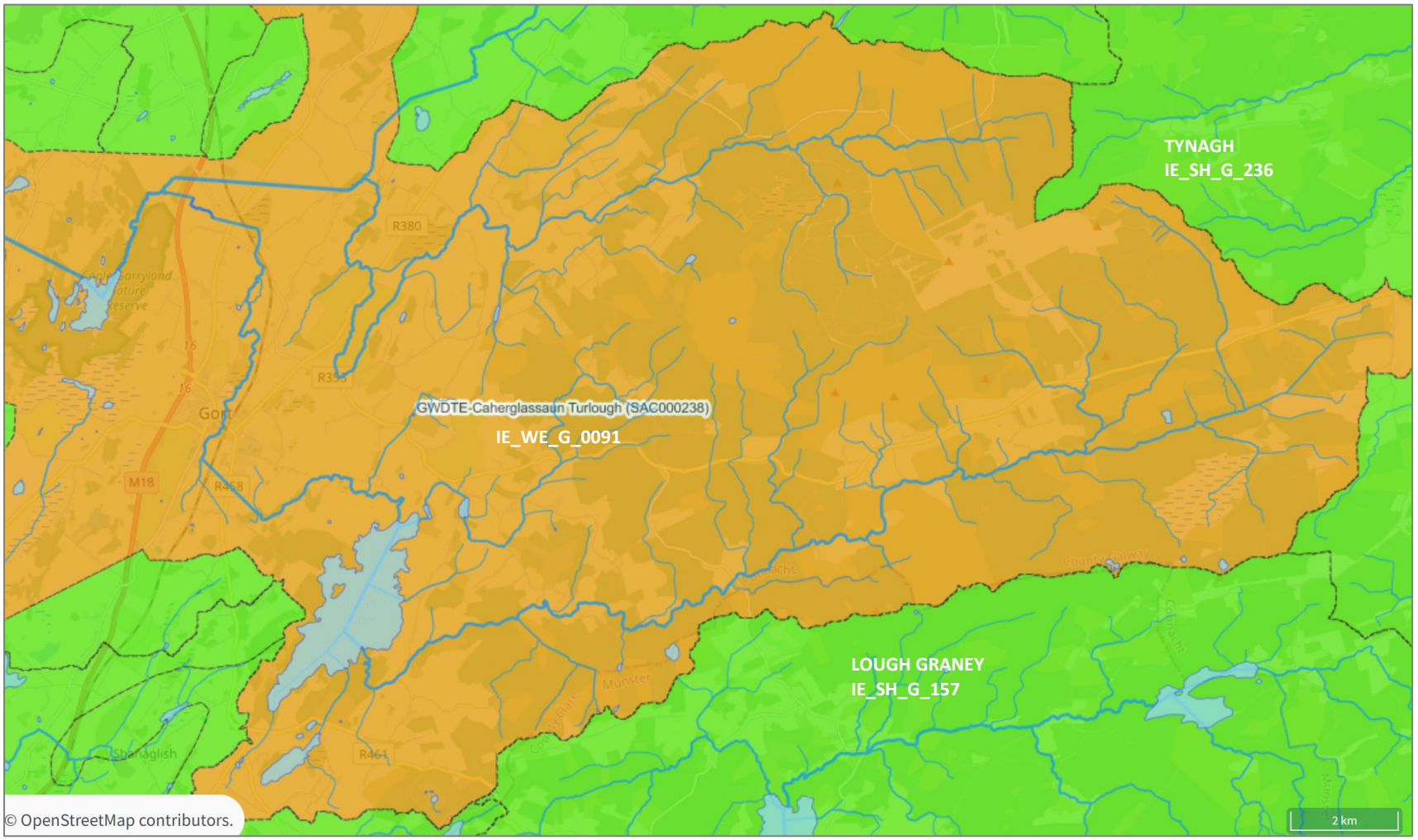

Figure 1-4 Relevant Groundwater Bodies in relation to Derrybrien Wind Farm Project (EPA status 2016-2021 indicated by WFD colour code)

1.3.1 Surface Water Body Status Classification

1.3.1.1 River Water Bodies

Ecological status of River Water Bodies (RWBs) is defined in Annex V of the WFD by the Biological Quality Elements (BQEs) along with the "supporting" hydromorphological, chemical and physico-chemical elements. BQEs (e.g., macroinvertebrates, algae, fish) employ standard methods for calculating a metric to reflect the EQR, which then equates to WFD status classes of High, Good, Moderate, Poor or Bad. Physicochemical quality elements are compared to statutory Environmental Quality Standards (EQSs) published in the surface water regulations which support High, Good and ≤Moderate status. Hydromorphology underpins structure and function of river ecosystems, hence sustaining the BQEs. Hydromorphological quality elements that support the BQEs for river water bodies are defined by:

- Hydrological regime (quantity and dynamics of water flow; connection to groundwater bodies).
- River continuity.
- Morphological conditions (river depth and width variation; structure and substrate of the river bed, structure of the riparian zone).

The above are the physical attributes by which any impacts of the proposed Retained Development on surface water body status were assessed in this report. The BQE that primarily defines status in the relevant RWBs in this assessment the macroinvertebrate Q-value, being the sole BQE monitored in all except Owendalulleegh_050, which has been monitored and assigned WFD Fish status by Inland Fisheries Ireland for WFD reporting periods to date.

1.3.1.2 Lake Water Bodies

The quality elements that define lake water body status are: (1) biological, (2) chemical, and (3) hydromorphological elements supporting the biological elements. As for rivers, the hydromorphological quality elements "support" status as defined by the poorer of the biological and chemical quality elements. Lake status is defined as being either 'High', 'Good' or 'Moderate' based on the poorest of the defining elements. The attributes by which any hydromorphological changes (which could affect biological quality elements / status) were assessed in this report are from WFD Annex V 1.2.2. as follows:

- Hydrological Regime: quantity and dynamics of flow, level, residence time, resultant connection to groundwaters.
- Morphological Condition: lake depth variation, quantity and structure of the substrate, and both the structure and condition of the lake shore zone.

The only LWB considered in this assessment is Lough Cutra, which is 22km downstream of Derrybrien Wind farm. It was included because it received run-off from the 2003 peat slide during the Project's construction phase.

1.3.2 Ground Water Body Status Classification

Groundwater body status is defined by its chemical status (concentration of pollutants) and its quantitative status (relating to ground water levels). Groundwater status is defined as being either 'Good' or 'Poor' based on the poorest of these elements. Good chemical status is defined in WFD Annex V 2.3.2 and includes meeting EQSs for pollutants, with no declining trends. The definition of good quantitative status is set out in WFD Annex V 2.1.2 (CIS Guidance No. 18, 2009). For a

groundwater body to be of good quantitative status the following criteria for the definition of good status must be met:

- Available groundwater resource is not exceeded by the long-term annual average rate of abstraction.
- No significant diminution of surface water chemistry and/or ecology resulting from anthropogenic water level alteration or change in flow conditions that would lead to failure of relevant WFD Article 4 objectives for any associated surface water bodies.
- No significant damage to groundwater dependent terrestrial ecosystems resulting from an anthropogenic water level alteration.
- No saline or other intrusions resulting from anthropogenically induced sustained changes in flow direction.

These are the attributes by which any impacts of the Retained Development on GWB quantitative status were assessed in this report.

1.4 EPA Assigned Water Body Status

Bradán Beo established that the only legal baseline against which water body status can be assessed in Ireland is that assigned by the EPA. Table 1-2, Table 1-3, Table 1-4 and Table 1-5 (below) set out the EPA assigned water body status for each reporting period under the RBMP cycles to date. The reporting periods are as follows:

- Surface Water (SW): 2007-2009, 2010-2012, 2010-2015, 2015-2018, 2016-2021.
- Groundwater (GW): 2007-2012, 2010-2015, 2013-2018, 2016-2021.

Noted is that the pre-construction baseline (1998) and the construction period (2003-2006) pre-dated the reporting of WFD status. The 1998 baseline for the Project, in fact, pre-dated the WFD (2000/60/EC). Hence there is no legal WFD status baseline against which to assess the construction phase. However, the EPA did monitor Q-values (macroinvertebrates) between 1996 and 2000 which covered the 1998 baseline period in each of the relevant RWBs, noting that all of the relevant RWBs were at high status at that time. The macroinvertebrate Q-value / EQR is still the Biological Quality Element (BQE) that defines status in most of the relevant river water bodies, i.e., all except Owendalulleegh_050 which is defined by macroinvertebrate and fish status. For ease of reference, EPA reported Q-value data are shown in **Table 1-1** (from Chapter 7, Table 7-11) covering the main receiving water catchments (Owendalulleegh, Boleyneendoorish, Duniry, Bleach).

Table 1-1 EPA Q-value Data defining each RWB

Year	EPA O1 Owendalulleegh_050	EPA O2 Owendalulleegh_040	EPA O3 Owendalulleegh_030	EPA OT1 Owendalulleegh_030	EPA O4 Owendalulleegh_020	EPA O5 Owendalulleegh_010	EPA B2 Boleyneendoorish_020	EPA B1 Boleyneendoorish_010	EPA D1 Duniry_010	Bleach_010
1996	-	-	-	-	-	-	-	-	5	4-5
1997	4-5	4-5	-	4-5	4-5	4-5	5	5	-	
1999	-	-	-	-	-	-	-	-	4-5	4-5
2000	4-5	5	5	4-5	5	4-5	5	4-5	-	
2003	4	4	4	4	3-4	2	5	5	4-5	4-5

Year	EPA O1 Owendalulleegh_050	EPA O2 Owendalulleegh_040	EPA O3 Owendalulleegh_030	EPA OT1 Owendalulleegh_030	EPA O4 Owendalulleegh_020	EPA O5 Owendalulleegh_010	EPA B2 Boleyneendoorish_020	EPA B1 Boleyneendoorish_010	EPA D1 Duniry_010	Bleach_010
2006	4	5	-	4-5	4-5	4-5	4-5	5	4	-
2009	4-5	4-5	5	4-5	-	4-5	-	-	4	-
2012	4-5	4-5	4-5	4-5	4-5	4-5	5	5	4	4
2014	-	-	-	-	-	-	-	-	-	3
2015	4-5	4-5	4-5	3-4	4-5	4-5	4-5	4-5	-	
2017	-	-	-	-	-	-	-	-	4	4
2018	5	5	4-5	4	4-5	4-5	4-5	5	-	-
2019	-	-	-	3-4	-	-	-	4	-	-
2021	5	5	-	4	4-5	4-5	4-5	4-5	-	-
2022	-	-	5	-	-	-	-	-	-	-
2023	-	-	-	-	-	-	-	-	3-4	3-4

The peat slide of October 2003 occurred in the upper headwaters of the Owendalulleegh_010 RWB. It affected Q-values (and representative RWB status) as recorded by the EPA one month after the event along a 22km reach downstream of the slide, demonstrated by results in 2003 presented in Table 1-1. The effect of the peat slide was a decline in EPA Q-value in 2003 for all RWBs between the headwater sub catchment SC7(b) in Owendalulleegh_010 and Lough Cutra, i.e., decline from representative high status in all to representative 'bad', 'moderate' and 'good' status, moving downstream. By 2006, however, EPA reported Q-values in had returned to representative 'high' status (Q4-5/Q5) in all RWBs downstream of the peat slide apart from the Owendalulleegh_050, 22km downstream (1.5km upstream of Lough Cutra), which remained at 'good' status (Q4) in 2006 then returned to high status Q-value (Q4-5) in 2009 (Table 1-1). The indication is that whilst there were negative effects on RWB status of the Owendalulleegh River sub-basins, i.e., downstream of the peat slide, the effect on the Q-value (Biological Quality Element [BQE]) had reversed in a relatively short period of time with Q5/Q4-5 (high status) returning within 3 years at all except the Owendalulleegh_050. EU CIS Guidance (EC, 2017) suggests that in the WFD context "*the frequencies mentioned for the monitoring programmes can serve as an indication*" of what constitutes a "short period of time". For the macroinvertebrate Q-value, WFD monitoring and reporting frequency is 3 years, meaning all except the Owendalulleegh_050 RWB had returned to high status within one WFD reporting cycle. Whilst the Q-value for this RWB had returned to high status following the peat slide (by 2009) within 6 years (i.e., two WFD reporting cycles), the fish community BQE has kept this site at moderate status since the 2007-2009 reporting period. However, there was no pre-peat slide fish survey conducted by IFI on the Owendalulleegh River, so it's not possible to attribute the ongoing 'moderate' status fish community solely to the peat slide, especially since the Q-value was high status both before and (within 6 years) after the peat slide and therefore the fish community index is apparently independent of the biological water quality index at this location. Furthermore, this monitoring station is furthest downstream of the wind farm (sampled 21.5 km downstream of the peat slide origin) and therefore also subject to other catchment land use effects.

Note that the term "representative status" is used above in relation to EPA sample results that pre-date either the WFD or the first official reporting of water body status by the EPA (2007-2009). This is

important because the *Bradán Beo* case established that EPA assigned water body status (which began with the 2007-2009 WFD reporting period) is the only legally valid baseline against which water status impact assessments can be made. Where 'representative status' is indicated, these data are outside the official EPA WFD reporting period. That being said, the historical EPA Q-value data is still completely valid, with the use of the Q-value and its relationship to the corresponding EQR having been through an intercalibration of boundaries between water quality categories (McGarrigle & Lucey, 2009). Had the WFD been enacted at that time, these Q-values (Table 1-1) would have defined water body status in the same way they have done since the first reporting period of 2007-2009.

Table 1-2 Directly Affected River Water Bodies (Major drainage input)

EPA Water Body Name [Code]	EPA Status Assessment Technique	EPA RWB Status (2007-2009)	EPA RWB Status (2010-2012)	EPA RWB Status (2010-2015)	EPA RWB Status (2013-2018)	EPA RWB Status (2016-2021)	Current Status Driver(s) (2016-2021)	WFD Objective Status	Water Body Risk (2016-2021)	Significant Pressure(s)
Boleyneendoorish_010 [IE_WE_29B040100]	Monitored: Invertebrate, Hymo.	Unassigned	High	High	High	High	Q-value (Invertebrate), Hymo.	High	Not at Risk	~
Owendalulleegh_010 [IE_WE_29O010500]	Monitored: Invertebrate, Hymo.	High	High	High	Good	High	Q-value (Invertebrate), Hymo.	High	Not at Risk	~

Table 1-3 Directly Affected River Water Bodies (Minor drainage input)

EPA Water Body Name [Code]	EPA Status Assessment Technique	EPA RWB Status (2007-2009)	EPA RWB Status (2010-2012)	EPA RWB Status (2010-2015)	EPA RWB Status (2013-2018)	EPA RWB Status (2016-2021)	Current Status Driver(s) (2016-2021)	WFD Objective Status	Water Body Risk (2016-2021)	Significant Pressure(s)
Owendalulleegh_020 [IE_WE_29O010700]	Monitored: Invertebrate, Hymo.	Unassigned	High	High	High	High	Q-value (Invertebrate), Hymo.	High	Not at Risk	~
Owendalulleegh_030 [IE_WE_29O010800]	Monitored: Invertebrate, Hymo.	High	High	Moderate	Good	Good	Q-value (Invertebrate)	High	At Risk	Forestry
Duniry_010 [IE_SH_25D070100]	Monitored: Invertebrate	Moderate	Good	Good	Good	Good	Q-value (Invertebrate)	Good	Not at Risk	~
Bleach_010 [IE_SH_25B070100]	Monitored: Invertebrate, GPC.	Unassigned	Good	Poor	Good	Good	Q-value (Invertebrate), GPC	Good	Not at Risk	~

Table 1-4 Relevant Indirectly Affected Waterbodies

EPA Water Body Name [Code]	EPA Status Assessment Technique	EPA RWB Status (2007-2009)	EPA RWB Status (2010-2012)	EPA RWB Status (2010-2015)	EPA RWB Status (2013-2018)	EPA RWB Status (2016-2021)	Current Status Driver(s) (2016-2021)	WFD Objective Status	Water Body Risk (2016-2021)	Significant Pressure(s)
Boleyneendoorish_020 [IE_WE_29B040200]	Monitored: Invertebrate, Hymo.	Unassigned	High	High	High	High	Q-value (Invertebrate), Hymo.	High	Not at Risk	~
Owendalulleegh_040 [IE_WE_29O010900]	Monitored: Invertebrate, Hymo.	High	High	High	High	High	Q-value (Invertebrate), Hymo.	High	Not at Risk	~
Owendalulleegh_050 [IE_WE_29O011000]	Monitored: Invertebrate, Fish, Phytobenthos, GPC, Chemical Status	Moderate	Moderate	Moderate	Moderate	Moderate	Fish (2016 IFI Survey) [Note- high and good status for all other elements]	Good	At Risk	Forestry, Hymo
Lough Cutra [IE_WE_29_37]	Monitored: Phytoplankton, Macrophyte, Hymo, GPC	Unassigned	Good	Moderate	Good	Good	Macrophyte	Good	Not at Risk	~

**Hymo = Hydromorphology. Note: EPA conduct River Hydromorphology Assessment Technique (RHAT) surveys at all sites that return 'high' status based on macroinvertebrate Q-value. For a site to be high status overall, the Biological Quality Element (in these RWBs - Q-values) must be at 'high status (Q4-5/Q5), and the RHAT Score must be in the 'high' status range.*

Table 1-5 Relevant EPA Groundwater Bodies

EPA Groundwater Body Name [Code]	EPA Status Assessment Technique	EPA RWB Status (2007-2012)	EPA RWB Status (2010-2015)	EPA RWB Status (2013-2018)	EPA RWB Status (2016-2021)	Current Status Driver(s) (2016-2021)	WFD Objective Status	Water Body Risk (2016-2021)	Significant Pressure / Issue(s)
GWDTE-Caherglassaun Turlough (SAC000238) [IE_WE_G_0091]	Monitored at Poldeelin Spring (Gort): Chemical. Quantitative.	Good	Poor	Poor	Poor	Chemical status: Failure on Total Phosphorus. Note: Quantitative status is 'Good'	Good	At Risk	Nutrients (Total Phosphorus)
Lough Graney [IE_SH_G_157]	Monitored (unpublished by EPA)	Good	Good	Good	Good	Chemical & Quantitative	Good	Not at Risk	~
Tynagh [IE_SH_G_157]	Monitored at Scariff: Chemical. Quantitative	Good	Good	Good	Good	Chemical & Quantitative	Good	Not at Risk	~

1.5 WFD Compliance Assessment

1.5.1 Surface Water Body Status Assessments

Of the RWBs listed above, the Owendalulleegh_010 and the Boleyneendoorish_010 (Table 1-2) directly receive approximately 63% and 33% of the wind farm site drainage respectively (96% in total). Furthermore, the Owendalulleegh _010 receives drainage from 93% of the OHL, i.e., only 540m of the 7.8km OHL is not within this RWB.

Of the remaining 4% of the wind farm site drainage, 3.6% has direct connectivity to the head of the Owendalulleegh _020 and Owendalulleegh _030 RWBs, while 0.4% drains to the Duniry_010. A small proportion of overall drainage, from 540m of the OHL and the Agannygal Substation, connects to the Bleach_010.

Hence the Owendalulleegh_010 and Boleyneendoorish_010 RWBs are by far the most important indicators of effects of the Project on RWB status as they have direct connectivity on a more significant scale. These two 'major' RWBs are addressed in detail in Section 1.4.1.1. RWBs with 'minor' direct connectivity are addressed in Section 1.4.1.2, whilst any relevant indirectly (downstream) affected RWBs are addressed in Section 1.4.1.3.

1.5.1.1 Directly Affected River Water Bodies (Major)

Owendalulleegh_010 RWB

OWENDALULLEEGH_010 [IE_WE_29O010500]
Starting point: Baseline status as represented by EPA Q-value in 1997 (Q4-5) and 2000 (Q4-5) would have been 'high' status. However, water body status was not officially reported by the EPA until 2007-2009 following the enactment and implementation of the WFD. The peat slide caused a temporary to short-term decrease in Q-value at the EPA River Station 29O010500 (Tooraglassa Ford), the station that defines status in this water body, which fell to representative 'bad' status (Q2) in 2003 but returned to representative 'high' status (Q4-5) by 2006. Owendalulleegh_010 RWB was officially reported by the EPA as 'high' status for the first reporting period (2007-2009) and remained 'high' status for the next 2 reporting periods (2010-2012 and 2010-2015) (Table 1-2). In the 2013-2018 reporting period, this RWB fell to overall 'good' status based on hydromorphology, but Q-value still merited 'high' status (Q4-5). The scoring of hydromorphology (using [1]RHAT) is a requirement at high-status Q-value sites, i.e., a site only merits high status if both the BQE (i.e., Q-value) and hydromorphology EQR are in the high-status band. It is a survey localised to a 500m reach, usually near the Q-value site. The less-than-high status result for hydromorphology in the 2013-2018 reporting period is not related to the Derrybrien Wind farm Project, noting that Tooraglassa Ford (the RWB monitoring site) is an active, though (based on field observations) infrequently used farm access route, i.e., a ford across the river. Google Earth imagery shows there was some earthmoving activity in the field south of the river / ford during the 2013-2018 WFD reporting period which may explain why hydromorphology was not the usual 'high' status at Tooraglassa Ford during EPA sampling of 2018. For the current EPA 2016-2021 reporting period both Q-value and hydromorphology are 'high' status. To assess the effect of leaving 'new physical modifications' in situ as part of the Retained Development, current EPA assigned high status (2016 - 2021) is considered the appropriate baseline for the waterbody status impact assessment (based on *Bradán Beo* ruling) as the Project goes into the Prospective Development and final stage of the Retained Development, noting that

[1] *RHAT = River Hydromorphology Assessment Technique – a field survey that produces a score and Ecological Quality Ratio (EQR) equating to WFD categories of high, good, moderate, poor and bad status.*

OWENDALULLEEGH_010 [IE_WE_29O010500]
this is a high-status objective waterbody where maintenance of high status is required under WFD Article 4(1).
Modification(s) proposed: This RWB receives drainage from approximately 66% of the Wind farm site on its southern side, including the Derrybrien Substation, plus most of the OHL (includes SC6, SC7(a) (b) (c) and (d)). The proposed direct modifications to this waterbody are those in SC7(b) and SC7(d) associated with offsite features in response to the 2003 peat slide as follows: (a) Barrages 1, 2, 3 and 4, (b) bridge repairs/works at Black Road, Flaggy Bridge, Stepping Stones and Unnamed Bridge C. Turbulence felling (7ha) occurred in SC7(c) of the RWB in 2017/2018. The OHL, substation and the wind farm site itself do not directly impinge on delineated watercourses of this RWB, though on-site drainage connectivity exists, arising upstream of delineated watercourses of the RWB. Apart from the Stepping Stones at Tooraglassa Ford (on Owendalulleegh main channel), the relevant modifications are entirely within SC7 (Derrybrien North tributary).
Effect of modification(s): Section 7.4.5 of this rEIAR (Effects of Prospective Development) sets out that any residual effects (with the implementation of mitigation as prescribed) are expected to be localised to several small headwaters of this RWB (represented by Sites (O1, O3A, O4/O5, O5A, O6, O6A and OHL1) in terms of slight declines in water quality, mainly related to potential sediment wash-out associated with ground disturbance near watercourses and drains. At worst, these residual effects would be localised and negligible to slight negative, reversible and temporary in duration. There is a very low probability that any effects would be picked up on the main channel of the Owendalulleegh River, and hence the potential for decline from current high status is very remote. This can be stated with a high level of confidence given everything the current study has proven about this RWB over the past two decades of the operational phase, i.e., smaller channels (if at all) tend to be affected locally, negatively and temporarily in response to the common ongoing land use activities in the RWB, i.e., forestry and turbary activity (and associated drainage), but without having a depressing effect on high status of the Owendalulleegh main channel at Tooraglassa Ford (i.e., monitoring station at the downstream end of this RWB). Section 7.4.6 (Effects of Retained Development) sets out that once the Prospective Development is complete (with prescribed mitigation measures), with listed features remaining *in-situ,* there are expected to be either neutral or slightly positive effects on water quality as the site consolidates and revegetates. Residual drainage water quality will improve over time as a consequence of increased attenuation and filtration. Importantly, based on the results of the Peat Stability Assessment set out in Chapter 8 of this rEIAR, there is low risk of peat instability (see Table 7-22) which means there are not expected to be levels of peat loss that could cause a decline in RWB status. It is clear that the presence of the wind farm and its substation, the OHL and the off-site peat slide related features are having no significant negative effect on biological water quality or hydromophology at a water body scale, given that Q4-5 (BQE high status) has been maintained since 2006, and overall RWB status has been at high status for all but one reporting period. The hydro morphological effects of off-site features related to the peat slide were assessed in Sections 7.4.6.2 and 7.4.6.3 of this rEIAR. › Repairs and Black Road Bridge, Flaggy Bridge and Unnamed Bridge C have a neutral effect on water quality and hydromorphology. Retention of Barrage 1 (plus the Coillte Access Track that runs over it) and Barrage 2 - high in the Derrybrien North tributary (SC7(b) sub catchment) where the watercourse is small, and somewhat ephemeral in nature with little to no fisheries habitat - has no negative effect on water quality or quantity and no material effect on the fish recruitment capacity of this tributary. Retention of Barrages 3 and 4 will have no significant effect on fisheries productivity in either the SC7(b) sub catchment, nor the Owendalluleegh system as a whole because fish currently fail to access even as far as Flaggy Bridge owing to two natural barriers and one artificial (forestry culvert) migration barrier between Flaggy Bridge and the Owendalluleegh main channel. By 2008

OWENDALULLEEGH_010 [IE_WE_29O010500]

(5 years after the peat slide) trout densities in the accessible reach of the SC7(d) tributary (i.e., downstream of the aforementioned forestry culvert) reflected the norm for this and adjacent small headwater sub catchments of the RWB which have naturally low productivity owing to their spate flow nature. Barrages 3 and 4 have no adverse effect on water quality and do not prevent the achievement of macroinvertebrate high status (Q4-5/Q5), noting the stream has been Q4-5 (high status) at Flaggy Bridge (Site O5) in surveys of 2019, 2022 and 2024, based on macroinvertebrate Q-values (see Table 7-12). Whilst the retention of Barrages 3 and 4 may be causing a slight reduction in finer substrate mobilization downstream, there are alternative sources of finer substrates (gravels) from numerous small tributaries adjoining both the SC7 sub catchment and the Owendalluleegh main channel, meaning the residual effect of Barrages 3 and 4 on morphology, hydrology and river continuity of the Owendalluleegh_010 at water body scale is considered a permanent (or at least long-term) imperceptible negative. As the EPA record shows, the presence of these morphological features has not caused deterioration and has not prevented achievement of high status at the water body scale.

In conclusion, there is no deterioration of any of the individual quality elements at a water body scale; the Prospective and Retained Development will not cause deterioration from high status and will not prevent achievement of high status at any time in the future.

	Biological quality element (monitored by EPA)	**Hydromorphological quality elements supporting the BQEs (monitored by EPA)**			**GPC (not monitored in this RWB)**	**Overall status**
	Invertebrate (Q-value)	Hydrology	Morphology	Continuity		
Starting point	H (2016-2021)	H	H	H	≤H*	H
Effect owing to modification	H	H	H	H	≤H*	H

Ecological Status Classes - H: High; G: Good; M: Moderate; P: Poor; B: Bad

**Conditions consistent with the achievement of high status of the biological quality element*

Boleyneendoorish_010 RWB

BOLEYNEENDOORISH_010 [IE_WE_29B040100]

Starting point: Baseline status as represented by EPA Q-value in 1997 (Q5) and 2000 (Q4-5) would have been 'high' status. However, water body status was not officially reported by the EPA until the 2010-2012 period following the enactment and implementation of the WFD.

This RWB had status "unassigned" for the first WFD reporting period (2007-2009), as it was not sampled in that period. The RWB has been assigned 'high' status for the four reporting periods (Table 1-2) since commencing 2010-2012, with BQE consistent Q5 or Q4-5. The peat slide had no hydrological connectivity with, and no physical impact on this RWB. The appropriate baseline for this water status assessment going into the Prospective and final stage of the Retained Development is current EPA assigned high status (2016-2021), noting this is a high-status objective waterbody where maintenance of high status is required under WFD Article 4(1).

Modification(s) proposed: This RWB receives drainage from approximately 33% of the Wind farm site on its northern side (SC1, SC2, SC3 and SC4). The wind farm site itself does not directly impinge on EPA delineated watercourses of this RWB, although there is on-site drainage connectivity, from tracks and turbine foundations on the northern side of the wind farm, i.e., arising upstream of the delineated watercourses of the RWB. Turbulence felling (10ha) occurred in SC1 in 2016.

BOLEYNEENDOORISH_010 [IE_WE_29B040100]

Effect of modification(s): There has been no effect on EPA assigned status of this RWB arising from the construction, operational and ceased operation phases of the project, as evidenced by the consistent 'high' status record.

Section 7.4.5 of the rEIAR and Section 7.4.2 of the EIAR (Effects of Prospective Development) sets out that any residual effects (with the implementation of mitigation as prescribed) are expected to be localised to several small headwaters of this RWB (represented by Sites B1, B1B, B2, B2A and perhaps B4A, B4B and B4C) in terms of slight declines in water quality, mainly related to potential sediment wash-out associated with ground disturbance near upland drains. At worst, these residual effects would be localised and negligible- to-slight negative, reversible and temporary in duration. There is a very low probability that any effects would be perceptible on the main channel of the Boleyneendoorish River, and hence the potential for decline from current high status is very remote. This can be stated with a high level of confidence given everything the current study has proven about this RWB over the past two decades of the operational phase, i.e., smaller channels (if at all) tend to be affected locally, negatively and temporarily in response to the common ongoing land use activities in the RWB, i.e., forestry (and associated drainage), but without having a depressing effect on high status of the Boleyneendoorish main channel at the Ford West of Poolboy (i.e. monitoring station at the downstream end of this RWB).

Section 7.4.6 of the rEIAR (Effects of Retained Development) sets out that once the Prospective Development (with prescribed mitigation measures) is complete, with listed features remaining *in-situ* there are expected to be either neutral or slightly positive effects on water quality as the site consolidates and revegetates. Drainage water quality is expected to improve over time as a consequence of increased on-site attenuation and infiltration. Importantly, based on the results of the Peat Stability Assessment set out in Chapter 8 of the rEIAR and EIAR, there is low risk of peat instability related to the Prospective and Retained Development (see Table 7-22 of rEIAR) which means there are not expected to be levels of peat loss that could cause a decline in RWB status.

The presence of the wind farm in this RWB throughout the construction, operational and ceased operation phases has had no significant negative effects on biological water quality or hydromophology at a water body scale. Q5/Q4-5 (BQE high status) has been maintained since 1997 and overall RWB status has been at high status for all reported WFD periods. In conclusion, the Prospective and Retained Development do not result in deterioration of any of the individual quality elements and will not cause deterioration from overall high status nor prevent achievement of high status at any time in the future.

Boleyneendoorish_010 IE_WE_29B040100	**Biological quality element (monitored by EPA)**	**Hydromorphological quality elements supporting the BQEs (monitored by EPA)**			**GPC (not monitored in this RWB)**	**Overall status**
	Invertebrate (Q-value)	Hydrology	Morphology	Continuity		
Starting point	H (2016-2021)	H	H	H	≤H*	H
Effect owing to modification	H	H	H	H	≤H*	H

Ecological Status Classes - H: High; G: Good; M: Moderate; P: Poor; B: Bad

**Conditions consistent with the achievement of high status of the biological quality element*

1.5.1.2 Directly Affected River Water Bodies (Minor)

Owendalulleegh_020 RWB

OWENDALULLEEGH_020 [IE_WE_29O010700]						
Starting point: Baseline status as represented by EPA Q-value in 1997 (Q4-5) and 2000 (Q5) would have been 'high' status. However, water body status was not officially reported by the EPA until 2007-2009 following the enactment and implementation of the WFD. This RWB had status "unassigned" for the first WFD reporting period, as it was not sampled in that period. The RWB has been assigned 'high' status for the four reporting periods since with consistent Q4-5. The peat slide had no physical impact on this RWB. The appropriate baseline for this water status assessment going into the Prospective and final stage of the Retained Development is current EPA assigned high status (2016-2021), noting this is a high-status objective waterbody where maintenance of high status is required under WFD Article 4(1).						
Modification(s) proposed: This RWB receives drainage from a tiny fraction (<1%) of the Wind farm site on its western side (SC8). The wind farm site itself does not directly impinge on delineated watercourses of this RWB, although there is on-site drainage connectivity, from a short reach of track and 1-2 turbine foundations on the western side of the wind farm, arising upstream of the delineated watercourses of the RWB. 12.58 ha of turbulence felling occurred in this RWB over 2 years (2016, 2017), although this was Coillte forestry that was due for felling in any case.						
Effect of modification(s): There has been no effect on EPA assigned status of this RWB arising from the construction, operational and ceased operation phases of the project, as evidenced by the consistent 'high' status record. Given the extremely low proportion of site drainage to this RWB, the likelihood of any detectable adverse effects on water quality arising from the Prospective and Retained Development is extremely remote, either locally in the O8A tributary and certainly there will be no effect at water body scale. Section 7.4.6 of the rEIAR (Effects of Retained Development) sets out that once the Prospective Development (with prescribed mitigation measures) is complete, with listed features remaining *in-situ,* there are either neutral or slightly positive effects on water quality expected as the site consolidates and revegetates. Drainage water quality is expected to improve over time as a consequence of increased on-site attenuation and infiltration. Importantly, based on the results of the Peat Stability Assessment set out in Chapter 8 of both the rEIAR and EIAR, there is low risk of peat instability (see rEIAR Table 7-22) which means there are not expected to be levels of peat loss that could cause a decline in RWB status. There are no significant effects on hydromorphology quality elements of this RWB that could impact negatively on conditions supporting high status on the Owendalulleegh main channel at the Ford at Inchamore (i.e. monitoring station at the downstream end of this RWB). The presence of the wind farm in this RWB throughout the construction, operational and ceased operation phases has had no significant negative effects on biological water quality or hydromophology at a water body scale. Q4-5 (BQE high status) has been maintained since 1997 and overall RWB status has been at high status for all reported WFD periods. In conclusion, the Prospective and Retained Development do not result in deterioration of any of the individual quality elements and will not cause deterioration from overall high status nor prevent achievement of high status at any time in the future.						
Owendalulleegh_020 IE_WE_29O010700	**Biological quality element (monitored by EPA)**	**Hydromorphological quality elements supporting the BQEs (monitored by EPA)**			**GPC (not monitored in this RWB)**	**Overall status**
	Invertebrate (Q-value)	Hydrology	Morphology	Continuity		

OWENDALULLEEGH_020 [IE_WE_29O010700]						
Starting point	H (2016-2021)	H	H	H	≤H*	H
Effect owing to modification	H	H	H	H	≤H*	H
Ecological Status Classes - H: High; G: Good; M: Moderate; P: Poor; B: Bad						
**Conditions consistent with the achievement of high status of the biological quality element*						

Owendalulleegh_030 RWB

OWENDALULLEEGH_030 [IE_WE_29O010800]
Starting point: There are two monitoring stations in this RWB (EPA O3 and EPA OT1, Table 1-1 and Figure 7-1). Note that using the WFD one-out-all-out (OOAO) principle, the poorest result in the waterbody defines status in the reporting period. Baseline status as represented by EPA Q-values in 1997 and 2000 (Q5 / Q4-5 for both sites) would have been 'high' status. However, water body status was not officially reported by the EPA until 2007-2009 following the enactment and implementation of the WFD. This RWB was assigned 'high' status for the first two WFD reporting periods, followed by 'moderate' (2010-2015), then 'good' and 'good' status for the two most recent reporting periods (2013-2018, 2016-2021). The appropriate baseline for this water status assessment going into the Prospective and final stage of the Retained Development is current EPA assigned 'good' status (2016-2021). This RWB is currently not meeting its high-status objective as set out in the RBMP.
Modification(s) proposed: This RWB receives drainage from a tiny fraction (<1%) of the Wind farm site on its western side (SC9). The wind farm site itself does not directly impinge on delineated watercourses of this RWB, although there is on-site drainage connectivity, from a short reach of track and 1-2 turbine foundations on the western side of the wind farm, arising upstream of the delineated watercourses of the RWB. 16.55 ha of turbulence felling occurred in this RWB over 3 years (2016-2018), although this was Coillte forestry due for felling in any case.
Effect of modification(s): Results from the river station on the Knocknarebana Stream (tributary of Owendalulleegh, Site EPA OT1 on Figure 7-1) are responsible for depressing overall RWB status to moderate and good (Q3-4, Q4) over the last 3 WFD reporting periods. That is, in the same years, the monitored site (EPA O3) on the main channel of the Owendalulleegh in this RWB maintained high BQE status (Q4-5). In 2022 Site EPA O3 was in fact Q5 (reference condition, i.e., pristine). It is clear therefore that activities upstream of Site EPA OT1 in this RWB are impacting on overall water body status and limiting overall 'high' status, as the main channel is unaffected and maintains high status BQE throughout. It is noted from Google Earth Imagery that a large area of non-Project related forestry felling occurred near upstream of Site EPA OT1 between 2012 and 2015, which likely explains the deterioration in status to 'moderate' in the 2010-2015 reporting period, i.e., not related to the wind farm. Further large blocks of non-Project related felling occurred between 2015 and 2018, all upstream of the RWB monitoring point at EPA OT1. Whilst it is possible that relatively small areas of Project-related turbulence felling (very high in the drainage catchment) may have contributed, cumulatively to suppression of 'high' status at EPA OT1 (Knocknarebana Stream), the very significant level of non-Project related forestry activity in this RWB is certainly the primary pressure for this RWB which is recorded in the latest RBMP (2022-2027) (EPA, 2024a) to be 'At Risk' with forestry as a significant pressure. The overall status of this RWB into the future will be defined by the significant level of non-Project related forestry activity that exists in the catchment above the limiting monitoring site EPA OT1 (Knocknarebana Stream). There is no further Project-related forestry felling to be undertaken. Given the extremely low proportion of drainage input (by area) from the wind farm site to this RWB, the likelihood of any detectable adverse effects on water quality is extremely

OWENDALULLEEGH_030 [IE_WE_29O010800]

remote, either locally in the O9A / EPA OT1 (Knocknarebana) tributary and certainly there will be no further impact or and neutral residual effects from the Project at water body scale. Drainage water quality from the fraction of the wind farm site that connects to the RWB is expected to improve over time as a consequence of increased attenuation and filtration. Importantly, based on the results of the Peat Stability Assessment set out in Chapter 8 of this rEIAR, there is low risk of peat instability (see Table 7-22) which means there are not expected to be levels of peat loss that could cause a decline in RWB status.

The wind farm did not prevent achievement of high status in the WFD 2007-2009 or 2010-2012 reporting period. Turbulence felling (noting that much of this was already ear-marked by Coillte for commercial felling as it was coming to maturity) cannot be ruled out as having a slightly negative, short term cumulative effect, contributing to keeping this RWB at 'good' status in the two most recent WFD reporting periods. However, the very high levels of non-Project related felling (and replanting) that occurred, certainly between 2012 and 2018 are primary drivers of RWB status.

Going forward, the level of Project-related disturbance in this RWB (Prospective Development and final stage of Retained Development) will be extremely low to nil and will not adversely affect water quality or hydromorphological quality that could, on its own or in-combination with ongoing catchment land-use activities (primarily forestry), prevent achievement of 'high' status in the future. The Prospective and Retained Development do not result in deterioration of any of the individual quality elements and will not cause deterioration from overall good status nor prevent achievement of high status at any time in the future.

Owendalulleegh_020 IE_WE_29O010800	**Biological quality element (monitored)**	**Hydromorphological quality elements supporting the BQEs**			**GPC (not monitored in this RWB)**	**Overall status**
	Invertebrate (Q-value)	Hydrology	Morphology	Continuity		
Starting point	G (2016-2021)	*G	*G	*G	*G	G
Effect owing to modification	**≥G	**≥G	**≥G	**≥G	**≥G	**≥G

Ecological Status Classes - H: High; G: Good; M: Moderate; P: Poor; B: Bad

**By definition, conditions consistent with the achievement of good status of the biological quality element.*
***≥ denotes that the Project does not prevent the achievement of good status or better, i.e., high status objective*

Duniry_010 RWB

DUNIRY_010 [IE_SH_25D070100]

Starting point: Baseline status as represented by EPA Q-values in 1996 and 1999 (Q5 / Q4-5) would have been 'high' status. However, water body status was not officially reported by the EPA until 2007-2009 following the enactment and implementation of the WFD. This RWB was assigned 'moderate' status for the first WFD reporting period (2007-2009), followed by 'good' status for the three most recent reporting periods. This RWB is currently, and has been, meeting its good-status objective since the 2010-2012 reporting period. The appropriate baseline for this water status assessment going into the Prospective and final stage of the Retained Development is current EPA assigned 'good' status (2016-2021).

DUNIRY_010 [IE_SH_25D070100]

Modification(s) proposed: This RWB receives drainage from a tiny fraction (<0.5%) of the Wind farm site on its eastern flank (SC5). The wind farm site itself does not directly impinge on delineated watercourses of this RWB, although there is on-site drainage connectivity, from a short reach of on-site track, 1-2 turbine foundations and the wind farm access road that occurs in this RWB catchment.

Effect of modification(s): This RWB has continued to meet its WFD objective of 'good' status since the 2010-2012 reporting period, which suggests the presence of the windfarm has no effect on downstream water quality and does not give rise to hydromorphological quality issues that impact on the BQE that defines status.

Overall RWB status was limited to 'moderate' in the 2007-2009 reporting period because it failed the pH and acidification criteria for good status, although the Q-value (Q4) in that period still met 'good' status. Acidification is a characteristic of heavily afforested small catchments and a noted effect of elevated run-off draining from blanket peat sites in many parts of Ireland (Kelly-Quinn et al., 2008). The forestry mediated effects on potential water acidification are completely unrelated to any aspect of the wind farm presence in this catchment.

Furthermore, it is noted from Google Earth Imagery that a large area of non-Project related forestry felling occurred in the upper catchment area between 2010 and 2011, with further large blocks felled between 2015 and 2018, most of that appearing to have been replanted.

Going forward, the level of Project-related disturbance in this RWB (Prospective Development and Retained Development) will be extremely low to nil and will not adversely affect water quality or hydromorphological quality elements that could, on its own or in-combination with ongoing catchment land-use activities (primarily forestry), cause deterioration or prevent achievement of 'good' status at any time in the future.

Duniry_010 IE_SH_25D070100	**Biological quality element (monitored)**	**Hydromorphological quality elements supporting the BQEs**			**GPC**	**Overall status**
	Invertebrate (Q-value)	Hydrology	Morphology	Continuity		
Starting point	G (2016-2021)	*G	*G	*G	*G	G
Effect owing to modification	G	*G	*G	*G	*G	G

Ecological Status Classes - H: High; G: Good; M: Moderate; P: Poor; B: Bad

**By definition, conditions consistent with the achievement of good status of the biological quality element.*

Bleach_010 RWB

BLEACH_010 [IE_SH_25B070100]

Starting point: Baseline status as represented by EPA Q-values in 1996 and 1999 (Q5 / Q4-5) would have been 'high' status. However, water body status was not officially reported by the EPA until 2007-2009 following the enactment and implementation of the WFD. This RWB was "unassigned" status for the first WFD reporting period (2007-2009), followed by 'good', 'poor', 'good' and 'good' for the subsequent four reporting periods. This RWB is currently, and has been, meeting its good-status objective since the 2013-2018 reporting period. The appropriate baseline for this water status assessment going into the Prospective and final stage of the Retained Development is current EPA assigned 'good' status (2016-2021).

BLEACH_010 [IE_SH_25B070100]

Modification(s) proposed: This is a large RWB (35.24 km^2), heavily afforested, also encompassing Lough Atorick. The Project has a very small footprint and drainage input within this RWB, comprising Agannygal substation, 530m of OHL plus the decommissioning haul route. There will be one upgraded culvert constructed on an existing forestry track to facilitate the Prospective Development , which will be left *in-situ* on the small, drained tributary of Lough Atorick at Site OHL2A.

Effect of modification(s): Overall RWB status was limited to 'poor' in the 2010-2015 reporting period because BQE (Q-value) was Q3, 'poor'. Historical aerial imagery (Google Earth) shows ongoing forestry activity, felling / replanting in various plots in the catchment, and it is not unreasonable to suggest that this land use activity is the dominant driver of water body status.

The presence of the Agannygal substation and 530m of OHL did not prevent achievement of required 'good' status in all but one of the WFD reporting cycles. Given the highly afforested nature of this large water body, and the comparatively tiny footprint and drainage contribution from the Retained Development, it is considered these features are having a neutral effect on status at water body scale.

The installation of an upgraded culvert on the OHL2A tributary will have a slightly positive effect on hydromorphology at a reach scale, because the existing culvert has collapsed, forcing water to flow over the track (entrain solids) and forms a localised barrier, noting that the channel is not suitable for salmonids but may support eel and stickleback.

Going forward, the level of Project-related disturbance in this RWB (Prospective Development and final stage of Retained Development) will be extremely low and will not adversely affect water quality or hydromorphological quality that could, on its own or in-combination with ongoing catchment land-use activities (primarily forestry), cause deterioration or prevent achievement of 'good' status at any time in the future.

Bleach_010 IE_SH_25B070100	**Biological quality element (monitored)**	**Hydromorphological quality elements supporting the BQEs**			**GPC**	**Overall status**
	Invertebrate (Q-value)	Hydrology	Morphology	Continuity		
Starting point	G (2016-2021)	*G	*G	*G	*G	G
Effect owing to modification	G	*G	*G	*G	*G	G

Ecological Status Classes - H: High; G: Good; M: Moderate; P: Poor; B: Bad

**By definition, conditions consistent with the achievement of good status of the biological quality element.*

1.5.1.3 Indirectly Affected Water Bodies

Owendalulleegh_040 RWB

OWENDALULLEEGH_040 [IE_WE_29O010900]

Starting point: Baseline status as represented by EPA Q-value in 1997 (Q4-5) and 2000 (Q5) would have been 'high' status. However, water body status was not officially reported by the EPA until 2007-2009 following the enactment and implementation of the WFD. This RWB has been at 'high' status for all five WFD reporting periods, therefore consistently meeting it's high-status objective. The appropriate baseline for this water status assessment going into the Prospective and final stage of the Retained Development is current EPA assigned 'good' status (2016-2021).

OWENDALULLEEGH_040 [IE_WE_29O010900]						
Modification(s) proposed: There were and are no direct physical modifications in this RWB from the Project, but it was on the pathway of the 2003 peat slide, hence considered in this assessment.						
Effect of modification(s): Technically there was a temporary decline in representative status in this waterbody when 'high' status (2000) fell to 'good' (2003), one month after the 2003 peat slide. However, status returned to Q5, 'high' (pristine, i.e., reference conditions) by 2006. Drainage water quality from the upstream wind farm is expected to improve over time as a consequence of increased attenuation and filtration. Importantly, based on the results of the Peat Stability Assessment set out in Chapter 8 of this rEIAR, there is low risk of peat instability (see Table 7-22) which means there are not expected to be Project-related levels of peat loss that could cause a decline in RWB status in the future. Going forward, the probability of the Prospective and Retained Developments will not adversely affect water quality or hydromorphological quality that could cause deterioration or prevent achievement of 'high' status at any time in the future.						
Bleach_010 IE_SH_25B070100	**Biological quality element (monitored)**	**Hydromorphological quality elements supporting the BQEs**			**GPC**	**Overall status**
	Invertebrate (Q-value)	Hydrology	Morphology	Continuity		
Starting point	H (2016-2021)	H	H	H	≤H*	H
Effect owing to modification	H	H	H	H	≤H*	H
Ecological Status Classes - H: High; G: Good; M: Moderate; P: Poor; B: Bad						
**By definition, conditions consistent with the achievement of high status of the biological quality element.*						

Owendaluleegh_050 RWB

OWENDALULLEEGH_050 [IE_WE_29O011000]
Starting point: Baseline status as represented by EPA Q-value in 1997 (Q4-5) and 2000 (Q5) would have been 'high' status. However, water body status was not officially reported by the EPA until 2007-2009 following the enactment and implementation of the WFD. This RWB has been at 'moderate' status for all five WFD reporting periods, meaning it has not met its good-status objective. The appropriate baseline for this water status assessment going into the Prospective and final stage of the Retained Development is current EPA assigned 'moderate' status (2016-2021).
Modification(s) proposed: There were and are no direct physical modifications in this RWB from the Project, but it was on the pathway of the 2003 peat slide, hence considered in this assessment.
Effect of modification(s): Technically there was a temporary decline in representative status in this waterbody when 'high' status (2000) fell to 'good' (2003), one month after the 2003 peat slide, remaining at 'good' in 2006. Since the commencement of WFD reporting, the fish BQE has limited overall RWB to 'moderate', noting that the Q-value BQE has been Q4-5 and more recently Q5 throughout that period. IFI carried out fish surveys for WFD classification in 2009, 2013 and 2016. Where fish status is used as a BQE, the Fisheries Classification Scheme 2 (FCS2 – Ireland) produces a metric that will fall into a WFD class bands of high, good, moderate, poor or bad. FCS2 uses probability-based comparisons of observed fish counts with expected (predicted) fish counts under reference (un-impacted) conditions (Kelly & Harrison, 2016). The model accounts

OWENDALULLEEGH_050 [IE_WE_29O011000]

for environmental, geographical and pressure variables, including natural impassable barriers (e.g., waterfalls, karst). The FCS2 tool is used only by IFI fisheries scientists and cannot be examined in any depth in this report, however, Kelly & Harrison (2016) sets out that a site at 'good' status under the FCS2 would have ~80% of the expected fish species present, plus at least one of the type-specific disturbance-sensitive species and the catch is 80% of the expected total catch. For 'moderate' fish status sites, assume 55% of expected species are present (the most likely) and for these the catch equals 55% of the expected total catch. In the absence of baseline fish survey data, i.e., prior to the 2003 peat slide, it is technically not possible to know what the expected catch and numbers ought to be in the Owendalulleegh system, but it appears that trout densities recorded were lower than expected for upland soft water geologies (see discussion in Chapter 7, Section 7.3.6.3). In contrast the upper tributary streams, even the SC7(d) tributary badly affected by the peat slide appeared to have recovered trout densities expected for similar stream types by 2008, 5 years after the event) (Inis Environmental Consultants, 2008) which was sustained through surveys conducted between 2011 and 2022 for this study.

Based on the results of the Peat Stability Assessment set out in Chapter 8 of this rEIAR, there is low risk of peat instability (see Table 7-22) which means there are not expected to be Project-related levels of peat loss that could cause a decline in RWB status in the future. This RWB has an overall upstream catchment that is highly afforested, with forestry and hydromorphology listed as Significant Pressures in RBMP reporting (EPA, 2024a). It is reasonable to deduce that wider catchment land use activities are the primary drivers of status in this RWB and hence the Prospective and final stage of the Retained Development will not cause deterioration in status and will not preclude achievement of good status in the future, which will be governed by the productivity of the system for trout. It could be argued that with Q-values consistently at high status, indicative of low nutrient levels, that naturally low trout productivity can be expected for this system, i.e., trout tend to thrive in slightly enriched conditions, in contrast to salmon (which cannot reach the Owendalulleegh system because of natural karst barriers) thrive in low nutrient waters such as this. It is assumed, however that these factors have been considered by the IFI FCS2 fish classification system, which ultimately defines the status of this RWB. With such good water quality, and very good habitat quality as observed during field surveys over the past 13 years, there is no Project-related reason that would prevent improvement in fish status in the future and therefore no reason that achievement of 'good' status is prevented by the Project. In conclusion, the Prospective and Retained Development do not result in deterioration of any of the individual quality elements and will not cause deterioration in status nor prevent achievement of required 'good' status at any time in the future.

Owendalulleegh _050 IE_WE_29O011000	**Biological quality element (monitored)**		**Hydromorphological quality elements supporting the BQEs**			**GPC and Chemical Status**	**Overall status**
	Invert. (Q-value)	Fish	Hydrology	Morphology	Continuity		
Starting point	H	M	*M	*M	*M	≤H	M
Effect owing to modification	H	≥M	≥M	≥M	≥M	≤H	≥M

Ecological Status Classes - H: High; G: Good; M: Moderate; P: Poor; B: Bad

**By definition, conditions consistent with the achievement of status of the poorest biological quality element, noting that habitat / hydromorphology based on field observation is very good quality*
≥M – denotes that the Project does not prevent the achievement of good status (or better)

Lough Cutra LWB

LOUGH CUTRA [IE_WE_29_37]

Starting point: No information is available to infer LWB status prior to the first WFD reporting period of 2007-2009. Status was "unassigned" by the EPA in that first reporting cycle, and was 'good' (2010-2012), 'moderate' (2010-2015), 'good' (2013-2018) and 'good' (2016-2021) for the last four reporting periods. The appropriate baseline for the water status assessment going into the Prospective and final stage of the Retained Development is the currently EPA assigned 'good' status (2016-2021).

Modification(s) proposed: There have been no direct physical modifications in this LWB from the Project, but the lake was on the pathway of the 2003 peat slide, hence considered in this assessment.

Effect of modification (Proposed Scheme): There appeared to be some evidence of an effect of the peat slide on Lough Cutra in terms of lake chemistry data for Total-P and to a lesser extent for chlorophyll a for up to 3 years after the slide. The most obvious feature of these data were three elevated Total-P results for 2004-2006 when compared to pre- peat slide 2001 (March) and 2003 (July) results, as well as all the 2010-2019 results (see rEIAR Chapter 7, Section 7.4.2.4). Peat silt did enter the lake and did spread, at least as far as the outflow river (Beagh River). Straw bales that were placed across the lake outlet shortly after the peat slide captured silt, indicating peat was had reached the outflow river and peat flushing from the lake was taking place very early in the event. It is important to note that the occurrence of the peat influx was late in the 2003 season when general biological activity (macrophyte, phytoplankton) in the lake would have been at its lowest, which likely significantly reduced any impact that may have arisen. Whilst the peat slide may have caused localised reductions in benthic littoral and open water macroinvertebrate density and diversity where deposits were thick, the late seasonal occurrence and subsequent winter flushing of silt from the system, would suggest the significance of any silt-related impacts would have diminished substantiality.

It is reasonable to deduce that wider catchment land use activities are currently the primary drivers of status in this LWB at the waterbody scale, and that 'good' status is being maintained with the current level of catchment activity (primarily forestry and agriculture). The Peat Stability Assessment set out in Chapter 8 of this rEIAR predicts low risk of peat instability (see rEIAR Table 7-22), meaning there is a low risk of excessive levels of peat loss that could reach Lough Cutra as a result of decommissioning and retention of features on the wind farm and OHL site, 22km upstream. Hence, from a starting point of the current WFD status baseline, the Prospective and Retained Development would not be likely to cause deterioration of any of the individual quality elements and will therefore not cause deterioration from 'good' status nor prevent achievement of good status at any time in the future.

Lough Cutra IE_WE_29_37	**Biological quality elements (BQEs) (monitored) (2016-2021)**		**Hydromorphological quality elements supporting the BQEs**		**GPC monitored**	**Overall status**
	Macrophyte	Phyto plankton	Hydrology	Morphology		
Starting point	G	H	G*	G*	G	G
Effect owing to modification	G	H	G*	G*	G	G

Ecological Status Classes - H: High; G: Good; M: Moderate; P: Poor; B: Bad

** "supporting conditions" are by definition equal to, or better than, poorest BQE value*

Boleyneendoorish_020 RWB

BOLEYNEENDOORISH_020 [IE_WE_29B040200]

Starting point: Baseline status as represented by EPA Q-value in 1997 (Q4-5) and 2000 (Q5) would have been 'high' status. However, water body status was not officially reported by the EPA until 2007-2009 following the enactment and implementation of the WFD.

This RWB had status "unassigned" for the first WFD reporting period, as it was not sampled in that period. The RWB has been assigned 'high' status for the four reporting periods since with consistent Q5 or Q4-5. The peat slide had no physical impact on this RWB. The appropriate baseline for this water status assessment going into the Prospective and final stage of the Retained Development is current EPA assigned high status (2016-2021), noting this is a high-status objective waterbody where maintenance of high status is required under WFD Article 4(1).

Modification(s) proposed: There were and are no direct physical modifications in this RWB from the Project. It is considered in this assessment on a precautionary basis as it is immediately downstream of the Boleyneendoorish_010 that receives 33% of drainage from the overall wind farm site.

Effect of modification(s): There has been no effect on EPA assigned status of this RWB arising from the construction, operational and ceased operation phases of the project, as evidenced by the consistent 'high' status record.

The presence of the wind farm upstream of this RWB throughout the construction, operational and ceased operation phases has had no significant negative effects on biological water quality or hydromophology at a water body scale. Q5 and Q4-5 (BQE high status) has been maintained since 1997 and overall RWB status has been at high status for all reported WFD periods. In conclusion, the Prospective and Retained Development gives no cause for deterioration of individual quality elements and will not cause deterioration from overall high status, nor prevent achievement of high status at any time in the future.

Boleyneendoorish_020 IE_WE_29B040200	**Biological quality element (monitored by EPA)**	**Hydromorphological quality elements supporting the BQEs (monitored by EPA)**			**GPC (not monitored in this RWB)**	**Overall status**
	Invertebrate (Q-value)	Hydrology	Morphology	Continuity		
Starting point	H (2016-2021)	H	H	H	≤H*	H
Effect owing to modification	H	H	H	H	≤H*	H

Ecological Status Classes - H: High; G: Good; M: Moderate; P: Poor; B: Bad

**Conditions consistent with the achievement of high status of the biological quality element*

1.6 Groundwater Body Assessments

GWDTE - Caherglassaun Turlough (SAC 000238) GWB

GWDTE - Caherglassaun Turlough (SAC 000238) [IE_WE_G_0091]
Starting point: Groundwater quantitative status has been classified as 'good' for each WFD reporting period to date. In the 2007-2012 period, overall status (i.e., quantitative + chemical) was 'good', but since then (2010-2015, 2013-2018, 2016-2021) chemical status has been 'poor', therefore limiting overall status to 'poor'. The reason for failure of chemical status is elevated Total Phosphorus. The appropriate GWB baseline for this water status assessment going into the Prospective and final stage of the Retained Development is current EPA assigned 'poor' status (2016-2021).
Effect of Proposed Scheme: As set out in the rEIAR Chapter 9, there has been no effect on EPA assigned status of this GWB arising from the construction, operational and ceased operation phases of the project. The presence of the wind farm within this GWB throughout the construction, operational and ceased operation phases has had no significant negative effects on hydrogeology at water body scale. The fall in groundwater levels during and following construction was consistent and gradual at a rate of approximately 0.1 m/year in close proximity to new drains. It is likely that groundwater levels across the wind farm site have stabilised since piezometers installed during construction stopped measuring in 2012. In general, the vast majority of dewatering of the peat close to wind farm drains took place in the early years following construction, but the degree and rate of change would have varied significantly with the greatest changes most likely taking place in the southwest of the site where most of the new drainage channels were introduced while the relatively undisturbed areas undergoing little evident change and remaining largely intact. It is estimated that only c. 1.3% of the overall wind farm area was subject to drawdown from the installation of new drainage because of the wind farm construction while the remainder saw groundwater levels unchanged. The decommissioning works and retained site will likely see that existing groundwater levels remain stable and if anything, gradually rise due to a lack of maintenance to the wind farm drainage network in the long-term. Repeated water chemistry sampling and Q-value data has shown that the wind farm is not contributing elevated levels of nutrient to connected surface waters, with 'high' status Q-value maintained in the main drainage catchment of Owendalulleegh and Boleyneendoorish as set out in Section 1.5.1, above, and there is a similarly low risk that the wind farm is adversely affecting chemical status of this groundwater body. There is a small natural peat-floored lake present close to the centre of the wind farm just north of T67. The lake is reported in to appears to be in a relatively natural state despite (Section 61315 Chapter 6 (Terrestrial & Avian Ecology) the planted forestry in the adjacent area and the development of the wind farm infrastructure close-by. It most likely would not have been affected by installation of wind farm drainage given the distance to the nearest drains, the size of these drains and the extremely low hydraulic conductivity of peat. The residual effect on quantitative and chemical status of the overall GWB will be neutral. The Prospective and Retained Development will not cause deterioration from 'good' quantitative status and will not prevent achievement of overall 'good' status at any time in the future.

		Starting point	Effect of modification
Quantitative Criteria	1) Available GW resource is not exceeded by the long term annual average rate of abstraction	G	G

	2) No significant diminution of surface water chemistry and/or ecology resulting from anthropogenic water level alteration or change in flow conditions that would lead to failure of Article 4 objectives for any associated surface water bodies?	G	G
	3) No significant damage to GW Dependent Terrestrial Ecosystems (GWDTEs) resulting from an anthropogenic water level alteration;	G	G
	4) No saline or other intrusions resulting from anthropogenically induced sustained changes in flow direction.	G	G
	Overall quantitative groundwater status	G	G
Chemical Status	No anthropogenically induced upward trends in pollutant concentrations and the reversal of such trends.	P	P
WFD GWB Status Classes - G: Good; P: Poor			

Lough Graney GWB

Lough Graney [IE_SH_G_157]			
Starting point: Overall groundwater status (quantitative + chemical) has been classified as 'good' for each WFD reporting period to date: 2007-2012, 010-2015, 2013-2018, 2016-2021.			
Effect of Proposed Scheme: Given the small footprint of the project on this GWB and the largely free-draining nature of the substation developed within it, there would have been no effects on groundwater levels nor consequently its Quantitative status. Any effect from the Project on groundwater would be no more than superficial, localised effects and would not affect GWB status at water body level. The residual effect on quantitative and chemical status of the overall GWB will be neutral. Overall quantitative GWB status will not deteriorate and the Retained Development would not cause deterioration from current overall 'good' status in the future.			
		Starting point	**Effect of modification**
Quantitative Criteria	1) Available GW resource is not exceeded by the long term annual average rate of abstraction	G	G
	2) No significant diminution of surface water chemistry and/or ecology resulting from anthropogenic water level alteration or change in flow conditions that would lead to failure of Article 4 objectives for any associated surface water bodies?	G	G
	3) No significant damage to GW Dependent Terrestrial Ecosystems (GWDTEs) resulting from an anthropogenic water level alteration;	G	G
	4) No saline or other intrusions resulting from anthropogenically induced sustained changes in flow direction.	G	G
	Overall quantitative groundwater status	G	G

Lough Graney [IE_SH_G_157]			
Chemical Status	No anthropogenically induced upward trends in pollutant concentrations and the reversal of such trends.	G	G
WFD GWB Status Classes - G: Good; P: Poor			

Tynagh GWB

Tynagh [IE_SH_G_157]			
Starting point: Overall groundwater status (quantitative + chemical) has been classified as 'good' for each WFD reporting period to date: 2007-2012, 010-2015, 2013-2018, 2016-2021.			
Effect of Proposed Scheme: Given the small footprint of the project on this GWB, there would have been no effects on groundwater levels nor consequently its Quantitative status. Any effect from the Project on groundwater would be no more than superficial, localised effects and would not affect GWB status at water body level. The residual effect on quantitative and chemical status of the overall GWB will be neutral. Overall quantitative GWB status will not deteriorate, and the Retained Development would not cause deterioration from current overall 'good' status in the future.			
		Starting point	**Effect of modification**
Quantitative Criteria	1) Available GW resource is not exceeded by the long term annual average rate of abstraction	G	G
	2) No significant diminution of surface water chemistry and/or ecology resulting from anthropogenic water level alteration or change in flow conditions that would lead to failure of Article 4 objectives for any associated surface water bodies?	G	G
	3) No significant damage to GW Dependent Terrestrial Ecosystems (GWDTEs) resulting from an anthropogenic water level alteration;	G	G
	4) No saline or other intrusions resulting from anthropogenically induced sustained changes in flow direction.	G	G
	Overall quantitative groundwater status	G	G
Chemical Status	No anthropogenically induced upward trends in pollutant concentrations and the reversal of such trends.	G	G
WFD GWB Status Classes - G: Good; P: Poor			

1.7 Conclusion

The above assessment has considered effects of the Derrybrien Wind Farm Development Decommissioning Project - Retained Development on river, lake and ground water body status throughout the lifetime of the Project: past, present and future.

The wind farm, OHL and Agannygal Substation sites are each currently in an essentially benign, ceased operation phase (2022 to present). It is important to note that any changes to ecological quality elements as defined by Annex V of the WFD would arise in comparison to current EPA assigned status. Given that the 'Do Nothing' scenario is not an option, i.e., decommissioning works are required, the effective baseline for each water body for the remaining stages of the Project is current (2016-2021) EPA assigned status, i.e., for the Prospective Development and final stage of Retained Development.

Table 1-6 summarises results of the WFD Article 4(7) Applicability Assessments for each water body in comparison to current EPA assigned water body status (2016-2021). The Prospective Development and final stage of the Retained Development are not predicted to cause deterioration of status in any water body at quality element level or overall water body status level, nor compromise improvement to good status (or high status, where required), hence the project does not need to be subject to the Article 4(7) Test for derogation. This document in conjunction with detailed information within the EIAR provides evidence supporting this conclusion. The project is compliant with WFD Article 4(1) objectives for the water bodies in question.

Table 1-6 Summary of WFD compliance tests

Water body	Deterioration of status?	Prevention of good / high status?	Is the proposed scheme compliant with WFD Article 4(1) objectives for this water body?
Boleyneendoorish_010 [IE_WE_29B040100]	No	No	Yes
Boleyneendoorish_020 [IE_WE_29B040200]	No	No	Yes
Owendalulleegh_020 [IE_WE_29O010700]	No	No	Yes
Owendalulleegh_030 [IE_WE_29O010800]	No	No	Yes
Duniry_010 [IE_SH_25D070100]	No	No	Yes
Bleach_010 [IE_SH_25B070100]	No	No	Yes
Boleyneendoorish_020 [IE_WE_29B040200]	No	No	Yes
Owendalulleegh_040 [IE_WE_29O010900]	No	No	Yes
Owendalulleegh_050 [IE_WE_29O011000]	No	No	Yes
Lough Cutra [IE_WE_29_37]	No	No	Yes
GWDTE-Caherglassaun Turlough (SAC000238) [IE_WE_G_0091]	No	No	Yes
Lough Graney [IE_SH_G_157]	No	No	Yes
Tynagh [IE_SH_G_157]	No	No	Yes
OVERALL WFD ASSESSMENT RECOMMENDATION	The Prospective Development and final stage of the Retained Development does not compromise WFD Article 4(1) objectives and could technically be authorized without an Article 4(7) Test.		

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LAND, SOIL AND GEOLOGY APPENDICES (APPENDIX 8-1 TO 8-7)

APPENDIX 8-1: AGEC 2004 REPORTS ON 2003 LANDSLIDE AND POST-LANDSLIDE APPRAISAL

Derrybrien Windfarm - Final Report on Landslide of October 2003, Applied Ground Engineering Consultants (AGEC), 4th February, 2004

Final Report on Derrybrien Windfarm Post-Landslide Site Appraisal, AGEC Report No. 378_099, Rev.0, 4th February 2004.

- **Appendix A:** Geotechnical Mapping Sheets
- **Appendix B:** In-Situ Vane Results
- **Appendix C:** Back-analysed Excavation Failures
- **Appendix D:** Stability Results for Cells
- **Appendix E:** Co-ordinates of Vane Locations
- **Appendix F:** Strength of Peat above Peat/Mineral Soil Interface

APPENDIX 8-2: GEOTECHNICAL STABILITY REPORT – WIND FARM SITE

Derrybrien Windfarm – Geotechnical Stability Report & Assessment of Stability Impacts of On-Site Activities, AGL Report No. 11-147-R04, Rev.4, 12th December, 2024

- **Appendix A – As-Built Records (Drawings)**
  - AGEC Drawing No. 003 – *Ground Investigation Location Plan for Wind Farm & Failure Scar*, Rev.0 dated 25th July, 2018
  - ESB E&MP Drawing No. QS-000192-01-D451-001 – *Derrybrien Wind Farm – Pre-existing & Constructed Drainage*, Rev.0, 29th June 2020
  - ESB E&MP Drawing No. QS-000192-01-D451-009 – *Derrybrien Wind Farm – Location Monitoring Points*, Rev.0, 29th June 2020
  - ESB E&MP Drawing No. QS-000192-01-D451-014 – *Derrybrien Wind Farm – Site Layout*, Rev.0, 5th May, 2020
  - ESB E&MP Drawing No. QS-000192-01-D451-016 – *Derrybrien Wind Farm – Approximate Location of Piezometers & Tiltmeter Points on Site*, 30th October, 2018
  - ESB E&MP Drawing No. QS-000192-01-D451-017 – *Derrybrien Wind Farm – Approximate Cable Route Locations*, 30th October, 2018
  - ESB E&MP Drawing No. QS-000192-01-D451-018 – *Derrybrien Wind Farm Constraints*, 30th October, 2018
  - ESBI Drawing No. P378015-C-0003 – *Derrybrien Wind Farm – Site Tracks Remedial Works – Remedial Works Plan*, Rev.1, 26rh March, 2014
- **Appendix B – Peat Stability Risk Assessment (PSRA)**
  - Tables B1-B5: Risk Factors & Rating Guidelines
  - Figure B-1: Baseline PSRA of Site in Original Condition in 1998 Prior to Construction
  - Figure B-2: PSRA for End of Construction in 2005 – Prior to Mitigation Measures
  - Figure B-3: Updated PSRA for Site Activities 2005-2018 - After Mitigation Measures

- Figure B-4: Updated PSRA for Site Activities 2018-End of Operation - After Mitigation Measures
- Figure 2.1B – LiDAR Topographical Survey
- Drawing No. 11-147-03: Aerial Photo
- ESB Drawing No.QS-000192-01-D451-025 – Site Layout- Peat Depth Banding
- ESBI Drawing No. 11-147-05: Slope Angle at Ground Surface
- ESB Drawing No. QS-000192-01-D451-020 – Site Layout, Bottom Peat Slope Banding
- ESB Drawing No. QS-000192-01-D451-028 – Site Layout, Infinite Slope Analysis, Peat Undrained Shear Strength, c_u = 5kPa, Surcharge = 0kPa
- ESB Drawing No. QS-000192-01-D451-026 – Site Layout, Infinite Slope Analysis, Peat Undrained Shear Strength, c_u = 2.5kPa, Surcharge = 0kPa
- ESB Drawing No. QS-000192-01-D451-029 – Site Layout, Infinite Slope Analysis, Peat Undrained Shear Strength, c_u = 5kPa, Surcharge = 13kPa
- ESB Drawing No. QS-000192-01-D451-027– Site Layout, Infinite Slope Analysis, Peat Undrained Shear Strength, c_u = 2.5kPa, Surcharge = 13kPa
- Peat Stability Assessment Worksheets, Turbine Nos. T1 to T71

- **Appendix C – AGL Report No. 11-147-R05 – Proof Load Testing of the Floating Roads in 2018**

  Derrybrien Windfarm Access Roads – Road Test on Floating Roads, AGL Report No. 11-147-R05, Rev.0, 30th October 2018
  - **Appendix A** – Results of Proof Load Test
- **Appendix D – Photos from AGL Site Inspections in 2018**
- **Appendix E – Photos from AGL Site Inspection in 2024**
- **Appendix F – AGL Report No. 11-147-R01: Construction Stage Geotechnical Investigations, Stability Analyses and Peat Stability Risk Mitigation Measures (Post-Slide)**

  Summary of Geotechnical Investigations, Stability Analyses and Peat Stability Risk Mitigation Measures Adopted During Post-Slide Construction Stage, AGL Report No. 11-147-R01, Rev.1, 14th July 2020
  - **Appendix I** – IGSL Factual Report for Pre-Construction SI (2002)

    Report on a Site Investigation at a Proposed Wind Farm, Derrybrien, Co. Galway – IGSL Report No. 7637, January 2002.
    - **Appendix I:** Trial Pit Records
    - **Appendix II:** Mackintosh Probe/Hand Auger Results
    - **Appendix III:** Laboratory Test Results
  - **Appendix II** – Factual Report on Rotary Coreholes at Turbine Locations by Irish Drilling Ltd. (2004)

    Proposed Windfarm at Derrybrien – Site Investigation Factual Report, Irish Drilling Ltd., 6th October, 2004
    - Appendix 1: Borehole Records (Rotary Core)
  - **Appendix III** – AGL Report No. 03-104-R01 (Rev.1) on Stability of Floating Roads, Turbine Excavations & Peat Disposal Areas.

    Report on the Stability of the Floating Roads, Turbine Excavations & Peat Disposal Areas on the site of the Derrybrien Windfarm, Co. Galway, AGL Report No. 03-104-R01, Rev.1, 1st November 2004.

- **Appendix A:** Results of Gouge Auger Probes and Geonor H-10 (65/130mm) Penetration Vane Tests
- **Appendix B**: Summary of Field Investigations at Proposed Peat Repository Sites
- **Appendix C:** Results of Slope/W Analyses for the Floating Roads
- **Appendix D:** Road Deflection Measurements from Field Load Tests on Floating Roads
- **Appendix E:** Results of Slope Stability Analyses for Proposed Peat Repository Sites

- **Appendix IV** – AGL Report 03-104-R02 – Report on the Stability of the Floating Roads

  Report on the Stability of the Floating Road on the site of the Derrybrien Windfarm, Co. Galway, AGL Report No. 03-104-R02, 16th December 2004.
  - **Appendix A:** Results of Gouge Auger Probes and Geonor H-10 (65/130mm) Penetration Vane Tests
  - **Appendix B:** Results of Slope/W Analyses for the Floating Roads
  - **Appendix C:** Road Deflection Measurements from Field Load Tests on Floating Roads
  - **Appendix D:** AGL Method Statement for Remedial Works on Sections of Floating Roads Classified as "Poor".
- **Appendix V** – AGL Memo 03-104-DM18 – Full Scale Testing on the Floating Roads
  - **Appendix A:** AGL Method Statement for Remedial Work on the Floating Roads
- **Appendix VI** – AGL Report 03-104-R06 – Report on the Load Test Carried Out on a Test Section of Floating Road

  Report on the Load Test Carried out on a Test Section of Floating Road on the Derrybrien Windfarm, Loughrea, Co. Galway, AGL Report No. 03-104-R06, 23rd May, 2005.
  - **Appendix A**: Vane Shear Test Results
  - **Appendix B**: Slope/W Analyses
  - **Appendix C**: Settlement Measurements
- **Appendix VII** – AGL Memo 03-104-DM24 – Transformer Load on the Floating Roads
- **Appendix VIII** – Peat Repository Sites – Geotechnical Investigations & Stability Analyses
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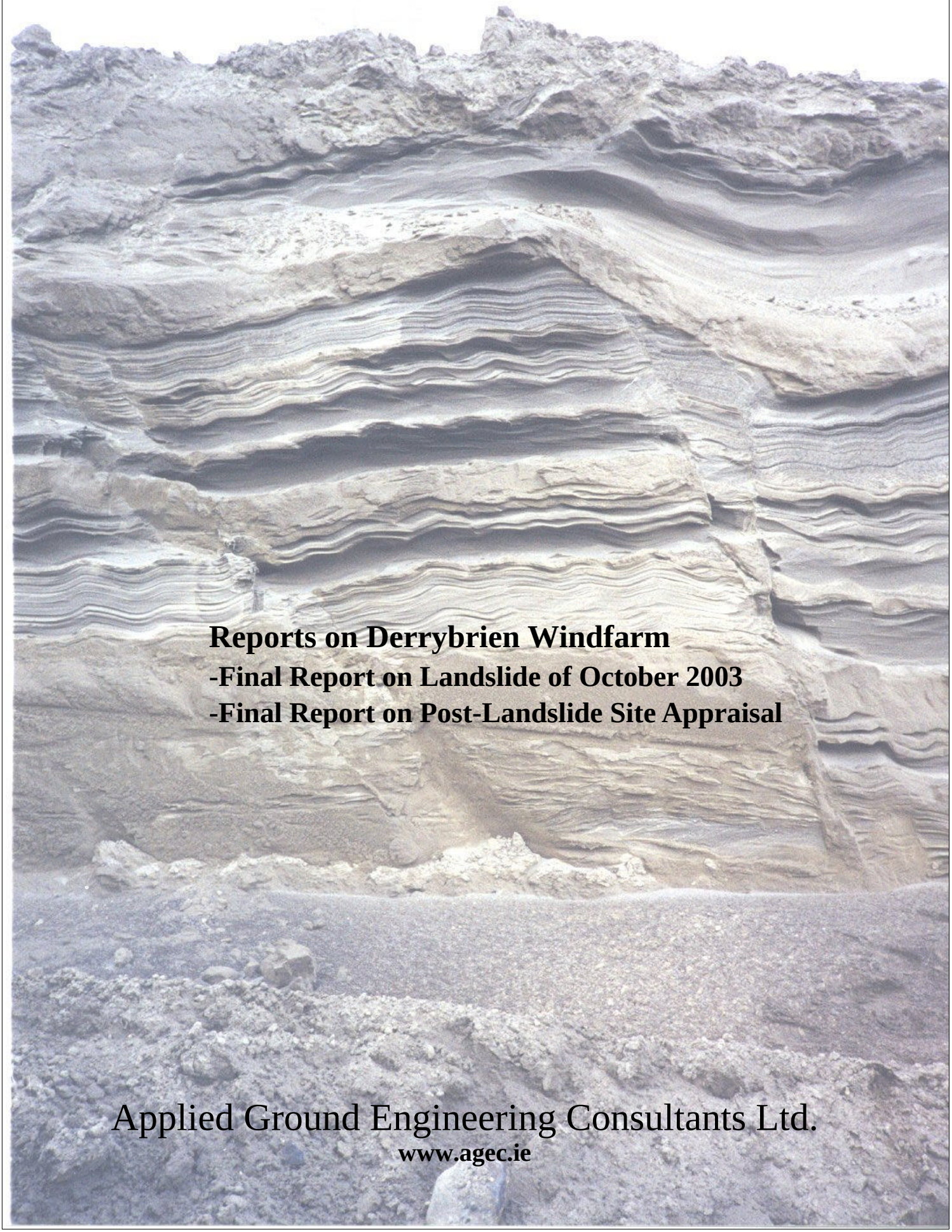

Reports on Derrybrien Windfarm

-Final Report on Landslide of October 2003

-Final Report on Post-Landslide Site Appraisal

Applied Ground Engineering Consultants Ltd.

www.agec.ie

EXECUTIVE SUMMARY

The Derrybrien Windfarm site is located on Cashlaundrumlahan Mountain in the Slieve Aughty Mountains, some 11 km south of Loughrea, Co Galway. The windfarm being developed by Hibernian Wind Power Ltd comprises some 71 proposed wind turbines and associated access roads. Construction of bases for wind turbines and associated access roads was ceased following a landslide on 16 October 2003.

Applied Ground Engineering Consultants (AGEC) were commissioned on behalf of Hibernian Wind Power Ltd to:

(1) Investigate the landslide which occurred at Derrybrien, Co Galway on October 16 last, and

(2) To assess the stability of the overall windfarm site based on findings from a walkover survey and ground investigation data.

The following is a summary of the recommendations and conclusions of these reports (full details are in the reports attached).

Key Findings of Reports

Final Report on Landslide of October 2003

- This report into the cause of the peat slide found that there was a combination of contributory factors, including a zone of weak peat, a natural drainage channel and that activity associated with the windfarm construction resulted in the failure of the peat.

Final Report on Derrybrien Windfarm Post-Landslide Site Appraisal

- To ensure the safe completion of the construction at the Derrybrien Windfarm current construction work practices must be revised. Provided that the recommendations are satisfactorily implemented it is considered that the construction of the Derrybrien Windfarm can be completed safely.

Key Recommendations

- The report recommends that no concentrated loads, such as excavated material from turbine foundation excavations, shall be placed on marginally stable ground. Concentrated water flow onto the peat slopes and unstable excavations are to be avoided.

- During construction there should be suitably qualified and experienced geotechnical presence on site on a full time basis.

- Ongoing ground investigation work should continue with regular monitoring of specialist movement detection equipment, site roads and other works.

- Modified construction work practices which do not adversely affect existing stability, are to be adopted.

- A robust drainage plan is to be developed and implemented.

- Periodic inspection of the site following completion of works by suitably experienced and qualified geotechnical personnel during the life time of the site.

Paul Jennings 04.02.04

Dr Paul Jennings, Director for AGEC

Final Report on Landslide of October 2003

DERRYBRIEN WINDFARM

FINAL REPORT ON LANDSLIDE OF OCTOBER 2003

1 INTRODUCTION

Applied Ground Engineering Consultants Ltd. (AGEC) was engaged on 17 October 2003 by Electricity Supply Board International (ESBI) to undertake a site inspection of a failure at the site of the Derrybrien Windfarm Project, County Galway.

The Derrybrien Windfarm Project is located on Cashlaundrumlahan Mountain in the Slieve Aughty mountains some 11km south of Loughrea town in County Galway. The wind farm comprises some 71 proposed wind turbines and associated access roads. Construction of bases for wind turbines and associated access roads were ceased following a landslide on 16 October 2003.

The wind farm is located on the upper slopes of the mountain. The upper slopes form a gently sloping plateau with a summit elevation of 365 mAOD. The ground conditions comprise an area of peatland covered by forestry plantation.

The site inspection was requested in order to provide an opinion on the cause(s) of the failure based on a walkover site inspection of the failure.

The site inspection was undertaken on 18 October 2003 and follow-up inspection of the site during the following week by AGEC staff and included the following main elements:

(1) Visual appraisal of the failure from a walkover along the perimeter and, to a limited extent, within the failed area,

(2) Survey measurements using a global positioning system (GPS) of the extent of the failure site,

(3) Measurement of in situ undrained shear strength of the failed material at the head of the failure using a hand-held shear vane,

(4) Visual appraisal of adjacent turbine sites, and

(5) Review of eyewitness accounts and construction records.

2 FINDINGS OF SITE INSPECTION

2.1 Time of Failure

The failure was reported to have occurred at about 16:00 hours on Thursday 16 October 2003 immediately south of the location for turbine T68. The reported weather at the time of failure was fine, with no rainfall recorded.

2.2 Failure Site

The failure was located on the southern slopes of Cashlaundrumlahan Mountain (Figure 1). The head of the failure, at an elevation of about 350m AOD, was located within the site boundary of the wind farm. The toe of the failure, at an elevation of about 195m AOD on 19 October 2003, was located immediately upslope of a minor rural road.

The head of the failure, as defined by a tension crack, was located a few metres downslope of excavation work for turbine base T68 and coincident with the upslope edge of a site access road. The site access road was constructed using locally won aggregate as a floating road supported by geotextile and an underlay of brushwood and felled trees. The road was up to 1.5m thick in the centre of the failure scar.

About 300m downslope the failure scar crossed the southern boundary access road of the windfarm. At this location a drainage channel was being constructed perpendicular to the slope on the day the landslide was reported.

Measurements along the upper failure scar show slope angles between about 3˚ and 5˚. At the head of the failure the slope angle is about 5˚.

The failure was in a natural drainage line within a shallow valley, which in the upper slope is aligned in a south-easterly direction. Downslope the drainage line becomes more distinct and comprises a narrow, 10 to 15m wide, steep-sided incised channel. Where the narrow channel starts the drainage line turns and flows in a more easterly direction.

The dimensions of the failure scar are about 45m wide at the head widening to a maximum of about 270m some 750m downslope. The approximate length of the failure was recorded on 18 October 2003 as 2450m.

2.3 Ground Conditions

The failure occurred in peat which overlies mineral soil. There were few exposures of mineral soil within the failure scar. The thickness of peat at the head of the failure scar was about 2m. Limited probing of peat along the perimeter of the scar indicated peat thickness generally reduced downslope to about 1.5m.

The basal shear surface of the failure was visible in part during the walkover. The failure surface was within peat, some 200 to 400mm above mineral soil. Failure surface was very soft brown amorphous peat with recognisable plant structure. An estimate of the degree of humification within the failure zone is H_6 to H_8 (Ref: *Hobbs, N. B. (1986).*

Mire morphology and the properties and behaviour of some British and foreign peats. Quarterly Journal of Engineering Geology, London, 1986, vol. 19, pp. 7-80).

2.4 Failure Type and Volume

The initial failure was a translational peat slide. Inspection of the failure scar identified the following (Figure 1).

(1) Upper failure. Area of failed peat that moved downslope as a translational slide. Basal failure surface appeared to be within the lower part of the peat layer, typically 200 to 400mm above mineral soil. The failed ground appeared to detach itself from intact ground as distinct peat rafts. Detachment occurred along forestry plough/drainage channels. Following initial movement, breakdown of peat rafts led to flow-type movement of peat.

(2) Debris track. Failure debris entered the lower part of the natural drainage line, which is a narrow steep-sided channel, and moved downstream as a debris flow. It is likely that the channel is on or close to bedrock. Any water concentrated within the channel would have further saturated the debris increasing its mobility.

(3) Deposition area. In the lower reaches of the channel, elevation of about 210 m AOD, the channel becomes more open and slope inclination is about 2˚. Failure debris was deposited at this location as lobes of material within the drainage line with several lobes having over-topped the channel.

The failed ground appears to comprise the upper part of the failure only. Within the debris track there appears to be little failure of the ground. The likely failure volume based on the extent of the upper failure is estimated as 450,000 m^3.

Preliminary estimates suggest that about 50 to 70% of the debris was removed from the upper failure area.

2.5 Other Recent Failures and Ground Movements

As part of a wider-scale walkover inspection of the wind farm site several areas of recent failures and ground movements were identified. These recent failures and ground movements are associated with construction activity.

(1) Site of turbine base T17. This base was immediately west of T68 base, some 230m distance apart. Following placement of arisings from excavation for the turbine base, a failure of in situ peat underlying arisings occurred. Arisings would have comprised peat and some till/weathered rock material. Failure scar was about 140m long by 22m wide with a depth estimated at 0.7 to 1.5m. The upper 85m of the scar comprised failure of underlying in situ peat along a shear surface located at the base of the in situ peat some 200mm to 500mm above mineral soil. The lower 50m of the scar comprised deposition of failure debris.

This failure volume is estimated as 2000 m^3. The failure was reported to have occurred on 2 October 2003.

(2) Site of turbine base T66. This base was located upslope from T68. To the south (downslope) of the base there was failure of underlying in situ peat below arisings from base excavation. Arisings comprised both peat and till. The arisings had slumped and there was subsidence in the road indicating movement of underlying in situ peat. Failure of in situ peat comprised heaving of up to 0.8m height together with cracking and distortion of in situ peat that extended several metres downslope of the arisings.

Ponding of water within arisings and the mobility of the arisings suggest that over-pumping from the excavation into the arisings area had taken place.

(3) Site of turbine T29. This base was located some 800m to the east of T68. To the south of the base there was failure of underlying in situ peat below arisings from base excavation. Arisings comprised both peat and till. The arisings had slumped. Failure of in situ peat comprised heaving of up to 1.5m height together with cracking and distortion of in situ peat that extended some 8m downslope of the arisings.

3 POSSIBLE CONTRIBUTORY FACTORS

The following factors are likely to have contributed to the failure of 16 October 2003.

(1) Natural drainage line. The failure occurred within a shallow valley, and where there would likely be a concentration of both surface and sub-surface water flow. Peat slides have previously been recorded within natural drainage lines.

(2) Zone of weaker peat. In situ strength testing suggests a zone of weaker peat is present within the centre of the drainage line.

(3) Placement of access track. An access track is located at the head of the failure. The additional load due to this floating track would have contributed to an increase in applied load.

(4) Placement of arisings on slope. Arisings from excavation of turbine base T68 were placed at the head of the failure. The additional load due to the arisings would have contributed to an increase in applied load.

(5) Water-filled excavation. Excavation for the base of turbine T68 was underway at the time failure was reported. This excavation, which was taken to mineral soil, has several drains feeding into it, and appeared to have been water-filled. Possible sub-surface transmission of water along the base of the peat would have lead to a build-up of water pressure at the base of the peat reducing effective stresses.

(6) Drainage works downslope. Construction records indicate that drainage works were underway on the southern boundary access road, some 300m downslope of T68. The drainage works included severing of the floating road at this location in order to install a drainage pipe. There is a possibility that the excavation locally removed lateral support in an area of wet peat. The need to construct the drain also indicates that the peat was wet.

(7) Previous instability. All direct evidence of previous instability or incipient instability within the drainage line would have been destroyed during the failure of 16 October 2003. Knee-bends on some trees are orientated into the drainage line suggesting possible creep movements within the drainage line. Creep movement over time may have reduced shear resistance within the peat.

(8) Forestry plough/drain channels. Existing plough/drain channels within the forestry dissected the vegetative upper layers of the peat creating lines of potential surface weakness. Once failure was initiated peat rafts generally detached themselves from intact material along existing plough/drain channels.

Other factors considered were over-pumping on to the downslope. Site representatives have indicated that they are unaware of any over-pumping at this location.

4 FAILURE MECHANISM

Whilst failure was initially reported to have occurred immediately south of the location for turbine T68 it is not possible to say with certainty that failure was initiated at this point. However, given the circumstantial evidence of failure occurring at the time of construction for base of turbine T68, this strongly indicates that construction activity was the most likely trigger. Initial failure possibly occurred within the vicinity of the site for turbine T68.

Evidence of recent failure at turbine base T17 and ground movements resulting in failure of in situ peat at other turbine bases, all as a result of construction activity, further suggests that construction activity likely initiated of the 16 October 2003 failure. In addition, the evidence from base T17 demonstrates that larger-scale failure can be initiated by loading at the head of the failure.

Considering the above, the possible failure mechanism was localised failure of peat in the vicinity and downslope of the site of turbine T68. The additional load from the access track, which was floated on the peat, and arisings together with localised zone of weaker peat and increase in water pressure at the base of the peat due to water-filled excavation could have resulted in localised reduction in shear resistance at the base of the in situ peat layer.

The localised reduction in shear resistance increased the downslope load on the adjacent in situ peat downslope resulting in the onset of progressive failure. It is likely that failure was concentrated in the centre of the shallow valley, and as material failed and moved downslope this removed toe support from both material upslope and laterally. Widening of the failure appeared to be controlled by the topographic width of the shallow valley. A significant body of peat was set in motion.

The role of the drainage works on the southern boundary access road is uncertain. Though local removal of lateral support in an area of wet peat would have contributed to instability.

Following initial movement, peat rafts disaggregated and flow-type movement occurred. Failure debris entered the lower part of the natural drainage line, which is a narrow steep-sided channel, and moved downstream as a debris flow.

5 CONCLUSIONS

The following conclusions are based on site inspection of the failure.

(1) A failure occurred on the southern slopes of Cashlaundrumlahan Mountain. The failure is some 2.45 km in length. The head of the failure was located within the site boundary of Derrybrien Windfarm and the debris from the failure extended to immediately upslope of a minor rural road (the 'Black Road') outside of the Derrybrien Windfarm Project site boundary.

(2) The failure was located within a natural shallow valley. The upper part of the shallow valley failed as a translational slide of peat. Basal failure surface appeared to be within the lower part of the peat layer, typically 200 to 400mm above mineral soil.

(3) The likely failure volume based on the extent of the upper failure is estimated as 450,000 m3. Estimates suggest that possibly 50 to 70% of the failed material has moved from the upper failure area.

(4) Failure was initially reported as occurring immediately downslope of location for turbine T68 at the same time that construction of turbine T68 base was underway. Given the circumstantial evidence of failure occurring at the time of construction for turbine base T68 and drainage works downslope, this strongly indicates that construction activity was the likely trigger.

(5) The evidence of recent 2000 m3 failure of peat at nearby turbine base T17 and ground movements resulting in failure of in situ peat at other turbine bases, all as a result of construction activity, demonstrates that construction activity is initiating ground failure. This further supports the role of construction activity triggering the 16 October 2003 failure.

(6) The construction work practices adopted on site to date have resulted in localised failure of the underlying in situ peat.

(7) It is considered that construction activity within the head of a shallow valley, an area of poorer ground, triggered a localised failure of the underlying in situ peat. The localised failure initiated progressive failure of the in situ peat resulting in a runaway failure.

Final Report on Post-Landslide Site Appraisal

FINAL REPORT ON
DERRYBRIEN WINDFARM
POST-LANDSLIDE SITE APPRAISAL

Prepared for:

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1 INTRODUCTION

The Derrybrien Windfarm site is located on Cashlaundrumlahan Mountain in the Slieve Aughty Mountains some 11 km south of Loughrea town in County Galway (Figure 1). The windfarm comprises some 71 proposed wind turbines and associated access roads. Construction of bases for wind turbines and associated access roads were ceased following a landslide on 16 October 2003.

The developer for the windfarm is Hibernian Wind Power, with Electricity Supply Board International (ESBI) acting as agent for Hibernian Wind Power. Ascon Ltd (Design and Build Sub-contractor) are responsible for all civil design and construction works.

During construction of turbine base T68 a landslide was reported to have occurred at about 16:00 hours on Thursday 16 October 2003 immediately south of the location for turbine T68. The reported weather at the time of failure was fine, with no rainfall recorded.

Applied Ground Engineering Consultants Ltd (AGEC) was engaged on 17 October 2003 by ESBI to undertake the following:

(1) Walkover survey of the 16 October 2003 failure, in order to provide a preliminary opinion on the cause(s) of the failure,

(2) Walkover survey of the area of the Derrybrien Windfarm site in order to provide an assessment of the potential for further failure,

(3) Associated ground investigation of the Derrybrien Windfarm site comprising in situ shear vane, cone penetration testing and resistivity survey, and

(4) Assessment of the stability of the site based on the findings from walkover survey and the ground investigation data,

This report presents the assessment of the stability of the site.

2 SITE DESCRIPTION

2.1 General

For the purpose of the report the site was divided into the following areas, referred to as cells (Figure 2).

(1) 200m by 200m cells. These provide an assessment of the entire site. Cells are typically 200m by 200m in area and centred on the proposed/constructed turbine bases. These cells cover the entire site and are referenced following the turbine reference, that is T1, T2, T3 and so on. Slope instability within these cells would represent potential large-scale failure.

(2) 50m wide cells. These provide an assessment of the ground in close proximity to individual turbines where construction work will be concentrated. Cells are centred on the proposed/constructed turbine bases. These cells are similarly referenced following the turbine reference, that is t1, t2, t3 and so on. Slope instability within these cells would represent localised failure which could lead to potential large-scale failure.

The survey area comprised blanket peat underlain by mineral soil or bedrock. Mineral soil comprised weathered rock or thin depth of glacial till.

2.2 Topography

The Derrybrien Windfarm Project is located on Cashlaundrumlahan Mountain. The wind farm is located on the upper slopes of the mountain. The upper slopes form a gently sloping plateau aligned on a northeast to southwest axis with a summit elevation of 365 mAOD (Figure 2).

The southern slope of the mountain is generally uniform with inclinations of typically between 3° and 5°. Locally, inclinations increase towards shallow valleys. The heads of several shallow valleys are present on the upper slope, where they generally represented by a subdued topographic depression in the landscape. These valleys become more distinct and confined downslope where the valleys form generally narrow steep-sided channels. Significant areas of the southern slope are covered in forestry.

The northern slope of the mountain is stepped in profile, with areas of relatively level benches separated by steeper scarp slopes. Slope inclinations on the benches vary from level to about 3°. Scarp slopes are typically 5° to locally 18° with the scarp generally running across the slope for several hundred metres before fading. Most of the northern slope is covered in forestry.

The upper northern slope, above about 320 mAOD, is drained by a few streams which originate from areas of wetter ground commonly found on the benches. Below about 320m AOD several small streams are present, many of these streams have been formalised within forestry drainage.

3 GEOMORPHOLOGY

3.1 General

The main geomorphological characteristics of the site are shown in Figure 3.

Previous small-scale failure was identified on the scarp slopes on the northern side of the survey area, see below. Within the site, based on visual inspection, no apparent signs of previous large-scale failure similar to the 16 October 2003 failure were identified.

A limited review of historical records indicates that peat failures have occurred in the Slieve Aughty Mountains in the past (Table 1). In general records show that peat failures have affected many upland peat areas in Ireland.

Year and Date of Incident	Description of Incident	Reference
1890, January 27	Bog above Ballinlough, County Galway. An area of 100 acres was covered with a foot of peat, the upper part of the bog subsiding 10 to 15 feet.	Pentland (1890)
1934, October	Slieve Aughty Mountains, County Clare. Bogburst following high antecedent rainfall	Mitchell (1935)

Table 1 Historical Recorded Peat Failures in Slieve Aughty Mountains

3.2 Previous Instability at the Windfarm Site

On some of the steeper scarp slopes found on the northern slopes there is irregular ground with discordant drainage. This likely represents naturally occurring localised instability or creep movement of overburden deposits on the steeper slope. This instability is local to the scarp, being less than 10m in downslope length, and could not be observed further downslope. Failures appeared shallow and involved peat. Failures are old and not active.

In addition, small arcuate scars are present at the crest of scarp slopes (for example in cell T49). These scars appear to represent the head of minor peat slides on the scarp slope. Depth probing within the scars showed peat thickness less than 1m, whereas outside the scar peat thickness was greater than 2m. The downslope extent of these peat slides appeared to be limited to the scarp slope. Failures are old and not active.

Possible minor rockfall has occurred from the steeper parts of the scarp slopes. Within cell T50 a small cliff line shows evidence of displaced blocks. It is unsure whether this displacement is as a result of natural rockfall or rockfall from abandoned quarry workings.

3.3 Recent Instability

Several areas of recent instability and ground movements were identified. All of these were associated with construction activity in relation to the Derrybrien Windfarm, and are presented in detail in Section 9.1.

Placing of arisings from base excavation onto the in situ peat surface has resulted in bearing failure in cells T23, T29 and T66. This bearing failure has resulted in upheaval and lateral movement of the underlying in situ peat.

Within cell T17 the placing of arisings from base excavation onto the in situ peat surface has resulted in failure of the underlying in situ peat, which in turn initiated a landslide that travelled some 140m downslope.

At several locations there has been local failure of recently excavated v-ditches, cells T14, T53 and T54.

Localised tension cracks are evident around several turbine base excavations. This is indicative of sidewall failure of the excavation.

4 SUPERFICIAL DEPOSITS

The superficial deposits within the survey area can be briefly classified into the following main types.

(1) Peat
(2) Glacial Till and Subsoil
(3) Weathered Rock

In general, all superficial deposit types other than peat may be referred to as mineral soil. Exposures below the base of the peat are limited to recent excavations such as on-site borrow areas, base excavations and some ditches. Exposures suggest that there is a minimal thickness of till and weathered rock on the upper slopes.

4.1 Peat

Blanket peat covers most of the slopes. In certain areas peat is thin, such as on the scarp slopes. Examination of peat exposures in failure (cell T68) showed humification at the base of the peat varied between about H_6 and H_8 (Hobbs, 1986).

Based on a general soil map of Ireland (An Foras Taluntais, 1980), the site is covered in high-level blanket peat. The thickness of peat, based on ground investigation for the windfarm (Malone O'Regan McGillicuddy, 2002), ranged from typically 1 to 4m. There is no clear pattern of peat thickness, though locally thicker peat was recorded in the upper part of the site where slope angles are less.

The upper about 1m of peat is generally very fibrous and possibly desiccated which results in a relatively stronger and stiffer upper layer. The base of the peat, from observations within the failure, was described using BS:5930 (BSI, 1999) as very soft brown amorphous PEAT with recognisable plant structure. Peat appeared to lay directly on bedrock or a thin layer of weathered rock/ glacial till.

4.2 Glacial Till and Subsoil

Peat is underlain by till or slightly silty sandy subsoil. The subsoil is likely derived from weathered rock. Generally in exposures both till and subsoil layer were present below peat and above weathered rock/rockhead.

Till, typically derived from sandstone overlies bedrock in some areas. Commonly the thickness of till varies from less than 0.5m to greater than 1m. Exposures of till suggest a thinning of the till to the east. Till was described using BS:5930 as generally firm to soft to firm sandy slightly gravelly SILT/CLAY with occasional sub-angular to rounded cobbles and boulders of sandstone.

Subsoil thickness is typically 0.3 to less than 1m. Subsoil was described using BS:5930 as generally medium dense grey slightly silty fine SAND with occasional sandstone and quartz gravel

4.3 Weathered Rock

Weathered rock comprises generally a highly decomposed layer above a more competent rock. The subsoil possibly represents a weathered rock layer (residual soil).

5 SOLID BEDROCK GEOLOGY

The bedrock geology of the area of the windfarm consists of rocks of the Devonian Old Red Sandstone Series.

Across the area there are localised variations ranging from medium grained pale brown thinly to massively bedded sandstones in the central, northern, southern and eastern areas, fine grained pale pink thinly to medium bedded silty sandstones in the central, southern and western areas, and medium bedded conglomerates inter-bedded with sandstones in the northern areas.

The bedding is horizontal to sub-horizontal with the more competent beds forming scarp slopes, which are most notable on the northern slope where the rock is occasionally exposed. The scarp slopes range in height from 2 to 5m. Gently sloping to flat benches are located between the scarps. Scarps and benches are also present on the southern slope although the scarps are less pronounced and exposed rock is rare.

6 WATERCOURSES AND GROUNDWATER

6.1 Watercourses

A number of natural minor streams drain the upper slope. In most cases, these streams originate in shallow topographic depressions on the upper slope where surface water concentrates, typically within the relatively flat bench areas. Some benches have a back-fall which promotes ponding of surface water. Bog holes, partly obscured by localised areas of floating vegetation over water-filled holes, are present on some benches.

Streams on the upper slopes are typically narrow gullies ranging in width from less than a metre to a few metres. Stream valleys in the upper slope are ill-defined, and where present form shallow valley features. Further downslope many streams are formalised into forestry drainage.

The location of watercourses is considered important, as failures are known to occur particularly in the heads of valleys.

6.2 Groundwater

Several springs have been identified on site, particularly within scarp slopes on the northern slope. Groundwater at these springs is transmitted through the open joint network of the underlying bedrock.

7 GROUND INVESTIGATION

7.1 Fieldwork

The following ground investigation has been carried out to assess the stability of the site.

(1) In situ shear vane testing using both hand-held and rig-mounted mechanical vanes,
(2) Cone penetration testing (CPT),
(3) Resistivity survey, and
(4) Driven-in piezometers.

Fugro Ltd using a 3 tonne mini crawler mounted rig carried out shear vane testing using a mechanical Geonor H-10, 55mm diameter vane.

Hand-held shear vanes were generally carried out by AGEC in open excavations using a Geonor H-60, 25.4mm diameter vane.

CPT was abandoned during the early stages of the investigation due to a breakdown, possibly water affecting electronics. Furthermore, CPT results carried out prior to breakdown could not be correlated with actual ground conditions and results are considered unreliable.

Resistivity survey was carried out by APEX Ltd. using a Wenner resistivity array. The 2D-resistivity profiling method records a large number of resistivity readings in order to map lateral and vertical changes in ground material types. The purpose of the resistivity surveys was to principally locate the base of the peat and rockhead.

Driven-in stand-pipes were installed at 10 locations by AGL Consulting Engineers on behalf of Ascon Ltd. The standpipes comprised 19mm internal diameter PVC tubing with a 300mm perforated push-in tip with ceramic inner porous filter. The standpipes were inserted by initially pre-forming a hole to about 1m and gently pushing in the standpipe to the bottom of the peat.

7.2 Laboratory Testing

Previous experience of laboratory strength testing for peat using a range of triaxial, simple and direct simple shear testing apparatus has shown that results can be scattered and difficult to interpret. This is due to the excessive deformations that peat undergoes and the difficulty in defining the resulting failure limit.

In situ strength testing is considered to provide the most realistic indication of peat strength. To support in situ test results observations of areas of failed ground in peat were recorded. These areas of failed ground were back-analysed to determine the likely operating shear strength of peat.

8 WALKOVER SURVEY

The purpose of the walkover survey was to provide a visual assessment of the site. The survey was carried out using the 200m by 200m cells. The following details were recorded for each cell.

(1) Presence of valley or drainage line
(2) Peat thickness
(3) Slope form
(4) Slope angle measured using Abney level (accuracy to nearest 0.5˚)
(5) Previous failure – present prior to construction of windfarm
(6) Recent failure - associated with construction of windfarm

Other factors were also recorded based on a cell-by-cell basis, such as slope form, presence of springs, deformed and distressed ground, saturation of ground. Due to the dense forest cover present over much of the site most of the observations were taken in clearings, such as at the turbine base, along access roads or in forestry firebreaks.

Inspection findings for each cell based on the walkover survey are given on geotechnical mapping sheets in Appendix A.

9 FINDINGS OF WALKOVER SURVEY

9.1 Recent Landslides and Ground Movements

Several areas of recent failures and ground movements were identified. These recent failures and ground movements are related to construction activity associated with Derrybrien Windfarm. The 16 October 2003 failure in cell T68 has been reported separately.

At a number of locations there are bearing failures below placed arisings, squeezing-in of recently excavated v-ditches and localised tension cracks around several turbine base excavations. These types of localised instability would not be uncommon in construction within peat areas.

(1) Cell T17. At the site of turbine base T17. This base was immediately west of T68 base, some 230m distance. Following placement of arisings from excavation for the turbine base, a failure of in situ peat underlying arisings occurred. Arisings would have comprised peat and some till/weathered rock material. Failure scar was about 140m long by 22m wide with a depth estimated at 0.7 to 1.5m. The upper 85m of the scar comprised failure of underlying in situ peat along a shear surface located within the base of in situ peat some 200mm to 500mm above mineral soil. The lower 55m of the scar comprised deposition of failure debris.

This failure volume was estimated as 2000 m^3. The failure was reported to have occurred on 2 October 2003 during excavation for the turbine base.

Inspection at the toe of the failure showed peat thickness of about 1.5 to 1.8m, which reduced downslope to about 1 to 1.5m. Inspection of the deposition lobes indicated that there is little/no failure of underlying in situ peat. It is likely that the in situ thinner peat downslope was more competent than peat upslope, and therefore did not fail.

Assessment of slope angles indicated that slope angles reduce downslope, from about 4˚ at the head of the failure to about 2˚ below the toe of the failure.

(2) Cell T23. On the southern limit of arisings, which are from the base excavation for turbine T23, there is heaving of the underlying in situ peat. This heaving likely represents a bearing failure of the founding peat. The heave is localised to the edge of the arisings.

Probing of in situ peat around the heaved area showed peat depths typically less than 1.5m deep. Beyond the area of heave there were no signs of distress.

(3) Cell T29. Site of turbine base T29 located some 800m to the east of base T68. To the south of base T29 there was failure of underlying in situ peat below arisings from base excavation. Arisings comprised both peat and till. The arisings had slumped. Failure of in situ peat comprised heaving of up to 1.5m height together with cracking and distortion of in situ peat on the downslope limit of the arisings.

(4) Cell T66. Site of turbine base T66 located upslope from base T68. To the south (downslope) of the base there was failure of underlying in situ peat below arisings from base excavation. Arisings comprised both peat and till. The arisings had slumped and there was a depression in the road indicating movement of underlying in situ peat. Failure of in situ peat comprised heaving of up to 0.8m height together with cracking and distortion of in situ peat that extended several metres downslope of the arisings.

Ponding of water within arisings and the mobility of the arisings suggest that over-pumping from the excavation into the arisings area may have taken place.

At several locations there has been local failure of recently excavated v-ditches in cells T14, T53 and T54. Failure of these ditches, which are typically 1.5m deep, comprises squeezing-in of the sidewalls. This represents areas of weaker peat. Most ditches show no signs of sidewall instability.

A number of excavations for the turbine bases show signs of localised tension cracking, bulging of the excavated faces and slumping of peat into the base excavation.

9.2 Site Drainage

A notable number of the excavated turbine bases were water-filled. In many of these cases, there was no apparent outlet drainage path from the excavations.

To avoid possible build-up of water within excavations and subsequent uncontrolled release of water appropriate drainage paths should be constructed from each excavation. From inspection it appeared that most excavations were dewatered by over-pumping. It was not clear whether the over-pumped water was fed into a formalised drainage network.

From inspection it was not apparent whether a formalised drainage network existed on the site.

All release of water should be into a formalised drainage path which should form part site-wide drainage network. This drainage network should be in place to receive water during both temporary works, such as for de-watering, and permanent works condition.

10 ASSESSMENT OF STABILITY

10.1 General

Initial reporting by AGEC of the likelihood of failure within cells was based on a qualitative risk assessment using the factors obtained from walkover survey. This was supported by a deterministic analysis of the likely stability using infinite slope analysis with assumed parameters.

This report has assessed the stability of the site using infinite slope analysis to calculate the factor of safety for each cell using parameters determined from the ground investigation.

10.2 Factor of Safety

The code of practice for earthworks BS 6031:1981 (BSI, 1981), an internationally recognised standard provides advice on design of both temporary and permanent earthworks. It states that for a first time failure with a good standard of site investigation the design factor of safety (FoS) of should be 1.3 to 1.4. A FoS less than 1.0 indicates an unstable slope; FoS greater than 1.0 indicates a stable slope.

For this report, a minimum FoS of 1.4 for peat stability is required.

The FoS is a measure of ground resistance available compared to disturbing forces, such as weight of ground, water and construction loading. Where ground resistance is equal to the disturbing forces then the FoS is unity, and the ground would be considered to be on the point of failing. An acceptable level of stability is where FoS is 1.3 to 1.4, that is there is in effect a 30 to 40% 'reserve' of ground resistance over and above the disturbing forces.

Ground resistance is provided by the shear strength of the ground along an assumed failure surface.

10.3 Stability Analysis

Stability analysis was carried out to determine the FoS of the existing natural peat slopes. The analysis was carried out taking into account the following observations from failures identified from the walkover survey, namely.

(1) Failures at T17 and T68 indicate a translational sliding failure within the peat.
(2) Basal sliding surface is within the lower part of the peat layer.
(3) Failures appear to be the result of undrained loading as evident by bearing failures under arisings during construction (T23, T29 and T66). Bearing failures would be initiated as non-circular shear failure.

Stability was assessed using infinite slope analysis (Skempton and DeLory, 1957) which was verified by more rigorous stability techniques in Talren computer program (Terrasol, 1997). The infinite slope analysis is suited to long downslope lengths where the mode of failure is by translational sliding, which is the mode of failure within the natural peat

slopes based on failures recorded in cells T17 and T68. The analysis is applied to each cell in the site.

This analysis is conservative as it ignores passive resistance at the toe of a potential sliding failure. This is not as critical for long downslope lengths as used in the 200m by 200m cells. However for shorter downslope lengths, such as the 50m cells the passive resistance becomes more significant, and the calculated FoS is underestimated.

Stability was analysed using total stress condition, which applies to short-term conditions occurring during construction and for a time following construction until construction induced pore water pressures dissipate. Undrained shear strength values (c_u) for peat are used for total stress analysis.

The factor of safety (FoS) against sliding from the infinite slope analysis for total stress was determined using the following parameters:

c_u: undrained shear strength.
z: depth of sliding layer.
β: slope angle on base of sliding
γ: bulk unit weight.

The following assumptions were used in the analysis of stability of natural peat slopes.

(1) Peat strength, depth, and inclination of base of peat were determined for each cell, that is 200m by 200m cells and 50m cells.
(2) c_u was determined using a cautious estimate based on results from vanes supported by back-analysed c_u where appropriate. The lowest recorded c_u in the cell was used.
(3) The depth of sliding layer (z) was assumed as the base of the peat layer derived from probe results.
(4) Slope angle on base of sliding (β) is basal surface of peat which is assumed to be parallel to ground surface.

10.4 Stability Load Cases

Analysis was carried out using the following load cases.

(1) Existing FoS of peat slopes where there is no loading of the peat slope, and
(2) FoS where peat slopes are subjected to construction loading of 10kPa (BSI, 1994). This is equivalent to 1.0m of peat arisings.

Case (1) provides an indication of the existing FoS prior to any construction activity. Case (2) is a cautious assessment of the likely short-term reduction in FoS following typical loading that may be experienced during construction.

Following placement of load there will be a reduction in FoS, though over the long-term as pore water pressure dissipates there will be consolidation of the underlying in situ peat. Consolidation of the peat will result in strength gain and increase in FoS.

The critical condition for peat stability for the undrained case is immediately following application of load.

10.5 Peat Parameters for Stability Analysis

10.5.1 Undrained Strength c_u

Undrained shear strength (c_u) of in situ peat was determined for each cell using a cautious estimate of c_u, which in all cells was the lowest recorded value. The following sources were used to assess c_u for peat:

(1) In situ vane testing using both hand-held and mechanical,
(2) Back-analyses of sidewall collapse of v-ditches and excavations, and
(3) Back-analyses of bearing failure under arisings.

The lowest c_u value derived from any of the above sources was used in the analysis. In general, from sources (2) and (3) the lowest calculated value was 4kPa. A value of 4kPa was also the lowest value obtained from a series of laboratory testing carried out by AGL Consulting Engineers on behalf of Ascon Ltd.

In Situ Vane Testing using Both Hand-held and Mechanical Vane

In situ vane test results for each cell are included in Appendix B. Results indicate that strength ranged from $c_{u\ vane}$ of 2.8 to 25kPa (Figure 4).

$c_{u\ vane}$ results for peat depths greater than 0.7m only (Figure 4) show a lower mean value. These results exclude the near-surface more fibrous and less humified layer, this near-surface layer has a higher undrained shear strength.

Altogether over 250 number shear vane tests were carried out across the site.

Vane results have not been factored, which is similar to other work on Irish peat (see for example Hanrahan, 1964, Piggott et al., 1992) and previous experience of blanket peat in the west of Ireland (AGEC, 2003). In these cases back-analysed failures were shown to compare directly to undrained peat strength measured directly from vane testing.

The rate of strain during testing was in accordance with the manufacturer's instruction.

Back-analyses of Sidewall Collapse of V-ditches and Excavations

Recently excavated v-ditches within the site were inspected for signs of sidewall collapse. Sidewall squeezing-in of v-ditches was limited to a few locations within cells T14, T53 and T54. The height of the sidewall at failure was measured. Back-analysed $c_{u\ back}$ was estimated using standard equation for collapse of excavation sidewalls (see Simon, Menzies and Matthews, 2001) with the following parameters:

H: height of vertical sidewall at failure.
γ: bulk unit weight of peat, taken as 10kN/m^3

The results are indicative only as the squeezing-in of the sidewall did not result in any apparent development of a shear surface and the effect, if any, of the upper stronger peat layer was not considered. Results indicate a $c_{u\ back}$ of about 4kPa at the locations of v-ditch sidewall collapse.

At several of the excavations for the turbine bases where there are steep excavation sidewalls there has been instability. This is usually indicated by tension cracking or in some cases slumping of material. Back-analyses of these failures using slip circle analysis and assuming a stronger upper peat layer underlain by a weaker layer were carried out using typical side-wall geometry (Appendix C).

Indicative results show $c_{u\ back}$ of about 4kPa for the lower weaker layer where the upper stronger layer is intact. Where the upper layer is cracked, the lower weaker layer alone resists the load, and in this case $c_{u\ back}$ for the lower peat layer is 5.5kPa.

Back-analyses of Bearing Failure Under Arisings

Back-analysis of bearing failures in cells T23, T29 and T66 was carried out using bearing capacity equation (Prandtl, 1920) and assumed likely pre-failure conditions. For the analysis it is assumed that the upper stronger layer has been disturbed and has a similar strength to the underlying layer. Results indicate a $c_{u\ back}$ of about 4kPa for peat at the site of bearing failure.

10.5.2 Depth of Peat Layer

Depth of peat was determined from probe results (Malone O'Regan McGillicuddy, 2002) and the results of vane testing and probing during the recent investigation. Altogether about 650 probes were used to assess depth of peat throughout the site. Resistivity results showed the depth to the base of rockhead, and did not distinguish between base of peat and underlying mineral soil. The pattern of results obtained from probing and geophysics were compared and found to be similar.

Range of peat depth varies from 0.4m to 5.5m throughout site (Figure 6) with an average of about 2.5m. During depth probing an assessment was made of whether mineral soil or rock was present below peat. Results show about 24% of probes indicated rock below peat and 59% of the probes indicated mineral soil below peat. 17% of probes gave no indication of material below peat.

For 200m by 200m cells the average peat depth across the cell was used. This provides a reasonable estimate of the depth of a potential large-scale failure plane which is assumed to be coincidental to the base of the peat.

For 50m cells the deepest recorded peat depth is used, as over the shorter cell distance the deeper peat may be more influential in initiating potential failure. The deepest peat depth was determined by drawing a cross-section through the cell using probe results.

10.5.3 Slope Angle on Base of Sliding

Slope angles were recorded using an Abney level that can be read to the nearest 0.5˚. Slope angle measurements were carried out over about 30 to 50m lengths measured in the direction of the greatest downslope gradient. Several measurements were taken throughout the cell to assess the range of slope angles. To verify the assumption that the base of peat was parallel with peat surface a comparison was carried out using cross-sections drawn through cells. Cells where peat thickens notably downslope in 50m cells that FoS is reduced are shown in Figures 10 and 11.

Localised steeper scarp slopes that are mostly found on the northern slopes were excluded from slope angle assessment. These localised steeper slopes, where peat thickness is thinner being typically 0.5 to 1.5m, are considered separately (see Recommendations).

The range of recorded slope angles is shown in Figure 7. Typically slope angles were between 2 and 4˚, with a mean value of about 3.2˚.

10.5.4 Bulk Unit Weight

Based on review of previous testing in peat and experience, unit weight for peat is assumed as 10kN/m^3. This reflects the very high moisture content of the peat mass.

10.6 Results of Stability Analysis

10.6.1 200m by 200m Cells

The results of the stability analysis are shown on Figures 8 and 9 for load condition (1) and (2) respectively. These show the FoS for each 200m x 200m cell. Tabulated results are given in Appendix D.

The lowest recorded c_u within each cell was used for analysis. Where peat c_u values were not available the cells are shown hashed (Figures 8 and 9) and a lower bound c_u of 4kPa was assumed. Where cells showed signs of instability such as sidewall collapse of v-ditches and excavations, or bearing failure then a lower bound c_u of 4kPa was also assumed unless a lower strength was recorded.

The following excludes the cells affected by previous sliding failure (T17, T68 and T70), which are assumed to have FoS of unity under loading condition (2).

The FoS for loading condition (1) shows all cells have a FoS greater than 1.4, except for the following 4 cells, namely T2, T5, T34 and T69 which have FoS of 1.19, 1.38, 1.10 and 0.97 respectively (Figure 8).

Under loading condition (2), there are a total of 5 cells with FoS less than 1.4. These are the 4 cells named above (T2, T5, T34 and T69) plus cell T18 with FoS of 1.21 (Figure 9).

10.6.2 50m Cells

The results of the stability analysis are shown on Figures 10 and 11 for load condition (1) and (2) respectively. These show the FoS for each cell. Tabulated results are given in Appendix D.

The lowest recorded c_u within each cell was used for analysis. Where peat c_u values were not available the cells are shown hashed (Figures 10 and 11) and a lower bound c_u of 4kPa was assumed. Where cells showed signs of instability such as sidewall collapse of v-ditches and excavations, or bearing failure then a lower bound c_u of 4kPa was also assumed unless a lower strength was recorded.

The following excludes the cells affected by previous sliding failure (T17, T68 and T70), which are assumed to have FoS of unity under loading condition (2).

Turbine bases are assumed to be located a minimum distance of 25m from localised steep scarp slopes. There are no bases constructed to date within 25m of a scarp slope. Where bases yet to be constructed are proposed to be located within 25m of scarp slopes these are to be moved; this affects some bases on the northern slopes (see Recommendations).

The following excludes the cells affected by previous sliding failure (t17, t68 and t70), which are assumed to have FoS of unity under loading condition (2) base on 200m by 200m cell analysis.

The FoS for loading condition (1) shows all cells have a FoS greater than 1.4, except for the following 4 cells, namely t2, t34, t51 and t69 which have FoS of 1.10, 0.96, 1.37, 0.83 respectively.

It is recognised that the low FoS's in cell t69 is unrealistically low, as this indicates that the slope should have already failed. The analysis does not consider passive resistance at the toe of a potential slide failure, and therefore the FoS is underestimated. Nevertheless the result indicates that there is a potentially adverse stability condition in the cell.

Under loading condition (2), there are 8 cells with FoS less than 1.4. These are the 4 cells named above (t2, t34, t51 and t69) plus cells t18, t47, t66 and t71 where the FoS is 1.10, 1.21, 1.15 and 1.21 respectively.

A comparison of FoS results between 200m by 200m and 50m cells under loading condition (2) is shown in Figure 12.

10.7 Sensitivity Analysis

A sensitivity analysis has been carried out to assess the effect of the presence of a continuous zone of weak peat at depth. Evidence from the 16 October 2003 failure scar showed that the basal shear surface was located about 200 to 400mm above the peat/mineral soil interface. Vane testing in the head of the failure indicated shear strength in the peat at depth of less than 4kPa. The strength results are possibly affected by remoulding of the underlying peat due to ground movement. Whilst the above does not indicate the presence of a weak zone, the possibility of a continuous weak zone at depth in the peat has been assessed.

An assessment of vane test results in peat with depth was carried out to determine whether a weaker zone was present at depth. Figure 13 shows the depths of the measured vane shear strength relative to the depth of the peat/mineral soil interface (also see Appendix E). It can be seen that the investigation has not identified any widespread zone of weaker peat (strength less than 4kPa) near this interface. However, in some areas shear vane tests were not near the interface, and the presence of a weak zone cannot be precluded on a site covering such a large area. The consequence of such a weak zone would be a reduction in the FoS within the cell in question.

A sensitivity analysis was carried out on 50m cells to examine the effect of a hypothetical weak zone at depth in peat. For this purpose, the lowest recorded shear strength of 2.8kPa in peat from cell T34 was used assuming a basal shear plane at the base of the peat.

The results show a notable number of cells with hypothetical FoS below unity (Figure 14 and Appendix D). Site inspection of these cells showed no apparent signs of the onset of peat sliding. Furthermore, in a number of cells with low FoS, turbine bases and roads have already been constructed. The above indicates that the selected shear strength is unrealistically low for the analysis adopted. The analyses are seen therefore to be conservative.

Nevertheless as a precautionary measure further testing of peat strength at depth should be carried out in these areas prior to construction. In the event that a weaker strength zone is encountered appropriate measures need to be taken, see Recommendations.

11 CONCLUSIONS

The following conclusions are given.

(1) A geotechnical investigation of the Derrybrien Windfarm site was carried out following the failure of 16 October 2003. The investigation included a walkover survey and ground investigation that included in situ shear vane, cone penetration testing, resistivity survey and the installation of standpipe piezometers. The purpose of the investigation was to assess the stability of the windfarm site.

(2) The site is located on the upper slopes of Cashlaundrumlahan Mountain which comprises upland blanket peat ranging in depth from typically 1 to 4m overlying generally a thin cover of mineral soil over dominantly sandstone bedrock. The natural slopes in the site have inclinations of between typically 1° and 5°.

(3) The walkover survey involved a visual inspection of all turbine bases and surrounding accessible areas. The survey identified no evidence of previous large-scale failure scars.

(4) The walkover survey identified several areas of old and inactive minor failures on the northern slope located on locally steeper scarp slopes. These failures represent localised instability or creep movement of overburden deposits and minor peat slides. This instability could not be observed further downslope. Failures appeared shallow and involved peat.

(5) A number of excavations for turbine bases were found to be water-filled. In many of these cases, there was no apparent outlet drainage path from the excavations. From inspection it appeared that most excavations were dewatered by over-pumping. It was not clear whether the over-pumped water was fed into a formalised drainage network.

(6) Construction activity has resulted in localised failure of peat at a number of locations. Placing of arisings from base excavation onto the in situ peat surface appears to have resulted in bearing failure in cells T23, T29 and T66. This bearing failure has resulted in upheaval and lateral movement of the underlying in situ peat. Within cell T17 the placing of arisings from base excavation onto the in situ peat surface appears to have resulted in failure of the underlying in situ peat leading to a 130m long peat slide.

(7) Results from in situ strength testing of peat from around the site show a range of undrained strength for peat of 2.8kPa to 25kPa. The range of undrained strength used for stability analysis was between 2.5 and 10kPa. Within the area of the 16 October 2003 failure, peat strength less than 4kPa has been recorded.

(8) Based on observations of failed ground the following failure characteristics were identified.

(a) Failures are likely initiated as a result of bearing failure below arisings, which is a non-circular failure.
(b) Subsequent failure of peat is by translational sliding failure within the peat.
(c) Basal sliding surface is within the lower part of the peat layer.
(d) Failures appear to be the result of undrained loading.

(9) A stability assessment was carried out using the observations above to model the likely failure mechanism. An infinite slope analysis assuming undrained conditions was used to model failure. To provide an assessment of stability the site was divided into cells typically 200m by 200m in area. The stability in the vicinity of the turbine base was also assessed using 50m wide cells centred on the proposed/constructed turbine bases (Figure 2). The Factor of Safety for each cell was then calculated. The stability assessment provides an indication of the potential stability of each cell.

(10) The Factor of Safety (FoS) is a measure of slope stability. A FoS less than 1.0 indicates an unstable slope. The code of practice for earthworks (BSI, 1981) states that for first time failure with a good standard of site investigation the FoS should be 1.3 to 1.4. This report has adopted a minimum acceptable FoS of 1.4.

(11) Results of stability assessment for 200m by 200m cells (Figure 8) show that the existing stability of the peat slope is above FoS of 1.4, except for the following 4 cells, namely T2, T5, T34 and T69. This excludes cells that have already been affected by sliding failure.

(12) The analysis was repeated for 200m by 200m cells assuming a loading of 10kPa was placed on the peat slope over the entire cell in order to simulate construction conditions (Figure 9). Results show that there are 5 cells with FoS less than 1.4. These are the 4 cells named above (T2, T5, T34 and T69) plus cell T18. This excludes cells that have already been affected by sliding failure.

(13) Results of stability assessment for 50m cells (Figure 10) show that the existing stability of the peat slope in the vicinity of the turbine base is above FoS of 1.4, except for the following 4 cells, namely t2, t34, t51 and t69. This excludes cells that have already been affected by sliding failure.

(14) The analysis was repeated for 50m cells assuming a loading of 10kPa was placed on the natural peat slope over the entire cell in order to simulate construction conditions (Figure 11). Results show that there are 8 cells with FoS less than 1.4. These are the 4 cells named above (t2, t34, t51 and t69) plus cells t18, t47, t66 and t71. This excludes cells that have already been affected by sliding failure.

(15) Comparison of FoS results between 200m by 200m and 50m cell analysis assuming a loading of 10kPa is shown in Figure 12. In general, except for two 50m cells on the northern slope, the analyses indicate similar areas with low FoS.

(16) The stability analyses indicate a number of cells where the FoS is less than unity (T2, T34 and T69) following simulated construction loading (Figures 9 and 11). Inspection of these cells following actual construction activity showed no apparent

indication of the onset of peat sliding. The analyses are seen therefore as conservative.

(17) The analyses show that most of the site under conditions of no construction activity has an acceptable FoS of 1.4 or greater. There are a few areas of marginal stability. The effect of construction activity, as represented by current working practice, would reduce the FoS in a number of areas to an unacceptable FoS, that is less than 1.4. Current working practice on site would need to be revised to ensure that the existing FoS of the peat slope was not adversely affected.

12 RECOMMENDATIONS

To ensure the safe completion of the construction at the Derrybrien Windfarm current construction work practices must be revised. Provided that the recommendations below are satisfactorily implemented it is considered that the construction of the Derrybrien Windfarm can be completed safely.

(1) Avoidance of placing arisings from excavations and local concentrated loads on peat slope. Where arisings from excavations and/or concentrated load are to be placed onto the peat surface the adequacy of the ground to support the load shall be determined. The stability and adequacy of the ground shall be determined by suitably qualified geotechnical personnel and may involve simple in situ testing, knowledge of previous similar load being placed, or monitoring of a load test to verify that ground can adequately support the load.

(2) Avoidance of uncontrolled concentrated water flow. All water discharged from excavations during work shall be directed into suitably designed drainage lines. No discharge of water onto slope surface shall be allowed. All release of water should be into a formalised drainage path which shall form part of a site-wide drainage network. Positive drainage measures shall be provided at all turbine bases to prevent potential build-up of water in the temporary and permanent condition.

(3) Avoidance of unstable excavations. All excavation shall be suitably supported to prevent collapse and development of tension cracks. With respect to excavated v-ditches, where there is collapse or squeezing-in of v-ditches these for example shall be piped over the affected length using a free-draining stone to back-fill the ditch.

(4) Avoidance of placing fill and excavations in the vicinity of steeper peat slopes. On the northern slope of the site in particular there are locally steeper scarp slopes. All turbine bases and access roads running parallel to these slopes shall be located a minimum of 25m from the crest of such slopes. The stability and adequacy of the ground at the re-located site shall be assessed.

(5) The failure of 16 October 2003 occurred within the head of a natural shallow valley. The location of all turbine bases shall be assessed with respect to location of natural valley features and drainage lines. Where turbine bases are located within or in the vicinity of natural valley/drainage line the stability and adequacy of the ground at this location shall be determined by suitably qualified geotechnical personnel.

(6) Notwithstanding the above, work in cells where FoS is less than 1.4 (see Figures 9 and 11) must proceed with caution and appropriate measures adopted that do not adversely affect the existing stability of the natural peat slopes. On-going ground investigation will be required to be carried out to substantiate the stability of these cells.

(7) Geotechnical supervision during works by suitably qualified and experienced personnel. Supervision shall be on a full-time basis for the duration of the construction works.

(8) On-going and confirmatory ground investigation. As construction progresses, on-going assessment of ground conditions shall be carried out to confirm the findings with respect to stability contained within this report. The results of on-going ground investigation are to be assessed by suitably qualified geotechnical personnel.

(9) The revised construction work practices should recognise the potential for weaker peat zone above the peat/mineral soil interface. In advance of new construction in an area and as part of on-going ground investigation, site geotechnical personnel shall obtain measurements of shear strength for the peat depth profile and in particular shear strength above the peat/ mineral soil interface. Shear strength testing shall be by hand vane, or other suitable device, at regular depth intervals at suitably spaced locations within the area.

(10) Improved method statements for all aspects of construction working practices that impinge or may impinge upon the stability of the peat. Method statements shall be produced by the contractor and take into account recommendations given herein and on-going ground investigation. Method statements shall be reviewed by appropriately experienced and qualified geotechnical personnel.

(11) Drainage plan giving details of all flows, drain capacity, drainage paths off site and drainage paths to main stream courses. The control of water from within the site is considered critical for long-term stability of the site. A robust drainage plan, monitoring and maintenance schedule for the proposed life-time of the site shall be produced and implemented. The resulting drainage network should be in place to receive water during both temporary works and permanent works condition.

(12) Installation and monitoring of geotechnical instrumentation, as appropriate, in areas of possible poor ground, as indicated from stability assessment in this report and for example by collapsed v-ditches, continued and accelerated settlement of floating roads, sidewall instability at shallow inclinations of excavations, wet ground areas, distressed ground. Monitoring works shall include periodic monitoring of piezometers installed on behalf of Ascon Ltd.

(13) Site reporting procedures to ensure that lessons are learnt and working practices changed to reflect ground conditions. A formalised reporting procedure shall be adopted on site that records site workings, monitoring results and any observations that may be pertinent to the stability of the works.

(14) Contingency plan to detail level of response to observed poor ground conditions. The performance of the ground shall be assessed against design assumptions. Where the works perform better than expected or as expected there will be no need for contingencies to be implemented. Where findings indicate that the ground is performing outside the expected limits, then a potentially adverse situation might

develop, and corrective actions shall be implemented in accordance with the contingency plan.

(15) Stabilisation of areas of failed ground (T17, T68 and T70). A number of stabilisation measures have been constructed to stabilise the failure scar and to constrain the failed debris within the scar. Details of the effectiveness of these measures for long-term stability are required.

(16) Routine inspection of windfarm site by maintenance personnel to include an assessment of ground stability conditions. This is to comprise a non-technical assessment based on observation. Maintenance personnel shall be briefed and made aware of key observations that can be carried out in the normal course of their work that may indicate potentially unstable ground conditions.

(17) Periodic annual inspection of the site following completion of works by suitably experienced and qualified geotechnical personnel. The site shall be inspected on initially a yearly basis to assess stability. This inspection shall include a walkover inspection of the site with a report produced.

13 REFERENCES

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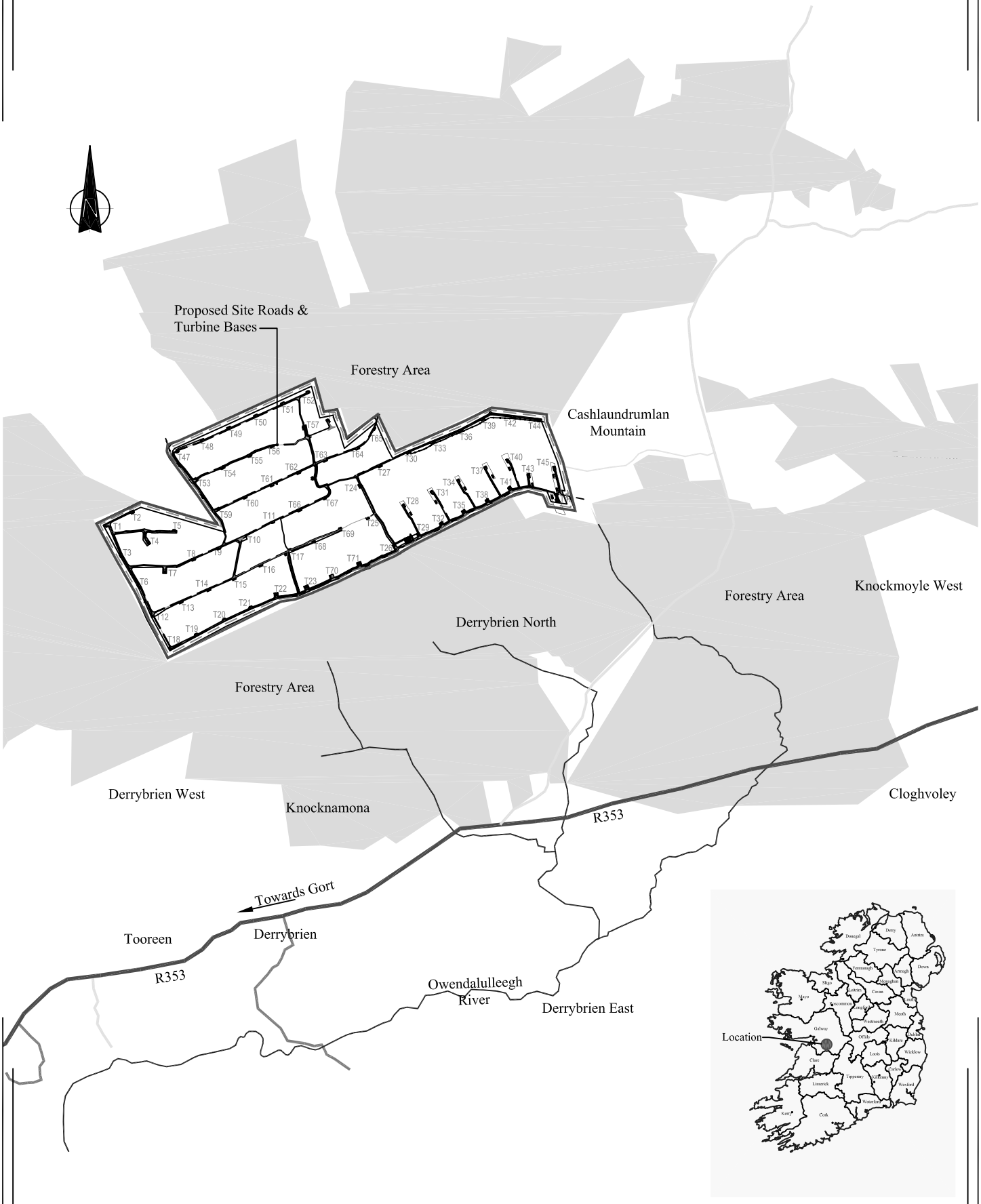
FIGURES



Scale: N.T.S. Date: 02/02/2004 Drawn: O.B. Checked: P.R. Revision: A Based on:	Client: ESB INTERNATIONAL	Job: Derrybrien Windfarm Post-Landslide Site Appraisal	Title: Site Location Figure 1	AGEC Ltd 5 Kilcarrig Street Bagenalstown Carlow Ireland Tel: +353 503 23800 Fax: +353 503 23793	agec www.agec.ie info@agec.ie

Applied Ground Engineering Consultants Limited

Notes :–

1. All dimensions are in millimetres – figured dimensions to be taken in preference to scaled dimensions.
2. All levels are in metres.

Legend:

- Forestry
- Streams/Drains
- Boundary
- 10m Contour
- 50m Contour
- Existing Road
- Spot Height +307
- Roads As Built
- Turbine Position T58
- Grid for 200m x 200m Cell
- 50m Cell
- Shear Vane Location +V27

N 206000 N 205500 N 205000 N 204500 N 204000

E 158000 E 158500 E 159000 E 159500 E 160000 E 160500 E 161000

200 210 220 240 260 270 280 290 300 310 320 330 340 350 360 307 344 385

To Site Entrance

Site Compound

Existing Forestry Road

Existing Turbary Road

Existing Trig. Station

Existing Telecoms Mast

Anenometer Mast

Borrow Pit

V1 V2 V3 V4 V5 V6 V7 V8 V9 V10 V11 V12 V13 V14 V15 V16 V17 V18 V19 V20 V21 V22 V23 V24 V25 V26 V27 V28 V29 V30 V31 V32 V33 V34 V35 V36 V37 V38 V39 V40 V41 V42 V43 V44 V45 V46

T1 T2 T3 T4 T5 T6 T7 T8 T9 T10 T11 T12 T13 T14 T15 T16 T17 T18 T19 T20 T21 T22 T23 T24 T25 T26 T27 T28 T29 T30 T31 T32 T33 T34 T35 T36 T37 T38 T39 T40 T41 T42 T43 T44 T45 T46 T47 T48 T49 T50 T51 T52 T53 T54 T55 T56 T57 T58 T59 T60 T61 T62 T63 T64 T65 T66 T67 T68 T69 T70 T71 T72 T73 T74 T75 T76 T77 T78 T79

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Further notes:

Notes:

Scale: 1:10000 A3	Checked: P.J.
Date: 02/02/2004	Revision: B
Drawn: O.B.	Based on:

Client: ESB INTERNATIONAL

Job: Derrybrien Windfarm
Post-Landslide Site Appraisal

Figure 2

Title: Site Layout Plan

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5 Kilcarrig Street
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Ireland

Tel: 353-503-23800
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info@agec.ie

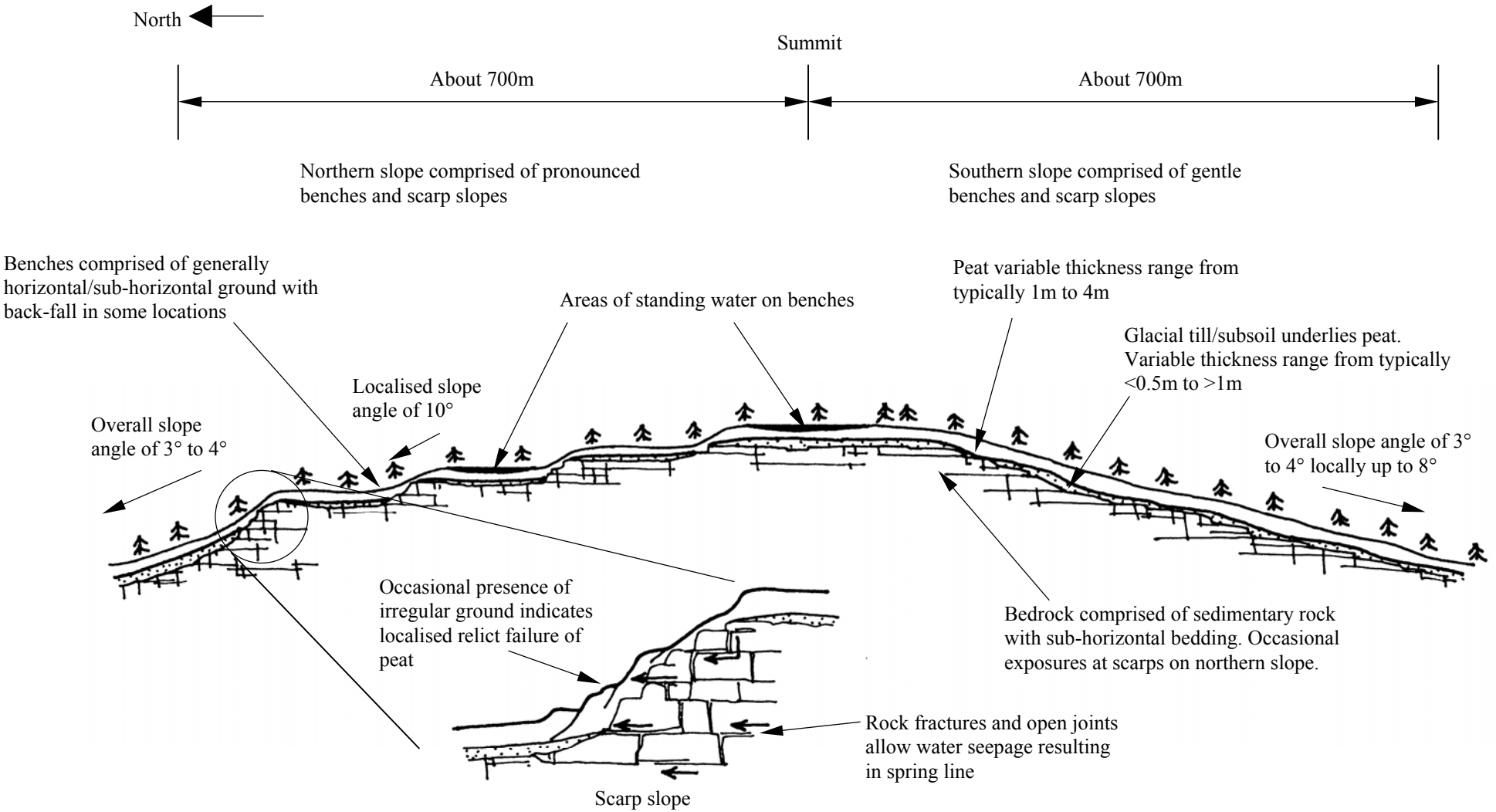


Figure 3 Geomorphological Characteristics of Site

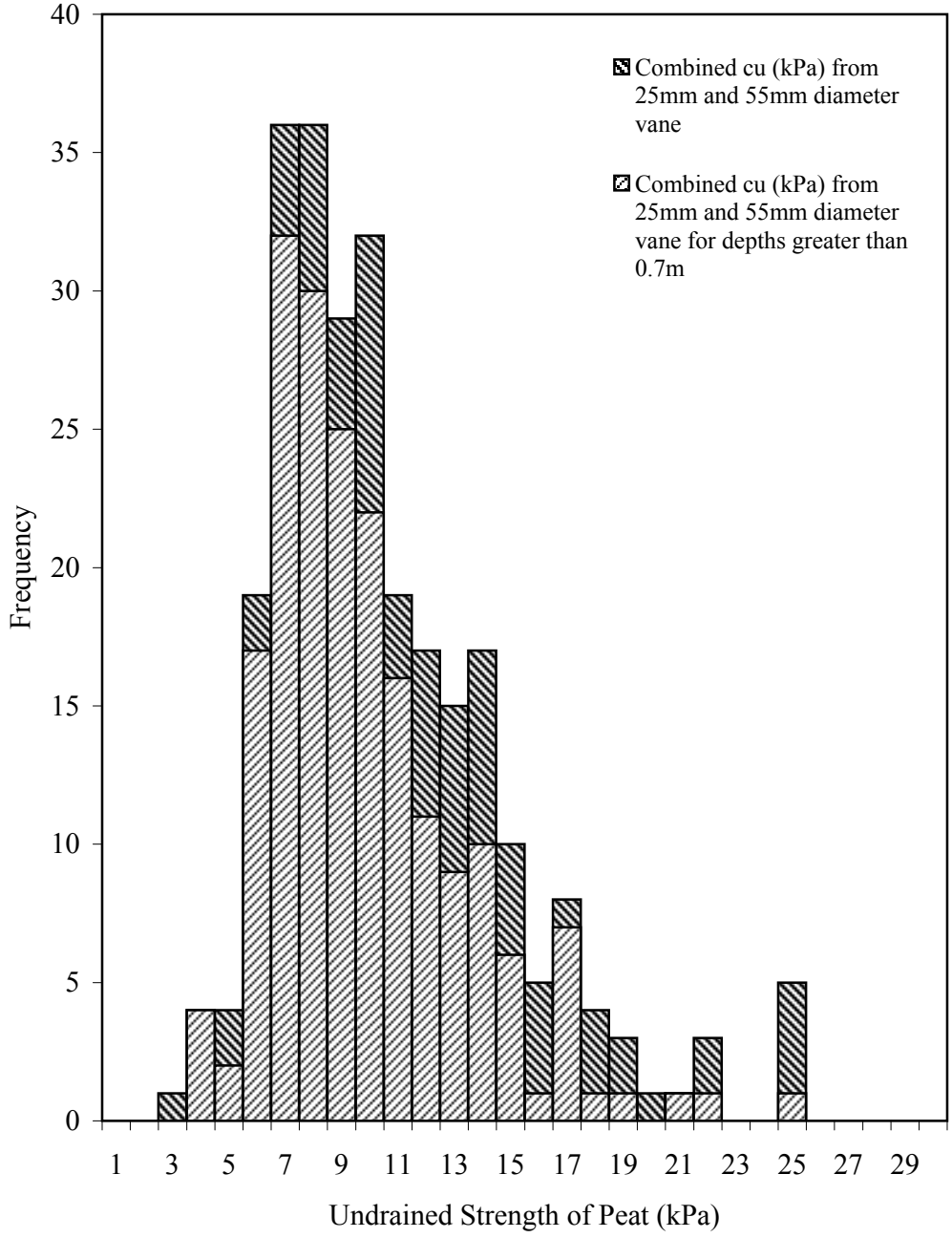


Figure 4 Range of Undrained Shear Strength (c_u) of Peat from Vane Testing

Note
(1) Vane results are from 25mm and 55mm diameter vanes

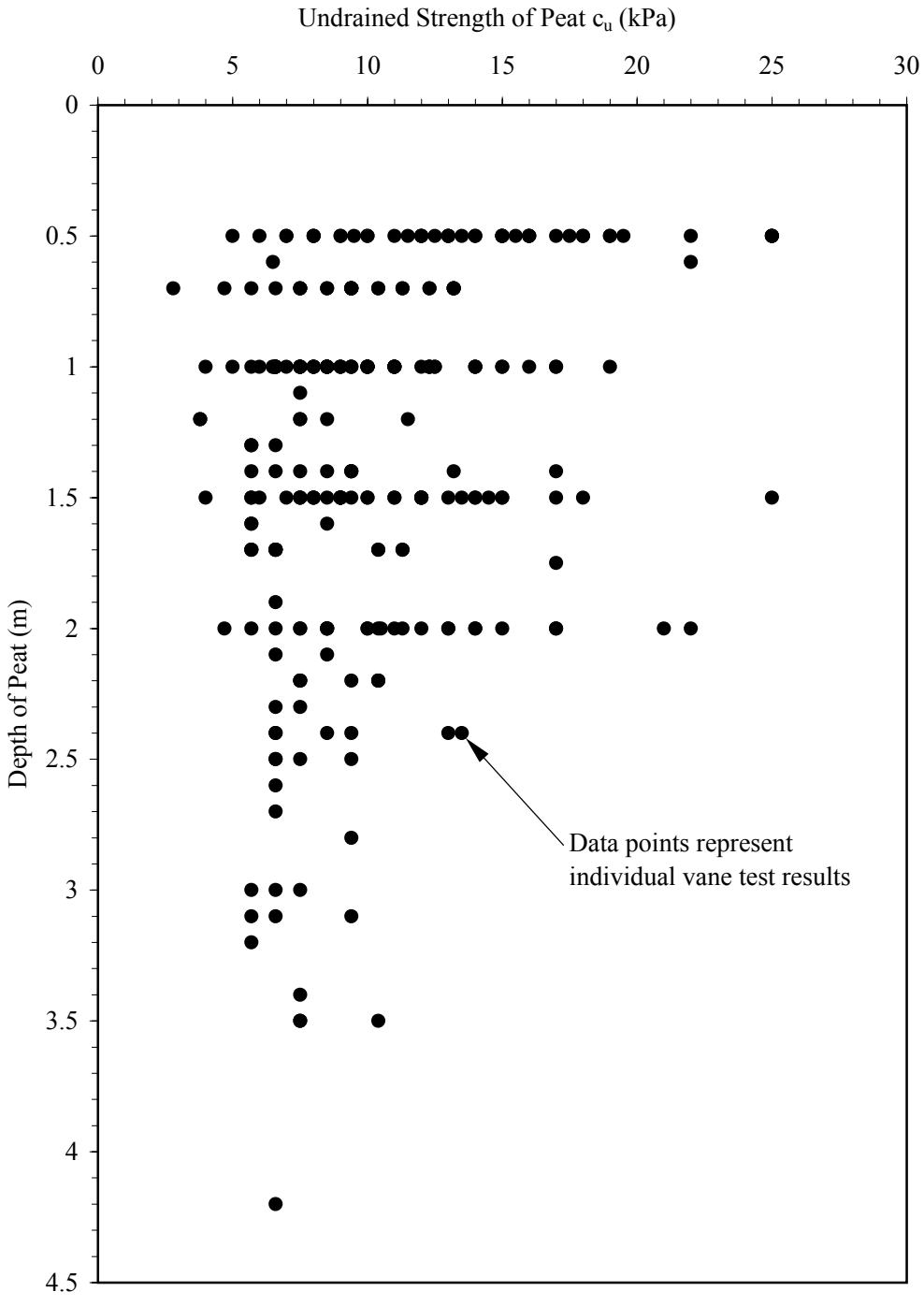


Figure 5 Profile of Undrained Shear Strength (c_u) of Peat with Depth from Vane Results

Note: Vane results are from 25mm and 55mm diameter vanes

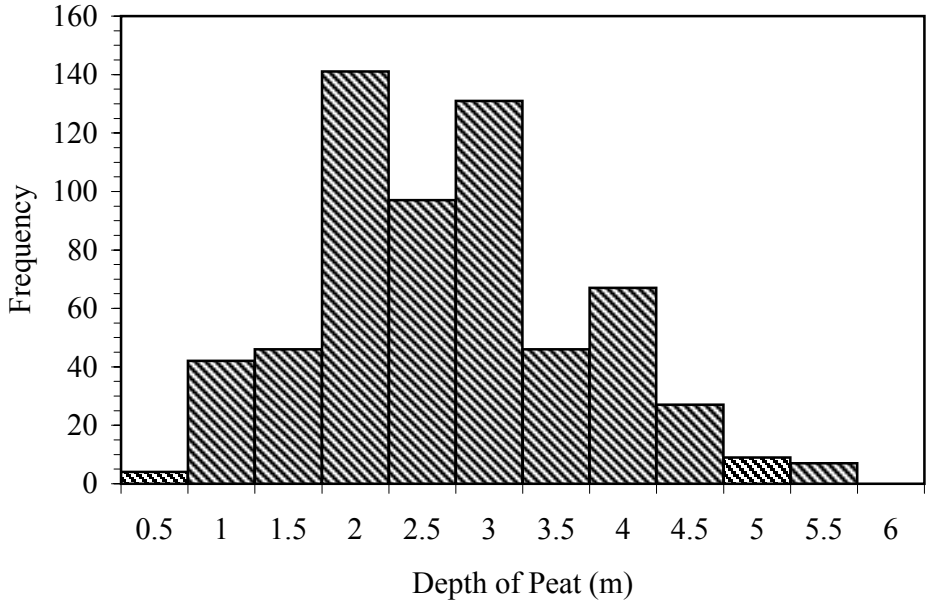


Figure 6 Range of Peat Depths

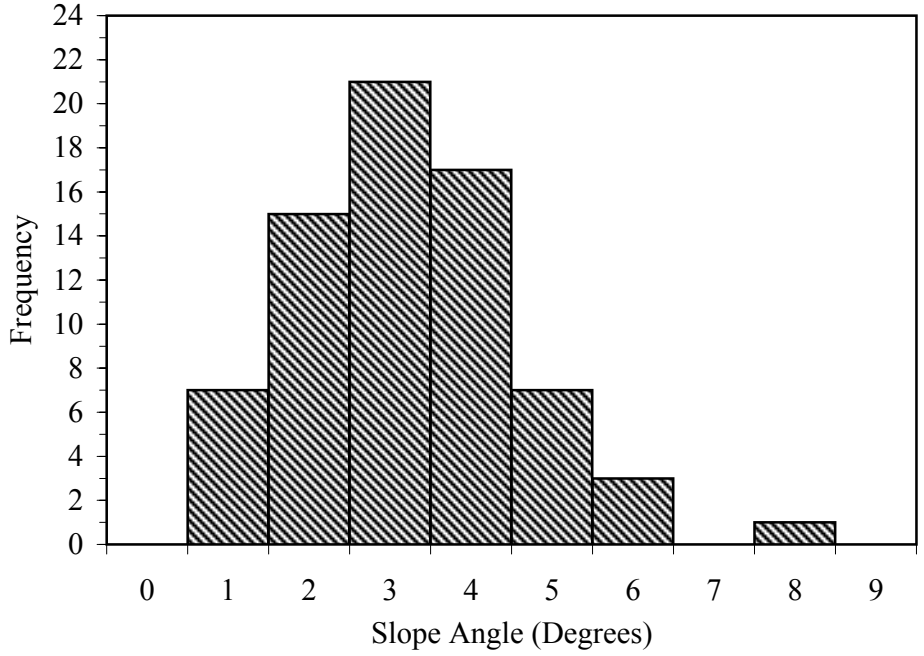


Figure 7 Range of Slope Angles

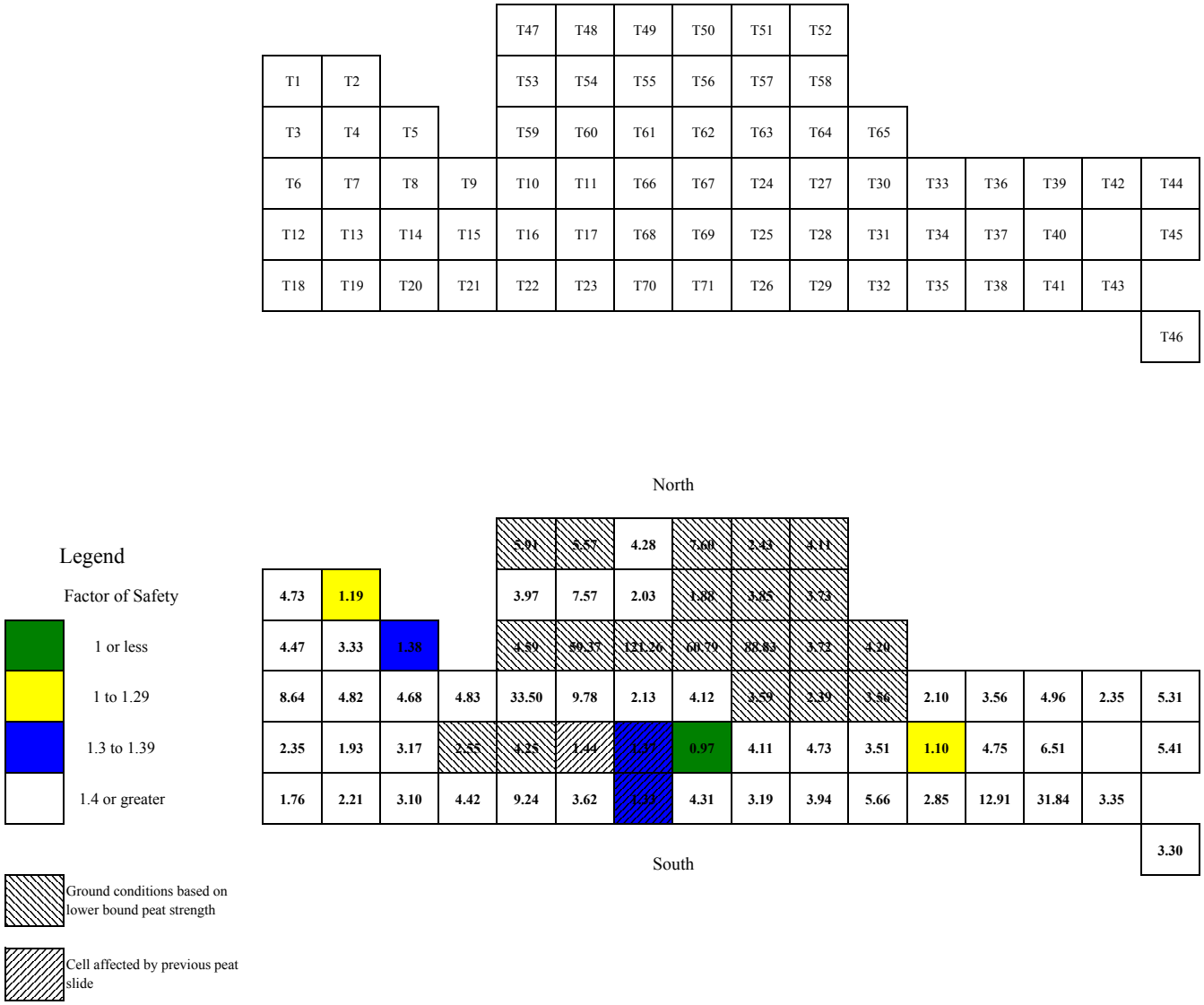


Figure 8 Factor of Safety for 200m by 200m Cell under Load Condition (1)

				T47	T48	T49	T50	T51	T52						
T1	T2			T53	T54	T55	T56	T57	T58						
T3	T4	T5		T59	T60	T61	T62	T63	T64	T65					
T6	T7	T8	T9	T10	T11	T66	T67	T24	T27	T30	T33	T36	T39	T42	T44
T12	T13	T14	T15	T16	T17	T68	T69	T25	T28	T31	T34	T37	T40		T45
T18	T19	T20	T21	T22	T23	T70	T71	T26	T29	T32	T35	T38	T41	T43	
															T46

North

Legend

Factor of Safety

- 1 or less
- 1 to 1.29
- 1.3 to 1.39
- 1.4 or greater

Ground conditions based on lower bound peat strength

Cell affected by previous peat slide

				3.90	3.75	3.12	4.57	1.71	2.68						
3.35	0.91			2.95	5.69	1.50	1.42	2.56	2.51						
3.02	2.44	1.09		3.28	47.16	79.30	48.05	64.02	2.81	3.07					
6.43	3.72	3.64	3.34	22.14	7.53	1.67	2.74	2.21	1.82	2.43	1.65	2.78	3.41	1.67	3.88
1.80	1.54	2.48	1.91	3.10	1.03	0.99	0.73	2.62	3.08	2.69	0.78	3.15	4.30		3.68
1.21	1.58	2.16	3.27	5.89	2.22	0.97	3.08	2.12	2.34	3.04	1.67	7.20	20.47	2.22	
															2.27

South

Figure 9 Factor of Safety for 200m by 200m Cell under Load Condition (2)

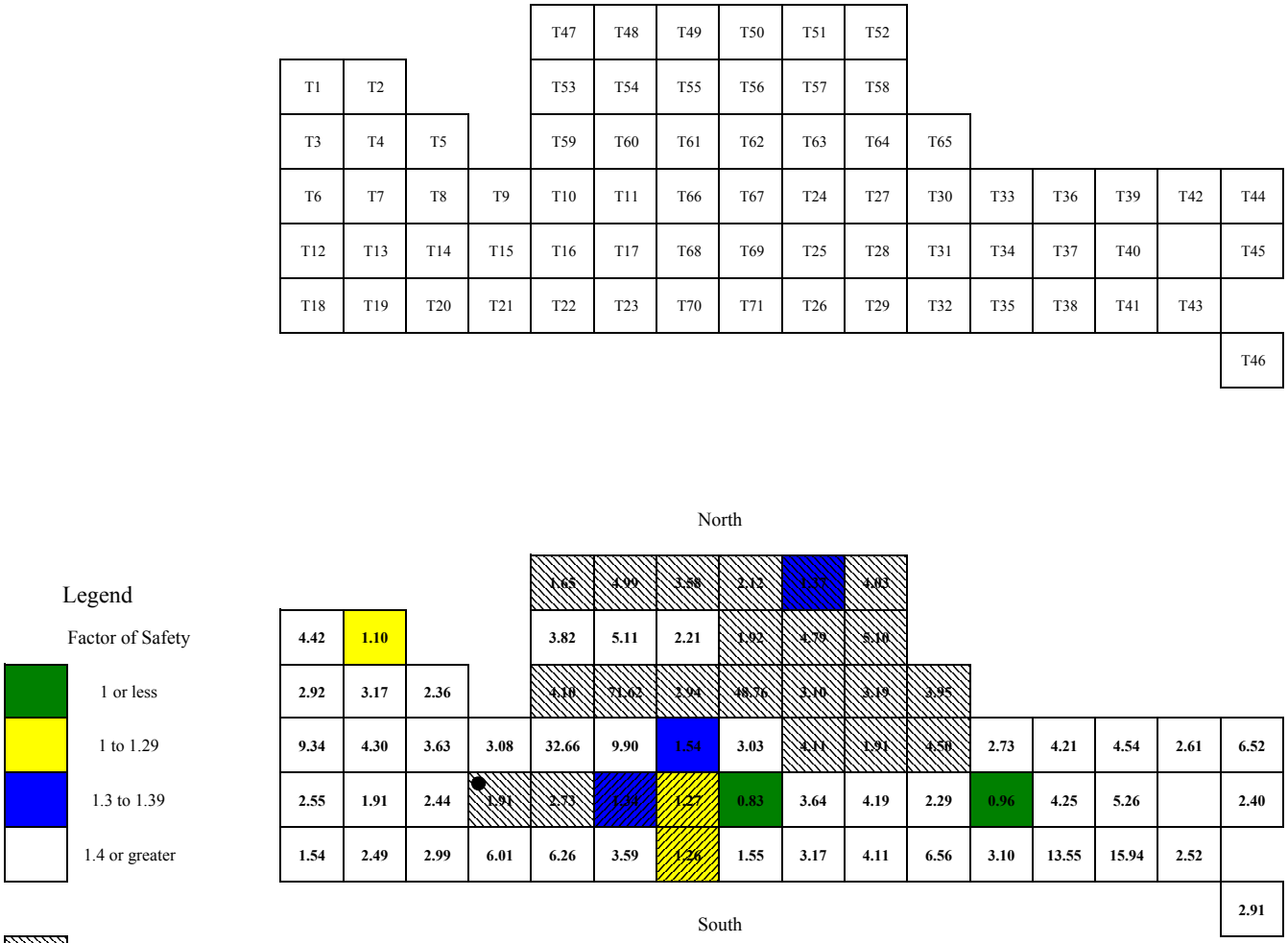


Figure 10 Factor of Safety for 50m Cell under Load Condition (1)

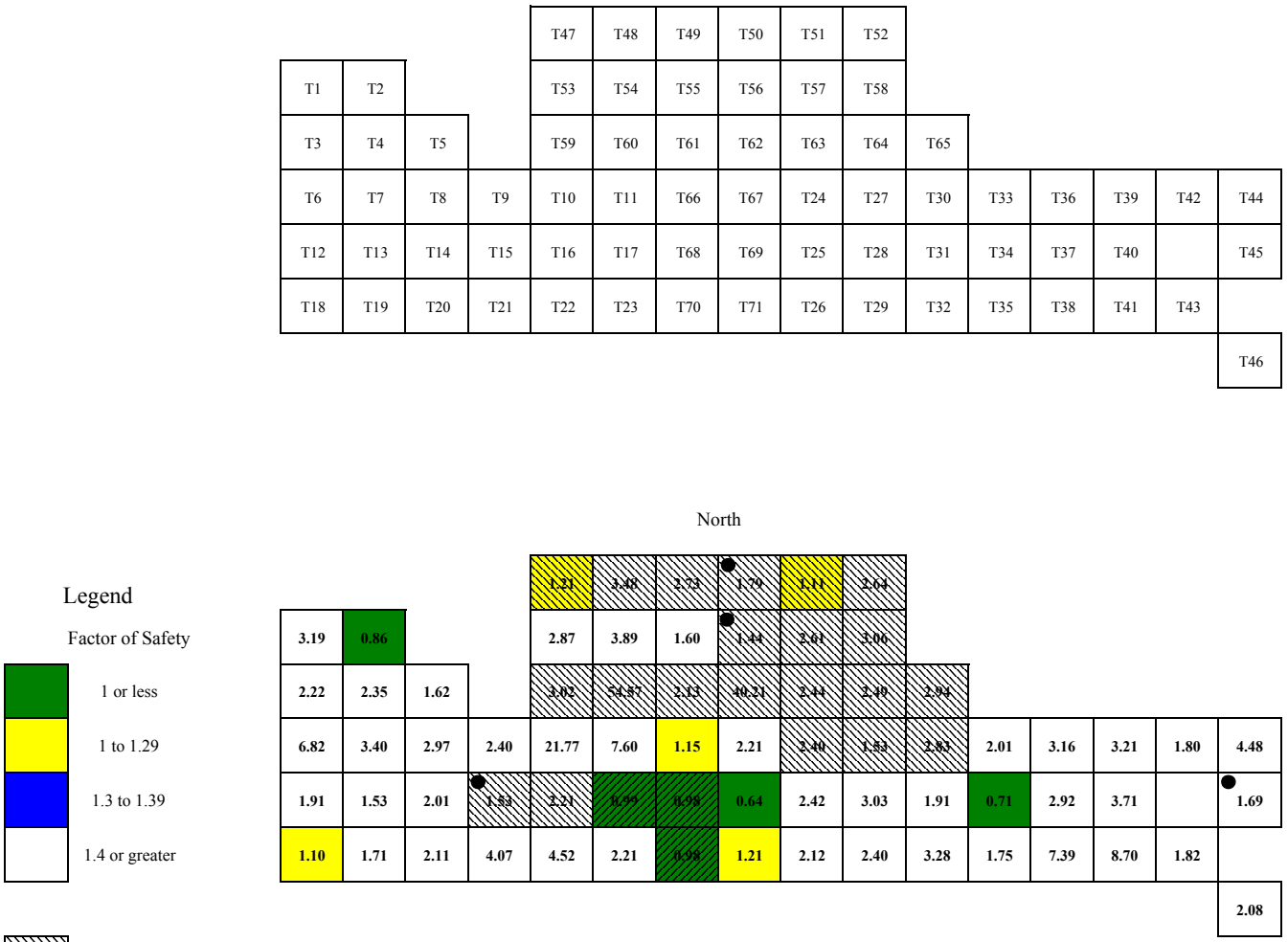


Figure 11 Factor of Safety for 50m Cell under Load Condition (2)

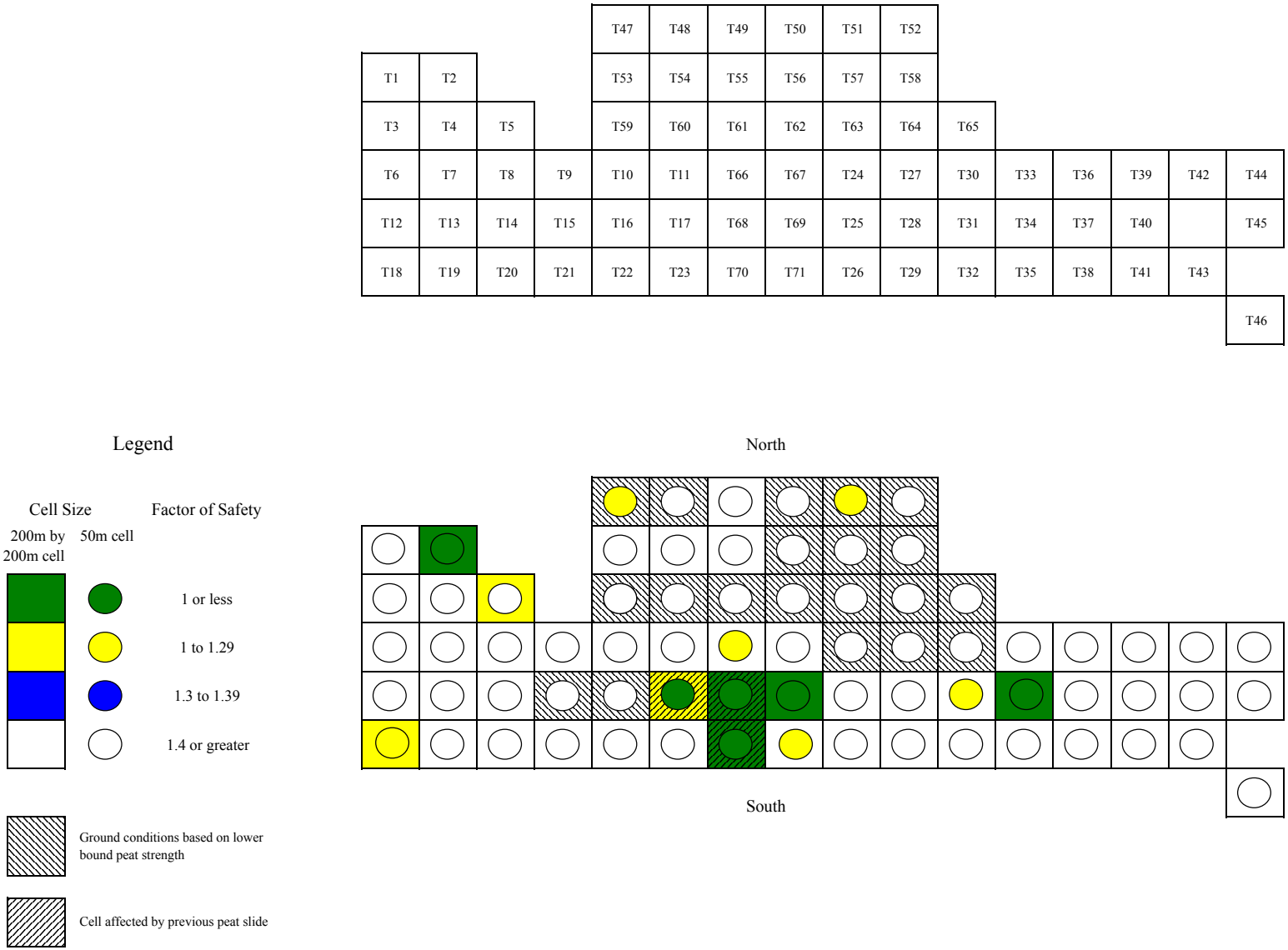


Figure 12 Summary of Factor of Safety for 200m by 200m and 50m Cells under Load Condition (2)

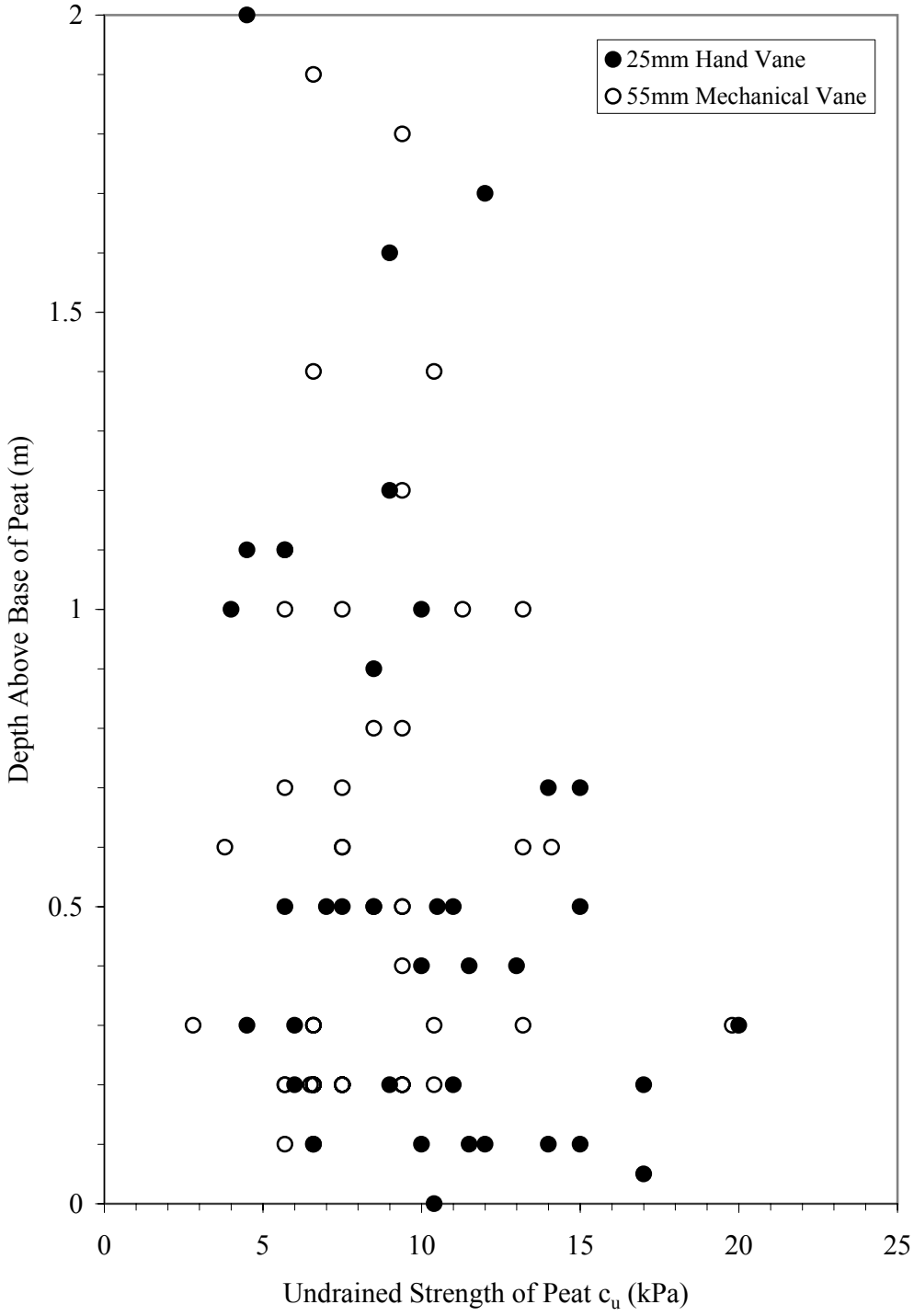


Figure 13 Variation of Undrained Shear Strength (c_u) of Peat with Depth above Base of Peat from Vane Results

Note: Vane results are from the deepest vane test within the peat at each test location

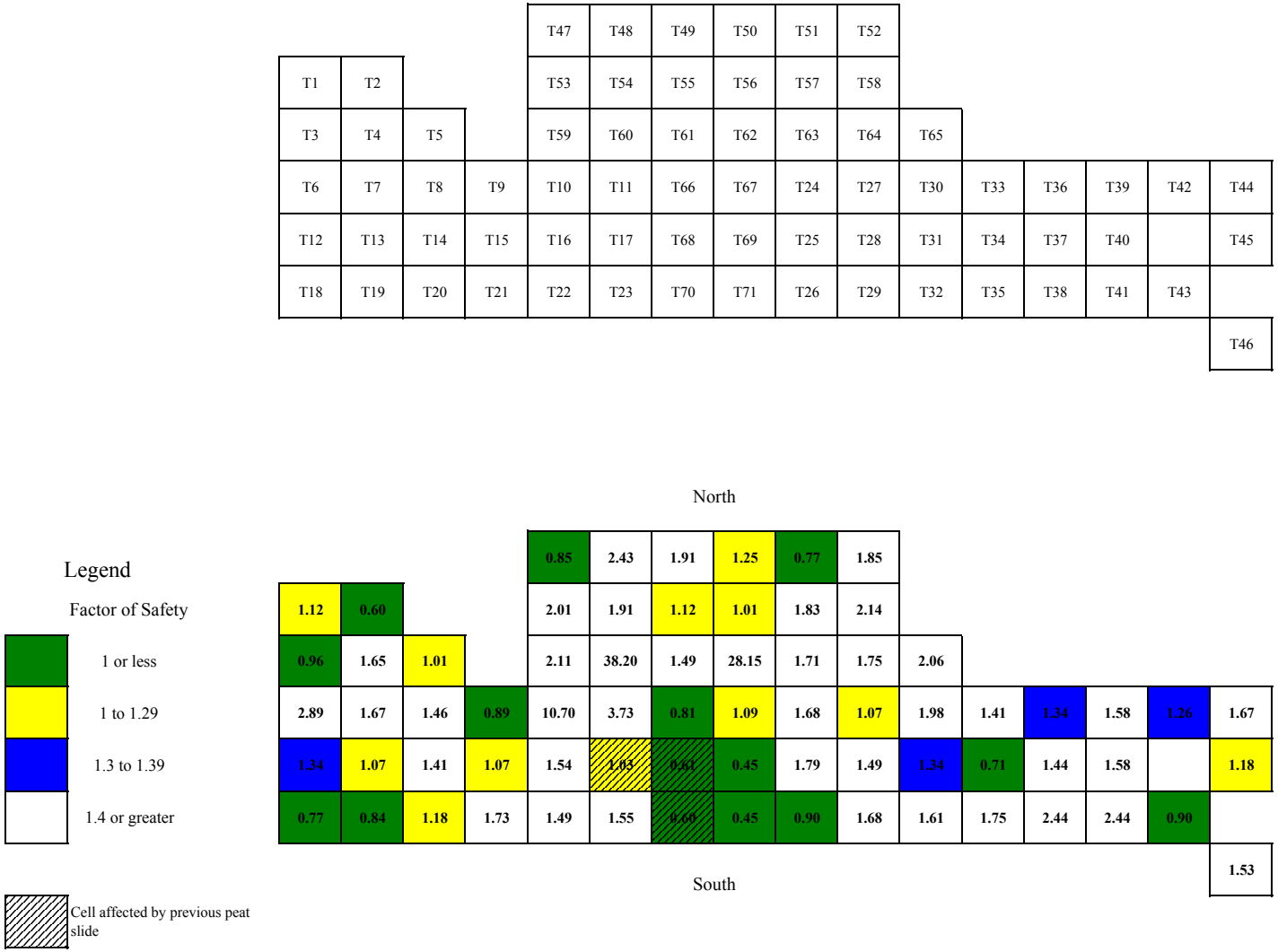


Figure 14 Sensitivity Analysis Showing Hypothetical Factor of Safety for 50m Cell under Load Condition (2)

APPENDIX A GEOTECHNICAL MAPPING SHEETS

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T1**	Mapped/Date: **DB & AL 03/11/03**
Description of Site: **Site is within the forest. Site slopes to west at 2.5°to 4°. Site is mostly on shallow uniform slope. The site is adjacent to a natural valley with a drainage channel approx 10m to north** **Peat thickness is 1.8 at east of excavation, greater than 2.0m thick further east and to the west**	
Description of Excavation: **Excavation is on a sloping site with 1.8m peat overlying between 1m and 0.4m mineral soil overlying sub-horizontal flaggy sandstone to the east. Peat slope sub-vertical.**	Description of Arisings: **Arisings to the west of excavation 20 L x 30 W x 0.5 H. Arisings to the east of excavation.**
Description of Access Road: **Floating Road running north-south turning to east-west. Site located at junction.**	Description of Dewatering: **Not Known**
Description of Watercourses/Drainage on Site**: Large drainage channel bearing 270° from T2 north of site. Thickness of peat in drainage bank to west approx 0.5m Rock in-situ in ditch bed. Extensive seepage into excavation from east draining around base egressing into 'V' ditch to west. 'V' ditch draining into main drainage ditch to west of excavation.**	
Description/Cause of Failure: **N/A**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **Seepage from peat and occasional seepage lines at mineral soil/rock interface. Slight ponding within the arisings.**
Description of Material above Failure Plane: **N/A**	
Description of Incipient Instability: **N/A**	
Location/Ref. of Instability: **N/A**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T2**	Mapped/Date: **DB & AL 03/11/03**
Description of Site: **Site is within the forest. Site slopes generally to the west at 2° to 6°. Site is mostly on shallow convex/uniform slope. A natural valley develops to the west of the excavation.** **Peat thickness is greater than 2.0m thick.**	
Description of Excavation: **Excavation has localised failure to the east with an area of standing water to the north adjacent to the excavation.**	Description of Arisings: **Arisings to the west and northeast of the excavation.**
Description of Access Road**: Floating road terminates at the south of the excavation. The sub-base of the road consists of boulders up to 0.7m**	Description of Dewatering: **Not Known**
Description of Watercourses/Drainage on Site**: Natural Drains and drainage furrows flow generally east to west. A drain bearing 230° is blocked to the east of the site. Seepage and impeded flow forms ponding to the north of the excavation and within the excavation itself. A natural drain runs to the west of the site (bearing 252°). A 'V' ditch (partially blocked) flows west from the excavation and joins the main drain.**	
Description/Cause of Failure: **N/A**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **Water seepage from the east feeding the ponding to the north of the excavation Ponding within the arisings.**
Description of Material above Failure Plane: **N/A**	
Description of Incipient Instability: **The localised failures are cause by the excavation and inadequate drainage**	
Location/Ref. of Instability: **The failures consist of tension cracks and are located to the south and east of the excavation. They form a crescent around the excavation and the furthest crack is approx 15m from the excavation at the tree line.**	Length of Crack: **There are numerous minor scars with lengths between 0.3 and 15m in length**
Average Width of Crack: **The maximum width of the major tension crack is approx 0.5m**	Average Depth of Crack: **The depth of the cracks are greater than 2m.**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T3**	Mapped/Date: **DB & AL 03/11/03**
Description of Site: **Site is within the forest. Site slopes to the northwest at 3.5˚to 4˚. Site is mostly on shallow concave/uniform slope. A natural valley develops to the northwest of the site.** **Peat thickness to the northwest is 1.5m to the southwest it is 1.7m thick.**	
Description of Excavation: **Excavation is on a sloping site and is located towards the head of a northwest sloping natural valley.**	Description of Arisings: **Arisings are located to the southwest, west and north of the excavation.**
Description of Access Road: **Floating Road running northwest-southeast.**	Description of Dewatering: **Not Known**
Description of Watercourses/Drainage on Site**: Drainage channels and furrows generally flow toward the excavation from the northeast, east and south. These are commonly impeded by the access road and arising resulting from the excavation. The ground where the water flow is impeded is commonly waterlogged. Note a major stream is impeded by the access road running north west from the site. The GPS co-ordinates are E 57918, N 04575.**	
Description/Cause of Failure: **N/A**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **Seepage from peat and impeded drainage channels.**
Description of Material above Failure Plane: **N/A**	
Description of Incipient Instability: **N/A**	
Location/Ref. of Instability: **N/A**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T4**	Mapped/Date: **DB & AL 03/11/03**
Description of Site: **Site is within the forest. Site slopes to the west at 2.5°. Site is mostly on shallow uniform slope. Large boulders have been used in an attempt to stabilise the eastern side of the excavation.** **Peat thickness is greater than 2m.**	
Description of Excavation: **Excavation is on a sloping site and is located towards the head of a northwest sloping natural valley.**	Description of Arisings: **Extensive Arisings (approx 40mx25mx1.3m) are located to the west of the excavation. The arisings are waterlogged. Minor excavations are located to the north and south of the excavation and access road.**
Description of Access Road: **Floating Road running east-west located to the north of the site.**	Description of Dewatering: **Not Known**
Description of Watercourses/Drainage on Site**: Drainage furrows commonly run north-south and areimpeded by the access road in the northeast. An active drainage ditch bearing 112° flows into the excavation. A 'V' cut channel flowing west into an existing drainage ditch is located at the western side of the excavation. This ditch is impeded resulting in the excavation being water filled. Drainage channels to the west and southwest flow in a general westerly direction. Approximately 100m to the west the drainage channels are impeded by the access road.**	
Description/Cause of Failure: **N/A**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **Seepage from peat and impeded drainage channels.**
Description of Material above Failure Plane: **N/A**	
Description of Incipient Instability: **A tension cracks is located to the east of the excavation propagating along a drainage furrow. The crack is a result of the excavation. Large boulders have been placed in the side of the excavation to impede the failure.**	
Location/Ref. of Instability: **The tension crack runs north-south approx 5m east of the excavation.**	Length of Crack: **10m**
Average Width of Crack: **0.35m**	Average Depth of Crack: **approx 0.5m**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T5**	Mapped/Date: **DB & AL 03/11/03**
Description of Site: **Site is within the forest and intersects a fire-break. Site slopes to the west and east at 2.5°. The central section of the site slopes at 5°. Site is mostly on shallow convex slope and appears to be located at the head of a drainage channel.** **Peat thickness is greater than 2m in the east and 2m in the west**	
Description of Excavation: **Excavation is on a sloping site. Boulders and stone-fill have been placed in the northeast of the excavation.**	Description of Arisings: **Arisings are located to the west and north of the excavation. The arisings are waterlogged.**
Description of Access Road: **Floating Road to the southwest of the site, terminates at the base.**	Description of Dewatering: **Not Known**
Description of Watercourses/Drainage on Site**: Drainage generally flows east to west. Surface water and water run off flows west into the excavation resulting in the excavation being flooded. To the west of the excavation a 'V' cut channel from the excavation flows into a drainage channel bearing 272°. The 'V' cut channel is impeded resulting in water flowing out of the excavation in to the trees to the northwest.**	
Description/Cause of Failure: **N/A**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **Seepage from peat to the east of the excavation and seepage from the excavation to the northwest causing waterlogging of the ground.**
Description of Material above Failure Plane: **N/A**	
Description of Incipient Instability: **N/A**	
Location/Ref. of Instability: **N/A**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T6**	Mapped/Date: **DB & AL 03/11/03**
Description of Site: **Site is within the forest. Site slopes gently to the west 1.5°. Site is on shallow uniform slope.** **Peat thickness is greater than 2m.**	
Description of Excavation: **Not Commenced**	Description of Arisings: **N/A**
Description of Access Road: **Floating Road to the east of the site.**	Description of Dewatering: **Not Known**
Description of Watercourses/Drainage on Site**: Drainage furrows generally contain no standing water and are orientated north-south. A 'V' cut ditch runs from the access road with a bearing of 253°.**	
Description/Cause of Failure: **N/A**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **N/A**
Description of Material above Failure Plane: **N/A**	
Description of Incipient Instability: **N/A**	
Location/Ref. of Instability: **N/A**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T7**	Mapped/Date: **DB & AL 03/11/03**
Description of Site: **Site is within the forest. Site slopes gently to the west 2 °. Site is on shallow uniform slope.** **Peat thickness is greater than 2m.**	
Description of Excavation: **Not Commenced**	Description of Arisings: **N/A**
Description of Access Road: **Floating Road to the north of the site.**	Description of Dewatering: **Not Known**
Description of Watercourses/Drainage on Site**: Drainage furrows generally contain no standing water and are orientated north-south. A drainage ditch located to the west of the site, is impeded by the access road. A drainage ditch is located to the south of the site bearing 243°.**	
Description/Cause of Failure: **N/A**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **N/A**
Description of Material above Failure Plane: **N/A**	
Description of Incipient Instability: **N/A**	
Location/Ref. of Instability: **N/A**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T8**	Mapped/Date: **DB & AL 03/11/03**
Description of Site: **Site is within the forest. Site slopes gently to the west 2 °. Site is on shallow uniform slope.** **Peat thickness is greater than 2m.**	
Description of Excavation: **Not Commenced**	Description of Arisings: **N/A**
Description of Access Road: **Floating Road to the north of the site.**	Description of Dewatering: **Not Known**
Description of Watercourses/Drainage on Site**: Drainage furrows generally contain no standing water and are orientated northeast-southwest. There are no active drainage channels located in the site area.**	
Description/Cause of Failure: **N/A**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **N/A**
Description of Material above Failure Plane: **N/A**	
Description of Incipient Instability: **N/A**	
Location/Ref. of Instability: **N/A**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T9**	Mapped/Date: **DB & AL 03/11/03**
Description of Site: **Site is within the forest. The site is generally flat however the ground to the south of the site slopes to the south at 4°.** **Peat thickness is greater than 2m.**	
Description of Excavation: **Excavation is on a generally flat site. Localised slumping of the peat has occurred in the sides of the excavation.**	Description of Arisings: **Arisings (64mx35mx0.75m)are located across the access road to the north of the excavation.**
Description of Access Road: **Floating Road to the north of the site.**	Description of Dewatering: **Not Known**
Description of Watercourses/Drainage on Site**: A 'V' cut channel to the east of the arisings is blocked in the east. 'V' cut channels bearing 192° and 88° run from the south and east sides respectively from the excavation. The 'V' cut channel bearing 192° has localized slumping along the length. The channel runs into a stream bearing 270° approx 100m south of the site. The 'V' cut channel bearing 88° connects with an established drainage channel and diverts into a 'V' cut channel bearing 202°. This channel connects into the stream bearing 270° approx 100m south of the site.**	
Description/Cause of Failure: **N/A**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **Minor seepage from the peat feeds into the excavation. The water level in the excavation is approximately 2m below ground level.**
Description of Material above Failure Plane: **N/A**	
Description of Incipient Instability: **N/A**	
Location/Ref. of Instability: **N/A**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T10**	Mapped/Date: **DB & AL 03/11/03**
Description of Site: **Site is within immature forest. The site is generally flat with a gentle slope 0.5° east.** **Peat thickness is greater than 2m.**	
Description of Excavation: **Excavation is on a generally flat site. The excavation contains water at a level of 0.5m below ground level.**	Description of Arisings: **Arisings (20mx23mx1.3m) and (31mx10mx1.3m) are located to the west and south of the excavation respectively.**
Description of Access Road: **Floating Road to the south of the site.**	Description of Dewatering: **Not Known**
Description of Watercourses/Drainage on Site**: Seepage runs into the excavation from the peat and there is no obvious egress for the water. A drainage channel bearing 238° to the east of the excavation is impeded by the road. A drainage channel bearing 194° located to the east of excavation is blocked and waterlogged.**	
Description/Cause of Failure: **N/A**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **Minor seepage from the peat feeds into the excavation. The water level in the excavation is approximately 0.5m below ground level.**
Description of Material above Failure Plane: **N/A**	
Description of Incipient Instability: **N/A**	
Location/Ref. of Instability: **N/A**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T11**	Mapped/Date: **DB & AL 03/11/03**
Description of Site: **Site is within the forest. Site slopes to south at 1°. Site is mostly on shallow uniform slope.** **Peat thickness is greater than 2.0m thick.**	
Description of Excavation: **Excavation is inundated with water and depth is unknown. Localised failure at northeast of excavation.**	Description of Arisings: **Arisings to the south of access road 40 L x 30 W x 0.5 H. Arisings to the north, east and west of excavation.**
Description of Access Road: **Floating Road running south southwest to north direction.**	Description of Dewatering: **Not Known**
Description of Watercourses/Drainage on Site**: Large drainage channel running 165° towards T17. Three drains blocked bearing 190°, 085° and 116° to the north of the excavation and south of the access road.**	
Description/Cause of Failure: **N/A**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **Ponding within the arisings.**
Description of Material above Failure Plane: **N/A**	
Description of Incipient Instability: **N/A**	
Location/Ref. of Instability: **N/A**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T12**	Mapped/Date: **DB/PJ 02/11/03**
Description of Site: **Site is partially cleared of forestry surrounding base excavation. Site is located on western side of wind farm. Site slopes to southwest at 3°. Excavation for base complete, and base constructed.**	
Description of Excavation: **Excavation inundated with water, depth not known. Sideslopes approximately 45°.**	Description of Arisings: **Arisings stockpiled to the south of access road. Arisings consist mainly of peat and extend some 45m by 20m. Arisings have flowed blocking drainage ditch aligned 275° with water now re-directed into access track.**
Description of Access Road: **Access roads comprise floating roads aligned east-west and north-south.**	Description of Dewatering: **Not known.**
Description of Watercourses/Drainage on Site: **Drainage line aligned 230° has been re-routed around excavation. Drainage ditch aligned 275° passing to south of arisings has been blocked.**	
Description/Cause of Failure: **No failure of intact peat. Arisings have flowed up to about 12m.**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **N/A**
Description of Material above Failure Plane: **N/A**	
Description of Incipient Instability: **Tension crack around north and east side of excavation**	
Location/Ref. of Instability: **N/A**	Length of Crack: **30 to 40m**
Average Width of Crack: **Approx. 0.3m**	Average Depth of Crack: **Approx. 1.8m**
Sketches Attached: (List) **N/A**	Photographs Taken: (List) **N/A**

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T13**	Mapped/Date: **DB/PJ 02/11/03**
Description of Site: **Site is partially cleared of forestry to west of base excavation. Site is located on western side of wind farm. Site slopes to south at 3°. Excavation for base complete, and base constructed.**	
Description of Excavation: **Excavation inundated with water, depth not known. Sideslopes approximately 45°.**	Description of Arisings: **Arisings stockpiled to the east and south of access road. Arisings consist mainly of peat. Arisings south of road have flowed some 25m downslope.**
Description of Access Road: **Access road is floating road aligned east-west.**	Description of Dewatering: **Not known.**
Description of Watercourses/Drainage on Site: **Drainage lines aligned 207° and 275° to north and south of excavation respectively.**	
Description/Cause of Failure: **No failure of intact peat. Arisings have flowed up to about 25m.**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **N/A**
Description of Material above Failure Plane: **N/A**	
Description of Incipient Instability: **Tension crack around north and east side of excavation**	
Location/Ref. of Instability: **N/A**	Length of Crack: **30 to 40m**
Average Width of Crack: **Approx. 0.3m**	Average Depth of Crack: **Estimated as 1.8m**
Sketches Attached: (List) **N/A**	Photographs Taken: (List) **N/A**

Geotechnical Mapping Sheet

Project: Derrybrien Landslide

Site Reference: **T14**	Mapped/Date: **DB/PJ 02/11/03**
Description of Site: **Site is partially cleared of forestry. Site is located on western part of wind farm. Site slopes to south at 1° to 2°. Excavation for base has not been started.** **Peat is notably poorer, with some standing water, immediately west of proposed base. V-ditches have been constructed in this area to facilitate drainage.** **Peat depth greater than 2m with base proven at 3.1m**	
Description of Excavation: **N/a**	Description of Arisings: **N/A**
Description of Access Road: **Access road, which does not extend to proposed site of base is floating road aligned east-west.**	Description of Dewatering: **N/A**
Description of Watercourses/Drainage on Site: **V-ditches constructed along either side of proposed access route. Partial collapse of ditches in soft ground areas.**	
Description/Cause of Failure: **No failure of intact peat.**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **N/A**
Description of Material above Failure Plane: **N/A**	
Description of Incipient Instability: **N/A**	
Location/Ref. of Instability: **N/A**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List) **N/A**	Photographs Taken: (List) **N/A**

Geotechnical Mapping Sheet

Project: Derrybrien Landslide

T14 – Collapsed Drain.

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T15**	Mapped/Date: **DB/PJ 02/11/03**
Description of Site: **Site is partially cleared of forestry. Site is located on western part of wind farm. Site slopes to south at about 3°. Excavation for base has not been started.** **Peat depth greater than 2m.**	
Description of Excavation: **N/a**	Description of Arisings: **N/A**
Description of Access Road: **Forestry felled but not cleared for floating access road.**	Description of Dewatering: **N/A**
Description of Watercourses/Drainage on Site: **Some existing forestry drainage in area.**	
Description/Cause of Failure: **No failure of intact peat.**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **N/A**
Description of Material above Failure Plane: **N/A**	
Description of Incipient Instability: **N/A**	
Location/Ref. of Instability: **N/A**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List) **N/A**	Photographs Taken: (List) **N/A**

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T16**	Mapped/Date: **DB/PJ 02/11/03**
Description of Site: **Site is partially cleared of forestry. Site is located on western part of wind farm. Site slopes to south at 1° to 2°. Excavation for base has not been started.** **Peat depth greater than 2m.**	
Description of Excavation: **N/a**	Description of Arisings: **N/A**
Description of Access Road: **Forestry felled but not cleared for floating access road.**	Description of Dewatering: **N/A**
Description of Watercourses/Drainage on Site: **Some existing forestry drainage in area.**	
Description/Cause of Failure: **No failure of intact peat.**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **N/A**
Description of Material above Failure Plane: **N/A**	
Description of Incipient Instability: **N/A**	
Location/Ref. of Instability: **N/A**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List) **N/A**	Photographs Taken: (List) **N/A**

Geotechnical Mapping Sheet

Project: Derrybrien Landslide

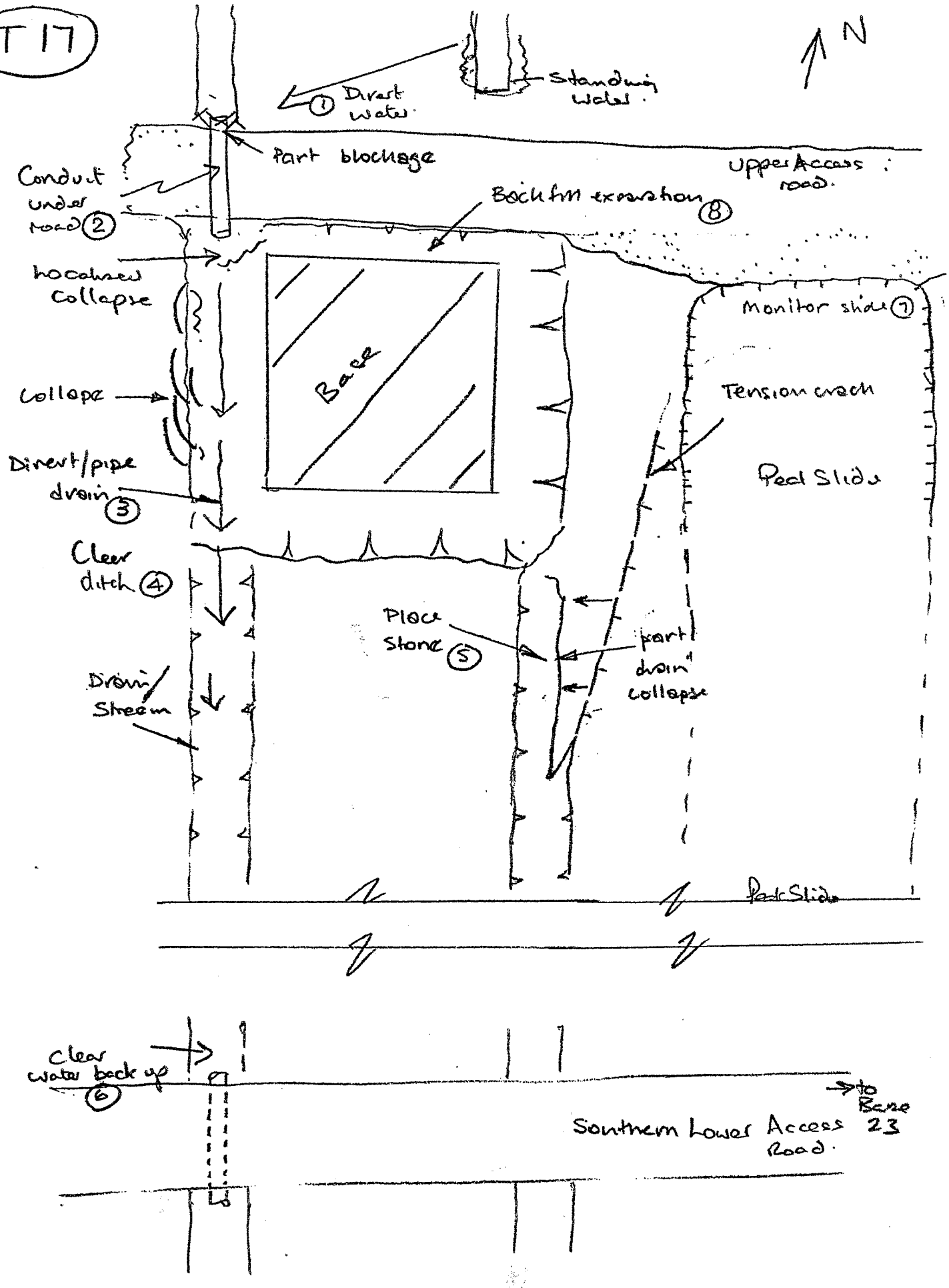
Site Reference: **T17**	Mapped/Date: **AL/PJ 31/10/03 & 1/11/03**
Description of Site: **Site is partially forested with mature trees upslope and immature trees downslope. Site is located towards the southwest of the wind farm. Site slopes to south at between 2 and 4 degs. Excavation for base complete, and base constructed.**	
Description of Excavation: **Excavation approximately 3m deep in peat with base on bedrock. Sideslopes about 45 degrees. Water flowing through excavation.**	Description of Arisings: **Arisings stockpiled to the south of the access road. Arisings are absent and assumed to have been involved in failure, see below.**
Description of Access Road: **Access road constructed from east up to base location. Access road has not been completed west of base.**	Description of Dewatering: **Ditch on downslope side of excavation drains water from within excavation.**
Description of Watercourses/Drainage on Site: **Two drainage lines, 15 m apart aligned N-S pass through base excavation. West drain is active, east drain is backing up upslope of road though there does not appear to be any active flow.**	
Description/Cause of Failure**: Failure located to 10m east of excavation. The head of the failure is coincidental with downslope edge of access road. Details of failure are as follows:** • **Possible diversion of east drain flow into head of failure; though no active flow apparent in drain during survey.** • **Arisings placed at head of failure, which would have increased applied load on slope.** • **Failure appears to be peat slide.** • **Lateral oblique tension crack to west of head of failure has partly closed drain, though no flow in drain.** • **Failure volume estimated as 2000 m^3.** • **Deposition lobes have come to rest on shallower peat thickness where slope angles are decreasing. Peat depth below lobes is about 1.8m, with peat depths reducing downslope to about 1m.** • **No evidence of failure of in situ peat below deposition lobes; no apparent significant movement at lobes.**	
Failure Location & Orientation: **From access road beside base T17 downslope in southerly direction.**	Width Dimension of Failure Scar: **Failure width about 22m.**
Length Dimension of Failure Scar: **Failure length 140m; of which upper 85m is failure within in situ peat.**	Angle/Shape of Failure Plane: **Concave slope with failure plane parallel to base of peat layer.**
Failure Material Thickness: **Depth to failure plane is typically 1.5 to 2 m bgl, and appears to be at base of peat layer**	Description of Failure Plane: **failure plane is parallel to base of peat and translational.**
Travel Distance of Failed Material: **Travel distance is about 130m; the last 45m comprises run-out beyond failure scar.**	Seepage/Water Description: **Some ponding of water in failure, though no concentrated water flow into failure scar.**
Description of Material above Failure Plane: **Very soft fibrous peat**	

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 2 of 4

Site Reference: **T17**	Mapped/Date: **AL/PJ 31/10/03 & 1/11/03**
Description of Incipient Instability: **Minor slumping of sidewall of excavation where west drain enters. Lateral oblique tension crack to west of failure head is failing into drain causing part collapse of drain.**	
Location/Ref. of Instability: **See attached**	Length of Crack: **+10**
Average Width of Crack: **0.2m (?)**	Average Depth of Crack: **1.5(?)**
Sketches Attached: (List) **see sheet 3 of 4**	Photographs Taken: (List) **see sheet 3 of 4**

T17


N
① Direct Water
Standing Water
Part blockage
Conduit under road ②
Upper Access road.
Backfill excavation ⑧
Localised Collapse
Monitor slide ⑦
Back
Collapse
Tension crack
Direct/pipe drain ③
Peat Slide
Clear ditch ④
Place Stone ⑤
part drain collapse
Drain/ Stream
Peat Slide
Clear water back up ⑥
to Base 23
Southern Lower Access Road.

ACEC
AKL

Geotechnical Mapping Sheet

Project: Derrybrien Landslide

T17 - East of Turbine Base Looking Downslope of Failure.

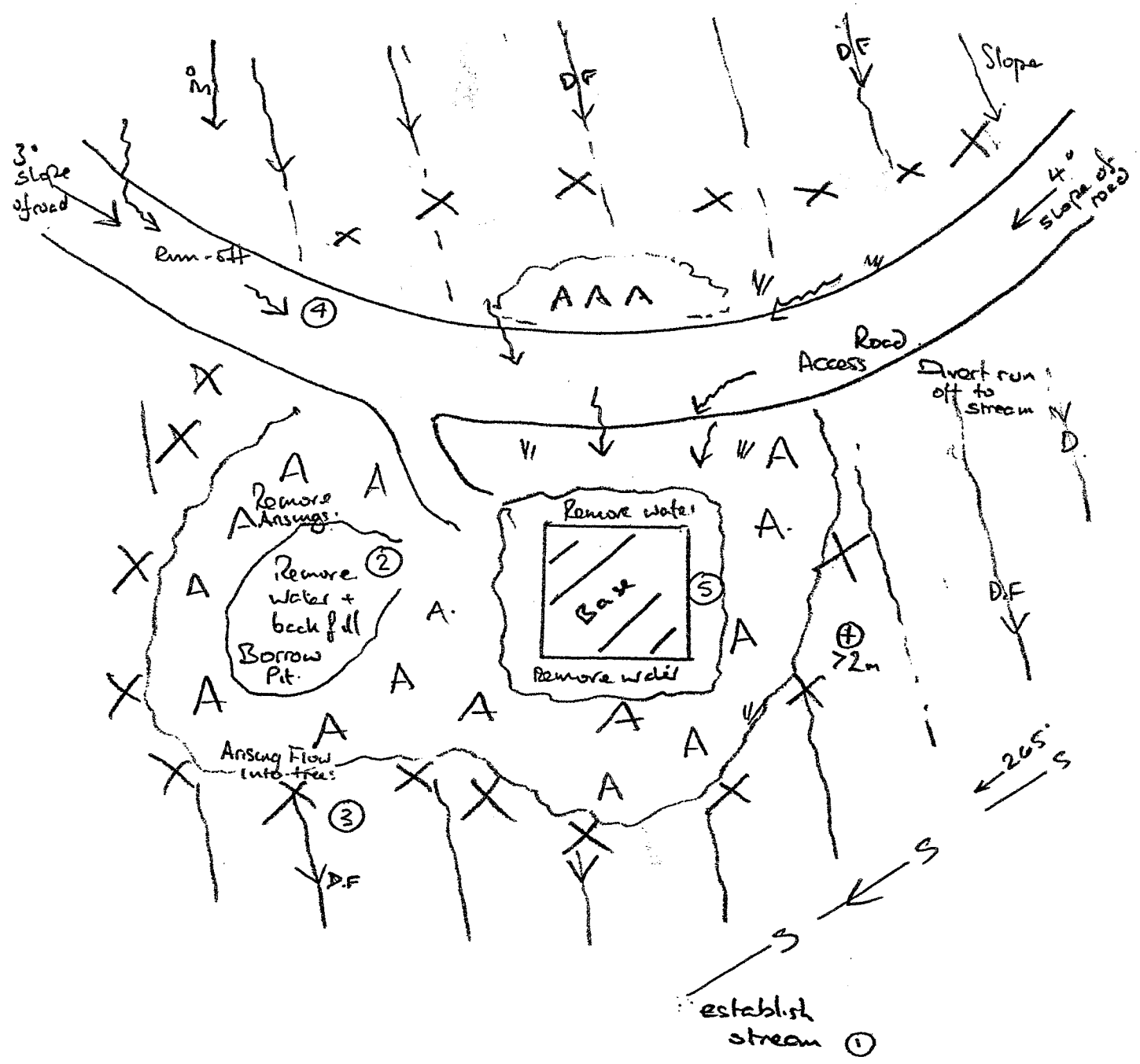
T17 - South of Failure Looking upslope

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 2

Site Reference: **T18**	Mapped/Date: **DB & TPJ 01/11/03**
Description of Site: **Site is within the forest. Site slopes to south to southwest at 4 to 6°. Site is mostly on shallow convex slope.** **Peat thickness is 1.2 to 1.7m thick.**	
Description of Excavation: **Excavation is inundated with water and depth is unknown.**	Description of Arisings: **Arisings to the south, southwest and northeast of the excavation. Arisings comprise peat and weathered bedrock. Arisings have flowed into the tree line into the forest. Lobe arisings dims are 70m by 120m wide, average height is 1.25m.**
Description of Access Road: F**loating Road running south southwest to north direction.**	Description of Dewatering: **Not Known**
Description of Watercourses/Drainage on Site**: Large drainage channel running 265° and is blocked by arisings. Dims are 0.75 deep, 1.25 depth and fast flowing. This large drain does flow into two forest furrows flowing south-southwest direction.** **9 No. forest furrows are blocked by arisings on the upslope side with standing water in some of the blocked furrows.**	
Description/Cause of Failure: **N/A**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **Ponding within the arisings.**
Description of Material above Failure Plane: **N/A**	
Description of Incipient Instability: **N/A**	
Location/Ref. of Instability: **N/A**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

T18



—S→— Stream (flow direction)

~~→ Seepage

AAA Arisings

X X X Tree line

V V Waterlogged ground

2°→ Slope

⊕ depth of Peat

→DF→ Drainage Furrow

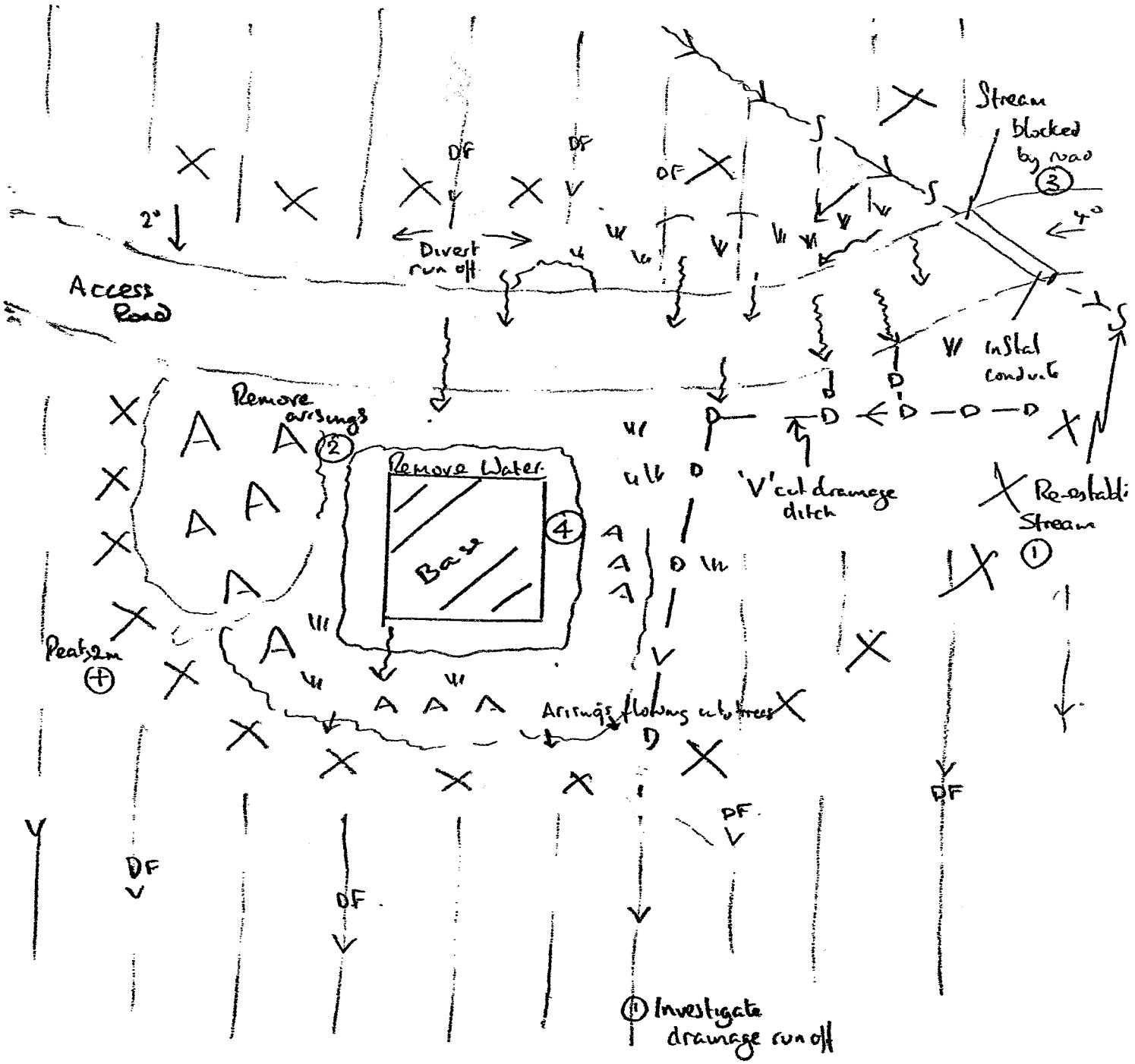
AGEC
AKL
2/11/03

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 2

Site Reference: **T19**	Mapped/Date: **DB & TPJ 01/11/03**
Description of Site: **Site is within the forest. Site slopes to south to southwest at 4 to 6°. Site is mostly on shallow convex slope.** **Peat thickness is greater than 2m.**	
Description of Excavation: **Excavation is inundated with water and depth is unknown.**	Description of Arisings: **Arisings to the south, southwest and northeast of the excavation. Arisings comprise peat, glacial till and weathered bedrock. Arisings have flowed into the tree line into the forest. Lobe arisings average height is 1.25m.**
Description of Access Road: **Floating Road running south to southwest direction.**	Description of Dewatering: **Not Known**
Description of Watercourses/Drainage on Site**: Large drainage channel running 265° to the southeast of the arisings (outside site boundary). Dims are 0.75 deep, 1.25 depth and fast flowing.** **Forest furrows are blocked by arisings on the downslope side with standing water in some of the blocked furrows.** **Further large drain on upslope side of road bearing 292° is blocked by road and overflow is flowing down the north-south furrows and is saturating the ground behind the base and also to the east. There are no obvious conduits under the road and seepage is almost continuous through the length of the road.** **The v-ditch to the south of the road picks up some of the water seeping through the road. This is then channelled down furrows, past the base. However, the existing stream has been blocked and is not functioning.**	
Description/Cause of Failure: **N/A**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **Ponding within the arisings.**
Description of Material above Failure Plane: **N/A**	
Description of Incipient Instability: **N/A**	
Location/Ref. of Instability: **N/A**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

T19



— DF → Drainage furrow (+direction)

Seepage

AA Arisings

XX Tree line

Waterlogged

Slope

⊕ Depth of peat.

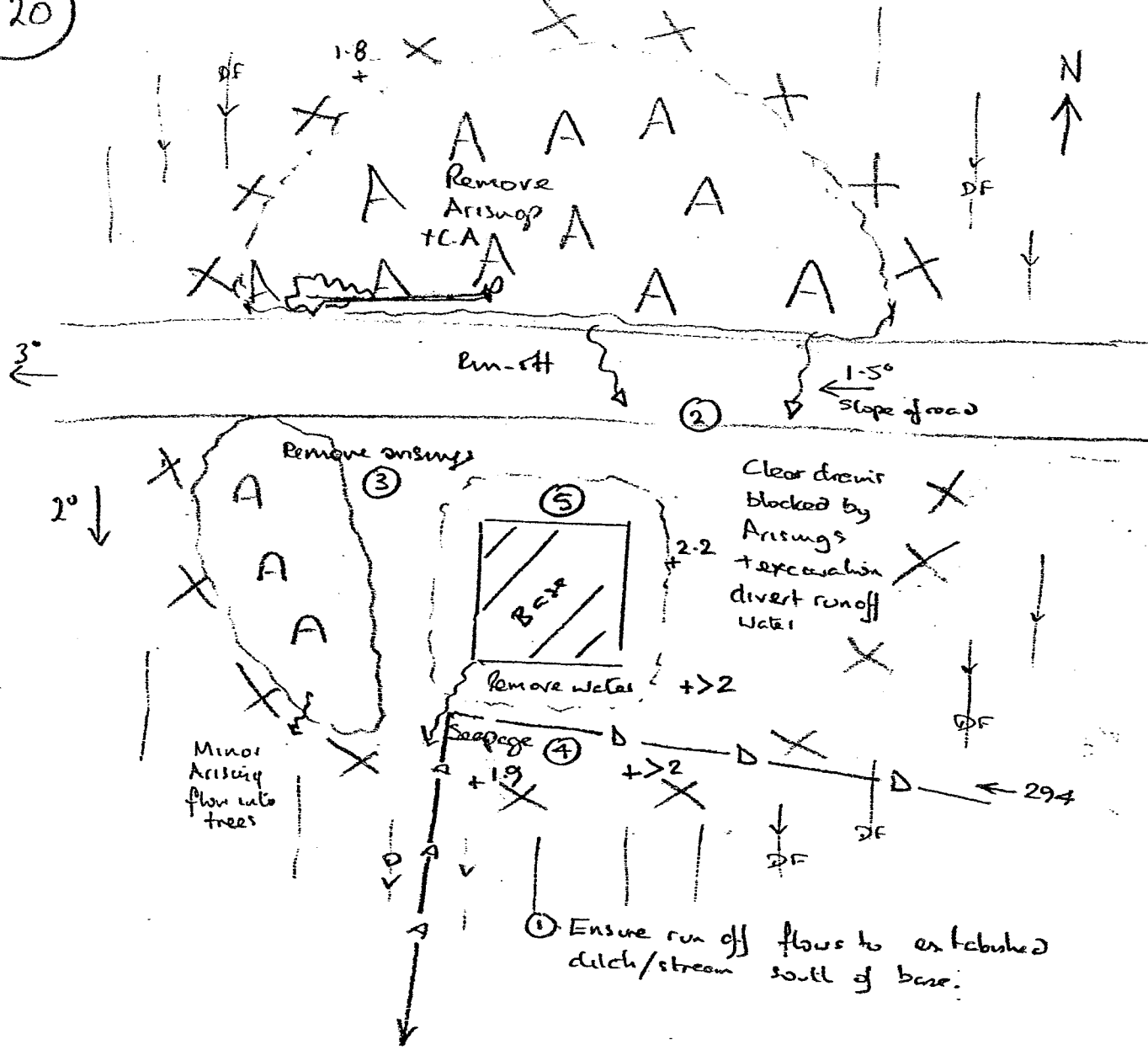
AGEC
AKL
2/11/03

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 2

Site Reference: **T20**	Mapped/Date: **AL 31/10/03**
Description of Site: **Site is within the forest. Site slopes to south to southwest at 2 to 4°. Site is mostly on shallow uniform slope.** **Peat thickness is greater than 2m.**	
Description of Excavation: **Excavation is inundated with water and depth is unknown.**	Description of Arisings: **Arisings to the north and west of the excavation. Arisings comprise peat and glacial till. Minor slumping of arisings.**
Description of Access Road: **Floating road running south to southwest direction.**	Description of Dewatering: **Not Known**
Description of Watercourses/Drainage on Site: **Seepage from south to southwest of excavation. Localised blockage of forest furrows and drain to south by fallen trees.**	
Description/Cause of Failure: **N/A**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **Ponding within the arisings.**
Description of Material above Failure Plane: **N/A**	
Description of Incipient Instability: **N/A**	
Location/Ref. of Instability: **N/A**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

120



DF→ Drainage Furrow (Direction of flow)
D→ Drainage Ditch
AA Arisings
× Tree line
2°→ Slope
+1.8 Peat thickness 1.8m

AGEC
AKL Sheet 2 of 2
2/11/03

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

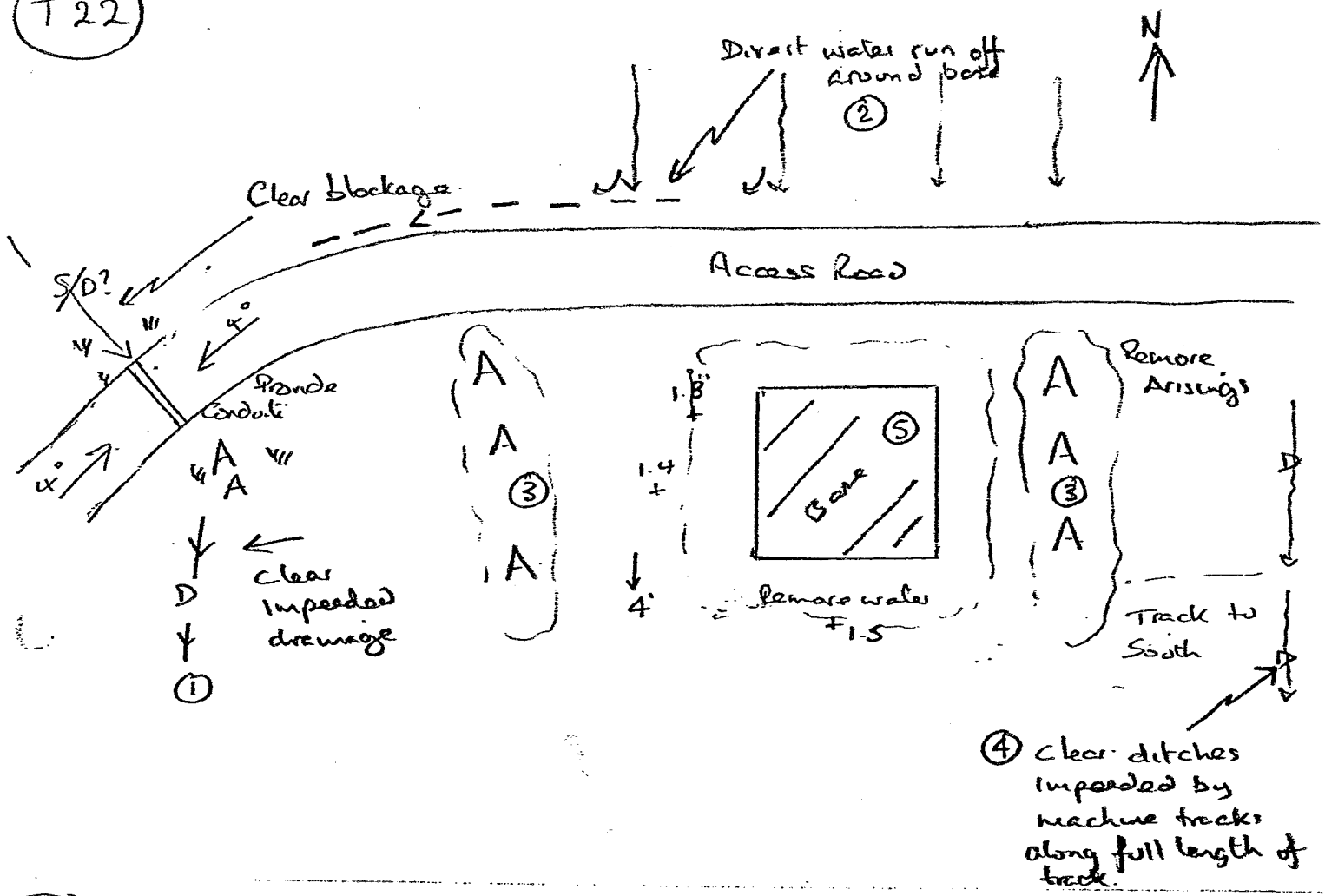
Site Reference: **T21**	Mapped/Date: **AL 31/10/03**
Description of Site: **Site is within the forest. Site slopes to south to southwest at 3°. Site is mostly on shallow uniform slope.** **Peat thickness is greater than 2m.**	
Description of Excavation: **Excavation is inundated with water and depth is unknown.**	Description of Arisings: **Arisings to the north and west of the excavation. Arisings comprise peat and glacial till. Minor slumping of arisings.**
Description of Access Road: **Floating road running south to southwest direction.**	Description of Dewatering: **Not Known**
Description of Watercourses/Drainage on Site: **Seepage from south to southwest of excavation. Localised blockage of forest furrows.**	
Description/Cause of Failure: **N/A**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **Ponding within the arisings.**
Description of Material above Failure Plane: **N/A**	
Description of Incipient Instability: **N/A**	
Location/Ref. of Instability: **N/A**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

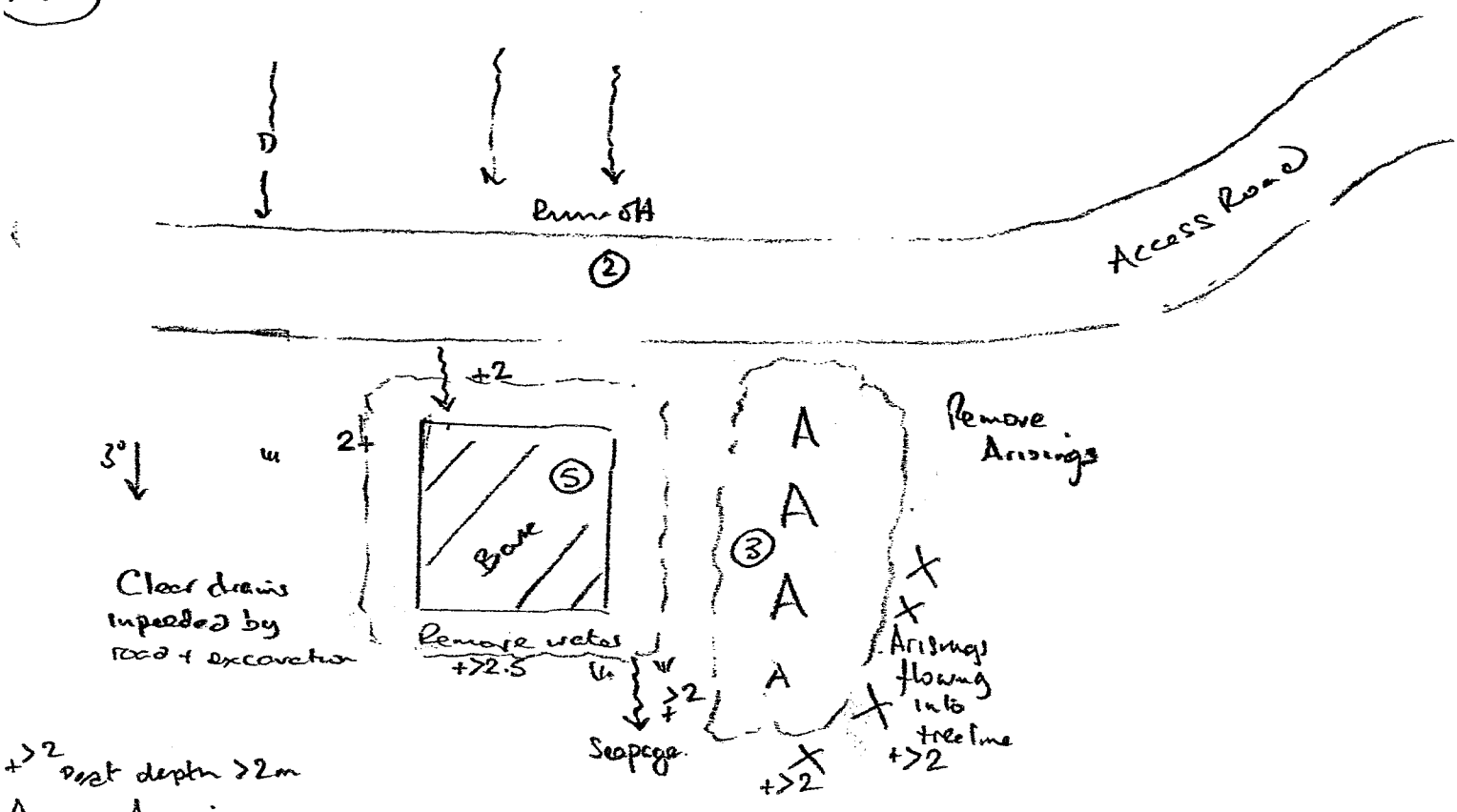
Project: Derrybrien Landslide Sheet No 1 of 2

Site Reference: **T22**	Mapped/Date: **AL 31/10/03**
Description of Site: **Site is within the forest. Site slopes to south to southwest at 3°. Site is mostly on shallow uniform slope.** **Peat thickness is between 1.5 and greater than 2m.**	
Description of Excavation: **Excavation is partly inundated and depth is unknown.**	Description of Arisings: **Arisings to the east and west of the excavation. Arisings comprise peat and glacial till. Minor slumping of arisings.**
Description of Access Road: **Floating Road running south to southwest direction.**	Description of Dewatering: **Not Known**
Description of Watercourses/Drainage on Site: **Blockage of stream/drain to west by road.**	
Description/Cause of Failure: **N/A**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **Ponding within the arisings.**
Description of Material above Failure Plane: **N/A**	
Description of Incipient Instability: **N/A**	
Location/Ref. of Instability: **N/A**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

T22



T21



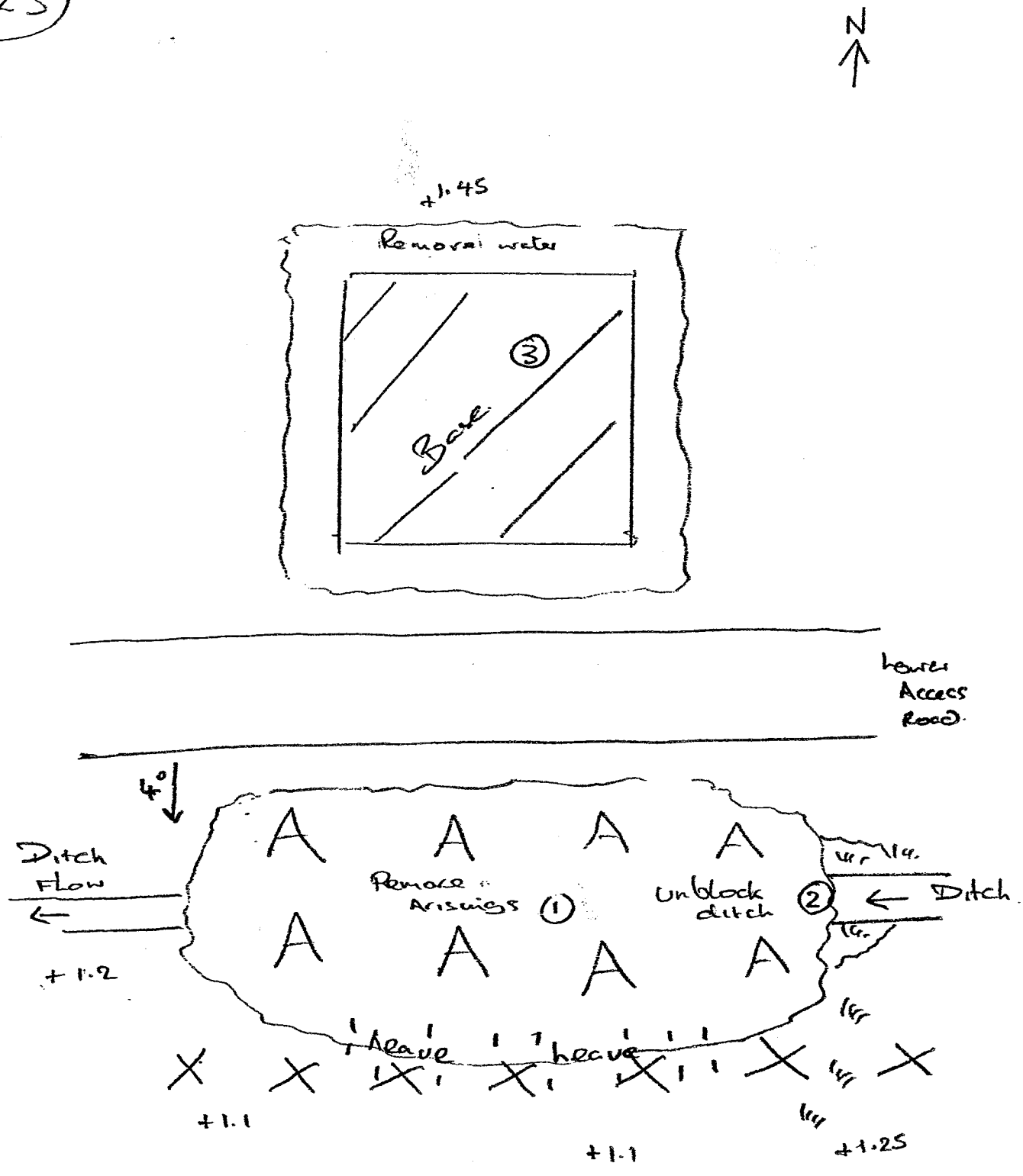
AGEC
AKL
2/11/03

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 2

Site Reference: **T23**	Mapped/Date: **AL/PJ 31/10/03 & 1/11/03**
Description of Site: **Site is partially forested downslope of base with small immature trees to north. Site is located towards the southwest of the wind farm. Site slopes to south at 2 to 4 degs. Excavation for base complete, and base constructed.**	
Description of Excavation: **Excavation inundated with water, depth not known. Sideslopes about 45 degrees.**	Description of Arisings: **Arisings stockpiled to the south of the access road. Arisings consist of peat and till and extend some 20m by 40m. A drainage ditch has been blocked by the arisings causing back-up of water to the east.**
Description of Access Road: **Access road is a floating road aligned east-west.**	Description of Dewatering: **Not known.**
Description of Watercourses/Drainage on Site: **Two drainage lines, 15 m apart aligned N-S pass some distance to west of base excavation.**	
Description/Cause of Failure**: Failure comprises bearing failure of in situ peat underlying arisings resulting in heaving of ground. Heave is about 2m. There has possibly been trafficking of plant over arisings which has contributed to heave.**	
Failure Location & Orientation: **South of arisings within tree-line.**	Width Dimension of Failure Scar**: Heave is limited to a few meters width along edge of arisings**
Length Dimension of Failure Scar: **Assumed 20 to 40m.**	Angle/Shape of Failure Plane: **Translational/circular bearing failure surface.**
Failure Material Thickness: **Depth to failure plane is typically less than 1.5 m.**	Description of Failure Plane: **Plane not visible.**
Travel Distance of Failed Material: **None**	Seepage/Water Description: **None**
Description of Material above Failure Plane: **Very soft fibrous peat**	
Description of Incipient Instability: **None**	
Location/Ref. of Instability: **N/A**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List) **N/A**	Photographs Taken: (List) **N/A**

23


N
+1.45
Removal water
3
Bank
Leaves Access Road
4°
Ditch Flow
+1.2
Remove Arisings
1
Unblock ditch
2
Ditch
Leave
Leave
+1.1
+1.1
+1.25

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T24**	Mapped/Date: **DB & KG 11/11/03**
Description of Site: **Site is east of T24 and is located at the centre of the wind farm. Site slopes to south at 4°. Base has been constructed**. **Peat thickness is 1.0m thick on shallow slope.**	
Description of Excavation: **Excavation in peat over mineral soil over glacial till.**	Description of Arisings: **Arisings up to 2.5m high to the North and West of the access road and base.**
Description of Access Road: **Running in an North South direction.**	Description of Dewatering: **Not known**
Description of Watercourses/Drainage on Site: **Drainage channel runs North-South along the eastern side of the base**	
Description/Cause of Failure: **N/A.**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **N/A**
Description of Material above Failure Plane: **N/A**	
Description of Incipient Instability: **N/A**	
Location/Ref. of Instability: **N/A**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T25**	Mapped/Date: **DB & KG 11/11/03**
Description of Site: **Site is south of T24 and is located to the South of the wind farm, to the West of the access road to T24 to T26 at its junction with access road (T17-T25). Site slopes at 3° to the South. Base excavation is complete. Peat thickness is 1.8m.**	
Description of Excavation: **Excavation in peat over mineral soil over glacial till.**	Description of Arisings: **Arisings occur to the North and East of the site. Further arisings occur 15m to the south of the base West and South (across the access road) from the excavation. The arisings are 1m high.**
Description of Access Road: **Running in an East-West direction and North South direction.**	Description of Dewatering: **N/A**
Description of Watercourses/Drainage on Site: **30m west of base flowing North-South, blocked by arisings**	
Description/Cause of Failure: **Localised slumping of the northeastern corner of the base. Micro-Cracking of the T25-T26 access road, 20m south of the base, east of the southern arisings occur. These run in an east west direction for the full width of the access road and cease to the south of the lower arisings.**	
Failure Location & Orientation:	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar:**N/A.**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **N/A**
Description of Material above Failure Plane: **N/A**	

Description of Incipient Instability: **N/A**	
Location/Ref. of Instability: **N/A**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T26**	Mapped/Date: **ML/DB 20&21/10/03**
Description of Site: **Site is forested and is located towards the southern part of the wind farm. Site slopes to south at 6 degs. and is downslope from T25. Excavation for base complete.**	
Description of Excavation: **Excavation approximately 2m in peat over 0.30m soft silty grey silt over 0.60m glacial till.**	Description of Arisings: **Arisings stockpiled to the east and west of the excavation and south of the access road, ground was saturated around arisings.**
Description of Access Road: **Access road running in an east west direction. No obvious settlement.**	Description of Dewatering: **Not known**
Description of Watercourses/Drainage on Site: **N/A**	
Description/Cause of Failure: **No indication of failure.**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A**	Angle/Shape of Failure Plane:**N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **Seepage at northeast corner of the excavation.**
Description of Material above Failure Plane: **N/A**	
Description of Incipient Instability: **N/A**	
Location/Ref. of Instability: **N/A**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T27**	Mapped/Date: **DB & KG 11/11/03**
Description of Site: **Site is located at the centre of the wind farm, to the North of the access road for turbine bases T27-T44. Site slopes to south at 3° and at 2° to the east. Excavation has been completed and ponding has occurred. Peat thickness is > 2m thick on shallow slope.**	
Description of Excavation: **Excavation in peat over mineral soil over glacial till.**	Description of Arisings: **Arisings 2m high (20x40m in plan) were recorded at a distance 30m to the East of the base, and 0.5m high, (20x27m in plan) at a distance of 15m to the West of the base.**
Description of Access Road: **Running in an East-West direction.**	Description of Dewatering: **Not known**
Description of Watercourses/Drainage on Site: **None Noted**	
Description/Cause of Failure: **Side slope instability noted at Northern part of excavation**	
Failure Location & Orientation: **Horizontal tension cracks (24m long in an East West direction) noted at 2.4m North of the base, and (20m long in an East West direction) at 18.5m North of the base.**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **24 and 20m.**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **N/A**
Description of Material above Failure Plane: **N/A**	

Description of Incipient Instability: **N/A**	
Location/Ref. of Instability: **N/A**	Length of Crack: **20m-24m.**
Average Width of Crack: **<0.4m**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T28**	Mapped/Date: **DB 12/11/03**
Description of Site: **Site is west of T31 and is located to the East of the wind farm, to the North of the access road T26 to T46. Site slopes at 3° to the West. Base excavation is complete. Peat thickness is >2.4m.**	
Description of Excavation: **Excavation in peat over mineral soil over glacial till.**	Description of Arisings: **Arisings occur to the West, 1.5m high (85mx15m in plan).**
Description of Access Road: **Running in an East-West direction.**	Description of Dewatering: **N/A**
Description of Watercourses/Drainage on Site: **The East-West access road drain is blocked by the turbine access road. An old excavated peat channel lies to the west of the arisings. A dry drainage ditch occurs to the east (running North–South) of the base.**	
Description/Cause of Failure: **N/A**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A.**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **N/A**
Description of Material above Failure Plane: **N/A**	
Description of Incipient Instability: **N/A**	
Location/Ref. of Instability: **N/A**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 2

Site Reference: **T29**	Mapped/Date: **DB & AL 21/10/03**
Description of Site: **Site is east of proposed substation and compound and is located on the southern boundary of the wind farm. Site slopes to south at 2° to 4°. Base has been constructed**. **Peat thickness is >2m thick on shallow slope.**	
Description of Excavation: **Excavation in 2m of peat, 15m wide by 17m long.**	Description of Arisings: **Arisings 27m long, 8m wide and 1m high. Arisings generally glacial till placed near tree line south of access road.**
Description of Access Road: **Running in an east west direction.**	Description of Dewatering: **Not known**
Description of Watercourses/Drainage on Site: **Drainage line (possibly natural line) runs N-S south of of access road, this area is very saturated.**	
Description/Cause of Failure: **Bearing failure of underlying intact peat. Arisings have slumped and flowed a small distance into forestry forming a lobe. The lobe has caused bearing failure of the underlying peat which has been displaced vertically upwards and outwards from under lobe.**	
Failure Location & Orientation: **South of access road, within the forestry.**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **1.5m**	Description of Failure Plane: **Shallow circular failure.**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **Drainage line east of failure.**
Description of Material above Failure Plane: **Very soft fibrous peat**	
Description of Incipient Instability: **Cracks within area of bearing failure.**	
Location/Ref. of Instability: **South of access road.**	Length of Crack: **greater than 1m.**
Average Width of Crack: **greater than 0.10m**	Average Depth of Crack: **greater than 1m**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide

T29 – Bearing Failure South of Access Road and Arisings.

T29 – Tension Crack at Tree Line

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T30**	Mapped/Date: **DB & KG 11/11/03**
Description of Site: **Site is east of T27 and is located at the east of the wind farm, to the North of the access road to T27-T44. Site appears to be at the brow of a hill and slopes to south at 3° and at 3° to the North. No Excavation has taken place. Peat thickness is > 2.4m.**	
Description of Excavation: **N/A**	Description of Arisings: **N/A**
Description of Access Road: **Running in an East-West direction.**	Description of Dewatering: **N/A**
Description of Watercourses/Drainage on Site: **Drain along road edge is blocked, Old drainage ditch/previous access road 3m wide to the south of the access road.**	
Description/Cause of Failure: **N/A**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar:**N/A.**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **N/A**
Description of Material above Failure Plane: **N/A**	
Description of Incipient Instability: **N/A**	
Location/Ref. of Instability: **N/A**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T31**	Mapped/Date: **DB 12/11/03**
Description of Site: **Site is west of T34 and is located to the East of the wind farm, to the North of the access road T26 to T46. Site slopes at 2° to the North and East. No construction has occurred**. **Peat thickness is >2.4m.**	
Description of Excavation: **N/A**	Description of Arisings: **N/A**
Description of Access Road: **Running in an East-West direction.**	Description of Dewatering: **N/A**
Description of Watercourses/Drainage on Site: **A v-ditch drain runs North-South to the West of the proposed base. A deep drain is present to the south of the access road.**	
Description/Cause of Failure: **N/A**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A.**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **N/A**
Description of Material above Failure Plane: **N/A**	
Description of Incipient Instability: **N/A**	
Location/Ref. of Instability: **N/A**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T32**	Mapped/Date: **DB & AL 21/10/03**
Description of Site: **Site is east of T29 and is located on the southern boundary of the wind farm. Site slopes to south at 5°. Base has been constructed**. **Peat thickness is >1m thick on shallow slope.**	
Description of Excavation: **Excavation in peat over mineral soil over glacial till, 15m wide by 17m long.**	Description of Arisings: **Arisings to east of the excavation and to the south of the access road.**
Description of Access Road: **Running in an east west direction. Slowing down water flow from drainage channels upslope.**	Description of Dewatering: **Not known**
Description of Watercourses/Drainage on Site: **Drainage line runs N-S south to the east of the excavation, drainage line infilled in areas during excavation works. Drainage channel running in a west east direction and 2.5m wide.**	
Description/Cause of Failure: **N/A.**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **N/A**
Description of Material above Failure Plane: **N/A**	

Description of Incipient Instability: **N/A**	
Location/Ref. of Instability: **N/A**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T33**	Mapped/Date: **DB & KG 11/11/03**
Description of Site: **Site is east of T30 and is located to the North-East of the wind farm, to the North of the access road to T27-T44. Site appears to be at the crest of a hill and slopes to south at 3˚ and at 3˚ to the North. No Excavation has taken place. Peat thickness is > 2.4m.**	
Description of Excavation: **N/A**	Description of Arisings: **N/A**
Description of Access Road: **Running in an East-West direction.**	Description of Dewatering: **N/A**
Description of Watercourses/Drainage on Site: **Channel runs North-South, to the West of the base.**	
Description/Cause of Failure: **Some localised tension cracking around edges of the access road.**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar:**N/A.**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **N/A**
Description of Material above Failure Plane: **N/A**	
Description of Incipient Instability: **N/A**	
Location/Ref. of Instability: **N/A**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T34**	Mapped/Date: **DB 12/11/03**
Description of Site: **Site is west of T37 and is located to the East of the wind farm, to the North of the access road T26 to T46. Site slopes at 3-6° to the North. Excavation is complete. Peat thickness is >2.4m.**	
Description of Excavation: **Excavation in peat over mineral soil over glacial till.**	Description of Arisings: **Arisings occur to the North West of the base and appear to have spread/slumped**
Description of Access Road: **Running in an East-West direction.**	Description of Dewatering: **N/A**
Description of Watercourses/Drainage on Site: **A v-ditch drain runs East West terminating 10-15m to the east of the base in a North-South trending old excavated peat trench. A north –south trending drain is present 15-20m west of the base and is not evident beyond the arising, possibly because of infilling by the excavated material. The access road drain is blocked by the turbine road construction.**	
Description/Cause of Failure: **The excavated material appears to have flowed some 80-130m downslope.**	
Failure Location & Orientation: **Steep slope and ponding water**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A.**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **80-130m**	Seepage/Water Description: **N/A**
Description of Material above Failure Plane: **N/A**	

Description of Incipient Instability: **N/A**	
Location/Ref. of Instability: **N/A**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T35**	Mapped/Date: **DB & AL 21/10/03**
Description of Site: **Site is east of T32 and is located in the forest on the southern boundary of the wind farm. Site slopes to south at 4°. Base has been constructed**. **Peat thickness is 0.75m thick on shallow slope.**	
Description of Excavation: **Excavation in peat over mineral soil over glacial till.**	Description of Arisings: **Arisings to east and west of the excavation and to the south of the access road.**
Description of Access Road: **Running in an east west direction. Slowing down water flow from drainage channels upslope.**	Description of Dewatering: **Not known**
Description of Watercourses/Drainage on Site: **Drainage line runs NW-SE to the west of the excavation.**	
Description/Cause of Failure: **N/A.**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **N/A**
Description of Material above Failure Plane: **N/A**	

Description of Incipient Instability: **N/A**	
Location/Ref. of Instability: **N/A**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T36**	Mapped/Date: **DB & KG 11/11/03**
Description of Site: **Site is east of T33 and is located to the North-East of the wind farm, to the South of the access road to T27-T44. Site is relatively flat in area of proposed base and slopes gently (≤ 3°) thereafter to the south. No Excavation has taken place. Peat thickness is > 2.4m.**	
Description of Excavation: **N/A**	Description of Arisings: **N/A**
Description of Access Road: **Running in an East-West direction.**	Description of Dewatering: **N/A**
Description of Watercourses/Drainage on Site: **Old drainage ditch/previous access road 3m wide to the south of the base location.**	
Description/Cause of Failure:	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar:**N/A.**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **N/A**
Description of Material above Failure Plane: **N/A**	
Description of Incipient Instability: **N/A**	
Location/Ref. of Instability: **N/A**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T37**	Mapped/Date: **DB & KG 11/11/03**
Description of Site: **Site is west of T40 and is located to the East of the wind farm, to the North of the access road T26 to T46. Site slopes at 3.5° to the South and 2° to the east. Base excavation is complete**. **Peat thickness is 1.5-2.0m.**	
Description of Excavation: **Excavation in peat over mineral soil over glacial till.**	Description of Arisings: **Arisings occur to the East, 1.5m high (70mx8m in plan), and to the South, 1m high (15mx10m in plan).**
Description of Access Road: **Running in an East-West direction.**	Description of Dewatering: **N/A**
Description of Watercourses/Drainage on Site: **The access road drain, to the North of the base has been blocked by arisings. Old peat excavated channels exist to the east and west of the base.**	
Description/Cause of Failure: **Localised failure at the face of the excavation in the South-West corner, where spoil heap is closest to excavation.**	
Failure Location & Orientation: **Localised failures of east and west excavated faces evident**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A.**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **N/A**
Description of Material above Failure Plane: **N/A**	
Description of Incipient Instability: **N/A**	
Location/Ref. of Instability: **N/A**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T38**	Mapped/Date: **DB & AL 21/10/03**
Description of Site: **Site is east of T35 and is located within the forestry on the southern boundary of the wind farm. Site slopes to south at 3°. Base has been constructed**. **Peat thickness is 0.75m thick on shallow slope.**	
Description of Excavation: **Excavation in peat over mineral soil over bedrock.**	Description of Arisings: **Arisings to east and west of the excavation and to the south of the access road.**
Description of Access Road: **Running in an east west direction.**	Description of Dewatering: **Not known**
Description of Watercourses/Drainage on Site: **Drainage line runs from west and east meeting at the south of the access road then running south.**	
Description/Cause of Failure: **N/A.**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **N/A**
Description of Material above Failure Plane: **N/A**	
Description of Incipient Instability: **N/A**	
Location/Ref. of Instability: **N/A**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T39**	Mapped/Date: **DB & KG 11/11/03**
Description of Site: **Site is east of T36 and is located to the North-East of the wind farm, to the South of the access road to T27-T44. Site slopes at 2° to the North and 3° to the East. No Excavation has taken place. Peat thickness is > 2.4m.**	
Description of Excavation: **N/A**	Description of Arisings: **N/A**
Description of Access Road: **Running in an East-West direction.**	Description of Dewatering: **N/A**
Description of Watercourses/Drainage on Site: **Old drainage ditch/previous access road 3m wide to the south of the base location.**	
Description/Cause of Failure:**.**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar:**N/A.**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **N/A**
Description of Material above Failure Plane: **N/A**	
Description of Incipient Instability: **N/A**	
Location/Ref. of Instability: **N/A**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T40**	Mapped/Date: **DB 12/11/03**
Description of Site: **Site is east of T37 and is located to the East of the wind farm, to the Nortth of the access road T25 to T45. Site slopes at 3° to the South. Base excavation is complete. Peat thickness is 2.0m.**	
Description of Excavation: **Excavation in peat over mineral soil over glacial till.**	Description of Arisings: **Arisings occur to the West, 1m high (35mx8m in plan), to the South, 2m high (20mx5m in plan) and to the East, 1m high (35x8m in plan).**
Description of Access Road: **Running in an East-West direction.**	Description of Dewatering: **N/A**
Description of Watercourses/Drainage on Site: **The access road drain, to the South of the base has been blocked by arisings.**	
Description/Cause of Failure: **N/A**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A.**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **N/A**
Description of Material above Failure Plane: **N/A**	
Description of Incipient Instability: **N/A**	
Location/Ref. of Instability: **N/A**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T41**	Mapped/Date: **DB & AL 21/10/03**
Description of Site: **Site is east of T38 and is located within the forestry on the southern boundary of the wind farm. Site slopes to south at 3°. Base has been constructed**. **Peat thickness is 1.5m thick on shallow slope.**	
Description of Excavation: **Excavation in peat over mineral soil over glacial till.**	Description of Arisings: **Arisings to the south of the access road. The arisings have blocked drain and have flowed into the tree line.**
Description of Access Road: **Running in an east west direction.**	Description of Dewatering: **Not known**
Description of Watercourses/Drainage on Site: **Drainage line runs in an east west direction at the south of the access road. Drain blocked by peat arising, arisings saturated around drain line.**	
Description/Cause of Failure: **N/A.**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **N/A**
Description of Material above Failure Plane: **N/A**	
Description of Incipient Instability: **N/A**	
Location/Ref. of Instability: **N/A**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T42**	Mapped/Date: **DB & KG 11/11/03**
Description of Site: **Site is east of T39 and is located to the North-East of the wind farm, to the North of the access road to T27-T44. Site slopes at 4° to the East. Base construction is complete. Peat thickness is 2.1m.**	
Description of Excavation: **Excavation in peat over mineral soil over glacial till.**	Description of Arisings: **Arisings occur approx 20m to the East, West and South (across the access road) from the excavation. The arisings are 0.5-1m high, show signs of slumping.**
Description of Access Road: **Running in an East-West direction.**	Description of Dewatering: **N/A**
Description of Watercourses/Drainage on Site: **Old drainage ditch/previous access road 3m wide to the south of the base location. A drainage channel has been excavated in an easterly direction from the North East corner of the base. This is blocked by arisings.**	
Description/Cause of Failure: **Slumping of the Northern face of the base is evident.**	
Failure Location & Orientation:	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **N/A**
Description of Material above Failure Plane: **N/A**	
Description of Incipient Instability: **Tension crack 20m upslope to the west of the base, terminating at the base.**	
Location/Ref. of Instability: **N/A**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T43**	Mapped/Date: **DB & KG 11/11/03**
Description of Site: **Site is east of T40 and is located to the East of the wind farm, to the North of the access road to T26 to T46. Site slopes at 5° to the South. Base excavation is complete**. **Peat thickness is 1.5m.**	
Description of Excavation: **Excavation in peat over mineral soil over glacial till.**	Description of Arisings: **Arisings occur to the West, 0.5m high (30mx20m in plan), to the North, 0.5m high (8mx15m in plan) and to the East, 2m high (60x10m in plan).**
Description of Access Road: **Running in an East-West direction.**	Description of Dewatering: **N/A**
Description of Watercourses/Drainage on Site: **A north-south trending drain has been excavated from the South-West corner of the base. This runs to the east-west access road drain.**	
Description/Cause of Failure: **N/A**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A.**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **N/A**
Description of Material above Failure Plane: **N/A**	
Description of Incipient Instability: **N/A**	
Location/Ref. of Instability: **N/A**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T44**	Mapped/Date: **DB & KG 11/11/03**
Description of Site: **Site is east of T42 and is located to the North-East of the wind farm, to the North of the access road to T27-T44. Site slopes at 3° to the East. Base excavation is complete. Peat thickness is 2.3m.**	
Description of Excavation: **Excavation in peat over mineral soil over glacial till.**	Description of Arisings: **Arisings occur approx 20m to the East, West and South (across the access road) from the excavation. The arisings are <1m high.**
Description of Access Road: **Running in an East-West direction.**	Description of Dewatering: **N/A**
Description of Watercourses/Drainage on Site: **Old drainage ditch/previous access road 3m wide to the south of the base location. A drainage channel 2.3m to the north of the base is blocked by arisings.**	
Description/Cause of Failure: **N/A**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar:**N/A.**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **N/A**
Description of Material above Failure Plane: **N/A**	
Description of Incipient Instability: **N/A**	
Location/Ref. of Instability: **N/A**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T45**	Mapped/Date: **DB & KG 11/11/03**
Description of Site: **Site is west of T46 and is located to the East of the wind farm, to the North of the access road T26 to T46. Site slopes at 2° to the South, and 4° to the east. Base excavation is complete. Peat thickness is > 2.0m.**	
Description of Excavation: **Excavation in peat over mineral soil over glacial till.**	Description of Arisings: **Arisings occur 10-15m to West, 1m high (70mx10m in plan), and to the East, 1m high (50x10m in plan).**
Description of Access Road: **Running in an East-West direction.**	Description of Dewatering: **N/A**
Description of Watercourses/Drainage on Site: **The access road drain, to the North of the base has been blocked by arisings. A dry channel exists at the rear of the base.**	
Description/Cause of Failure: **Localised failure at the face of the excavation in the South-West corner, where arisings is closest to excavation.**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A.**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **N/A**
Description of Material above Failure Plane: **N/A**	

Description of Incipient Instability: **N/A**	
Location/Ref. of Instability: **N/A**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T46**	Mapped/Date: **DB & KG 11/11/03**
Description of Site: **Site is south of T45 and is located to the East of the wind farm, to the South of the access road to T26 to T46. Site slopes at 3° to the South. Base excavation is complete. Peat thickness is 1.5m to 1.8m.**	
Description of Excavation: **Excavation in peat over mineral soil over glacial till.**	Description of Arisings: **Arisings occur approx. 20m South (20mx15m in plan) and East (50mx15m in plan) of the site. The arisings are up to 1.5m high.**
Description of Access Road: **Running in an East-West direction.**	Description of Dewatering: **N/A**
Description of Watercourses/Drainage on Site: **Excavated channels/peak harvested areas occur 25m to the east and West of the base. Both channels run in a North South direction, with the eastern channel being 5m wide and 1.2m deep, and the western channel being 10m wide and up to 1.5m deep. A drain runs along the access road.**	
Description/Cause of Failure: **N/A**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar:**N/A.**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **N/A**
Description of Material above Failure Plane: **N/A**	
Description of Incipient Instability: **N/A**	
Location/Ref. of Instability: **N/A**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T47**	Mapped/Date: **PJ & ML 22/10/03**
Description of Site: **Site is forested and is located on the north-western boundary of wind farm. Site slopes to northwest at 1° to 13°. Site is mostly on shallow slope with a scarp slope along northern side. Proposed base for T47 is some 65m south of crest of scarp slope. Scarp slope is about 13°.** **Peat thickness is >2m thick on shallow slope decreasing to about 1.6m on scarp slope and further downslope.**	
Description of Excavation: **None**	Description of Arisings: **None**
Description of Access Road: **None**	Description of Dewatering: **None**
Description of Watercourses/Drainage on Site: **Western boundary v-ditch discharges into existing channel. V-ditch is some 10m to west of proposed base.**	
Description/Cause of Failure: **None**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **Numerous wet areas and springs present along scarp slope. Forestry furrows channel surface water into scarp slope.**
Description of Material above Failure Plane: **N/A**	
Description of Incipient Instability: **Areas of irregular ground along scarp slope. Movement is not recent and does not appear active.**	
Location/Ref. of Instability: **On scarp slope along northern boundary of site.**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T48**	Mapped/Date: **PJ & ML 22/10/03**
Description of Site: **Site is forested and is located on the northern boundary of wind farm. Site slopes to northwest at 2° to 13°. Site is mostly on shallow slope with a scarp slope along northern side. Proposed base for T48 is some 30m south of crest of scarp slope. Scarp slope is about 13°.** **Peat thickness is >2m thick on shallow slope decreasing to about 1m on scarp slope and further downslope.**	
Description of Excavation: **None**	Description of Arisings: **None**
Description of Access Road: **None**	Description of Dewatering: **None**
Description of Watercourses/Drainage on Site: **None**	
Description/Cause of Failure: **None**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **Numerous wet areas and springs present along scarp slope. Forestry furrows channel surface water into scarp slope.**
Description of Material above Failure Plane: **N/A**	

Description of Incipient Instability: A**reas of irregular ground along scarp slope. Movement is not recent and does not appear active.**	
Location/Ref. of Instability: **On scarp slope along northern boundary of site.**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T49**	Mapped/Date: **PJ & ML 21/10/03**

Description of Site: **Site is forested and is located on the northern boundary of the wind farm. Site slopes to northwest at 2˚ to 15˚. Site is mostly on shallow slope with a scarp slope along northern side. Proposed base for T49 is 10m south of crest of scarp slope. Scarp slope is 10˚ and comprises irregular ground.**

Peat thickness is >2m thick on shallow slope decreasing to about 1m thick on scarp slope. Rock is considered to be at shallow depth on scarp slope.

Description of Excavation: **None**	Description of Arisings: **None**
Description of Access Road: **None**	Description of Dewatering: **None**

Description of Watercourses/Drainage on Site: **No existing watercourses or drainage. Fire-break running N-S through site is notably wetter than forested area.**

Numerous wet areas and springs present along scarp slope.

Description/Cause of Failure: **Possible several failures on scarp slope comprising irregular ground with discordant drainage. Cracks or possibly narrow incised watercourses at some locations. Failures are considered shallow and likely comprised movement of peat over rock.**

Failures are not recent and show no signs of activity.

Downslope extent of irregular ground is about 20m, that is the extent of the scarp slope. There is a fire-break at the toe of the scarp slope. Examination of mature forest at the toe of the scarp slope showed no apparent signs of instability.

Failure Location & Orientation: **On scarp slope along northern boundary of site.**	Width Dimension of Failure Scar: **10 to 20m.**
Length Dimension of Failure Scar: **Up to 20m.**	Angle/Shape of Failure Plane: **8˚ to 15˚.**
Failure Material Thickness: **Less than 2m.**	Description of Failure Plane: **Translational sliding on rockhead.**
Travel Distance of Failed Material: **Less than 20m.**	Seepage/Water Description: **Numerous wet areas and springs present along scarp slope. Forestry furrows channel surface water into scarp slope.**

Description of Material above Failure Plane: **Very soft to soft black fibrous peat (?)**

Description of Incipient Instability: **Numerous areas of irregular ground along scarp slope. Movement is not recent and does not appear active.**

Location/Ref. of Instability: **On scarp slope along northern boundary of site.**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T50**	Mapped/Date: **PJ & ML 22/10/03**

Description of Site: **Site is forested and is located on the northern boundary of wind farm. Site slopes to northwest at 2˚ to 18˚. Site is mostly on shallow slope with a scarp slope along northern side. Proposed base for T50 is several metres south of crest of scarp slope. Scarp slope is about 18˚.**

Peat thickness about 1.5m to >2m thick on shallow slope decreasing to about <0.5m thick on scarp slope. Rock is considered to be at shallow depth on scarp slope.

Rock exposures along scarp slope. 20m length of minor cliff with voids in rock (2W x 3L x 1.5H). Possible quarry or local failure of rock.

Areas of wet ground with standing water some 100m south of location of proposed base.

Description of Excavation: **None**	Description of Arisings: **None**
Description of Access Road: **Floating road**	Description of Dewatering: **None**

Description of Watercourses/Drainage on Site: **No existing watercourses or drainage. Fire-break running N-S through site is notably wetter than forested area.**

Numerous wet areas and springs present along scarp slope.

Description/Cause of Failure: **Possible failure on scarp slope comprising irregular ground with discordant drainage and reduced peat thickness. Failure considered shallow and likely comprised movement of peat over rock.**

Failure is not recent and shows no signs of activity.

Downslope extent of irregular ground is about 20m, that is the extent of the scarp slope. There is a fire-break at the toe of the scarp slope. Examination of mature forest at the toe of the scarp slope showed no apparent signs of instability.

Failure Location & Orientation: **On scarp slope along northern boundary of site.**	Width Dimension of Failure Scar: **9m.**
Length Dimension of Failure Scar: **Up to 20m.**	Angle/Shape of Failure Plane: **14˚.**
Failure Material Thickness: **Less than 2m.**	Description of Failure Plane: **Translational sliding on rockhead.**
Travel Distance of Failed Material: **Less than 20m.**	Seepage/Water Description: **Numerous wet areas and springs present along scarp slope. Forestry furrows channel surface water into scarp slope.**

Description of Material above Failure Plane: **Very soft to soft black fibrous peat (?)**

Description of Incipient Instability: **Numerous areas of irregular ground along scarp slope. Movement is not recent and does not appear active.**

Location/Ref. of Instability: **On scarp slope along northern boundary of site.**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T51**	Mapped/Date: **PJ & ML 22/10/03**
Description of Site: **Site is forested and is located on the northern boundary of wind farm. Site slopes to northwest at 1° to 6°. Site is mostly on shallow slope with a scarp slope along northern side. Proposed base for T51 is 25m south of crest of scarp slope. Scarp slope is about 4° to 6°, note scarp slope becomes steeper to the west.** **Peat thickness is >2m thick on shallow slope and on scarp slope.**	
Description of Excavation: **None**	Description of Arisings: **None**
Description of Access Road: **Floating road**	Description of Dewatering: **None**
Description of Watercourses/Drainage on Site: **Drainage line (possibly natural line) runs N-S and passes 50m to west of proposed location of base. Upstream drainage line comprises some 20m wide wet ground with standing water.** **Fire-break running N-S in forest below proposed base site is notably wetter than forested area and contains stream. Slope angle is about 6°.** **Numerous wet areas present at base of scarp slope.**	
Description/Cause of Failure: **None**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **N/A**
Description of Material above Failure Plane: **N/A**	
Description of Incipient Instability: **N/A**	
Location/Ref. of Instability: **N/A**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T52**	Mapped/Date: **PJ & ML 22/10/03**
Description of Site: **Site is forested and is located on the north-eastern boundary of wind farm. Site slopes to northwest at 2° to 5°. Site is mostly on shallow slope with a scarp slope along northern side. Proposed base for T52 is south of crest of scarp slope. Scarp slope is about 5°, note scarp slope becomes steeper to the west.** **Peat thickness is 1.5m to 2.8m thick on shallow slope and on scarp slope.** **Dense mature and upright trees surround proposed location of base.**	
Description of Excavation: **None**	Description of Arisings: **None**
Description of Access Road: **Floating road**	Description of Dewatering: **None**
Description of Watercourses/Drainage on Site: **Drainage line (possibly natural line further downslope) runs N-S and passes some 100m to west of proposed location of base. Drainage line is V-ditch.**	
Description/Cause of Failure: **None**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **N/A**
Description of Material above Failure Plane: **N/A**	
Description of Incipient Instability: **N/A**	
Location/Ref. of Instability: **N/A**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T53**	Mapped/Date: **PJ & ML 21/10/03**

Description of Site: **Site is forested and is located on the north-western boundary of wind farm. Site slopes to northwest at 1° to 7°. Site is mostly on shallow slope with a minor scarp slope along southern side. Proposed base for T53 is some 70m north of scarp slope. Scarp slope is about 2.5m high at about 7°.**

Peat thickness is 1.2m to 3.5m thick.

Area of shallow depression lies to south of proposed base.

Description of Excavation: **None**	Description of Arisings: **None**
Description of Access Road: **Floating road**	Description of Dewatering: **None**

Description of Watercourses/Drainage on Site: **Drainage line runs N-S and passes some 10m to west of proposed location of base. Drainage line is V-ditch.**

Further V-ditch runs NE-SW some 5m south of proposed location for base.

Description/Cause of Failure: **None**

Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **N/A**

Description of Material above Failure Plane: **N/A**

Description of Incipient Instability: **Closure of walls of V-ditch located some 5m to south. This also corresponds to kink in road (7m distance) and area of hard standing (12m distance).**

Location/Ref. of Instability: **Within V-ditch located to south of base.**	Length: **20m**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T54**	Mapped/Date: **PJ & ML 21/10/03**
Description of Site: **Site is forested and is located in the northern part of wind farm. Site slopes to northwest at 1˚ to 15˚. Site is mostly on shallow slope with a minor scarp slope along northern side. Proposed base for T54 is some 70m south of scarp slope. Scarp slope is about 5m high at about 15˚.** **Peat thickness is 1.3m to 2.7m thick.**	
Description of Excavation: **None**	Description of Arisings: **None**
Description of Access Road: **Floating road**	Description of Dewatering: **None**
Description of Watercourses/Drainage on Site: **V-ditch running NE-SW some 10m from proposed location for base.**	
Description/Cause of Failure: **Minor scar at head of scarp slope.**	
Failure Location & Orientation: **On scarp slope 70m to north.**	Width Dimension of Failure Scar: **5m(?)**
Length Dimension of Failure Scar: **>20m**	Angle/Shape of Failure Plane: **15˚**
Failure Material Thickness: **<1m**	Description of Failure Plane: **Translational slide likely on rockhead**
Travel Distance of Failed Material: **<20m**	Seepage/Water Description: **N/K**
Description of Material above Failure Plane: **Peat**	
Description of Incipient Instability: **Areas of irregular ground with discordant drainage on scarp slope.**	
Location/Ref. of Instability: **N/A**	Length: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T55**	Mapped/Date: **PJ & ML 21/10/03**
Description of Site: **Site is forested and is located in the northern part of wind farm. Site slopes to northwest at 1° to 7°. Site is mostly on shallow slope with a minor scarp slope along northern side. Proposed base for T55 is some 75m south of scarp slope. Scarp slope is about 3m to 5m high at about 7°.** **Peat thickness is 1.3m to >3.1m thick.** **Shallow depression, with standing water some 70m to south**	
Description of Excavation: **None**	Description of Arisings: **None**
Description of Access Road: **Floating road**	Description of Dewatering: **None**
Description of Watercourses/Drainage on Site: **V-ditch running NE-SW some 10m from proposed location for base.**	
Description/Cause of Failure: **None**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **N/A**
Description of Material above Failure Plane: **N/A**	

Description of Incipient Instability: **Localised bulging of V-ditch**	
Location/Ref. of Instability: **N/A**	Length: **5m**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T56**	Mapped/Date: **PJ & ML 21/10/03**
Description of Site: **Site is forested and is located in the northern part of wind farm. Site slopes to northwest at 1° to 5°. Site is mostly on shallow slope with a minor scarp slope to the south.** **Peat thickness is 1m to >2m thick.** **Shallow depression, with standing water to north**	
Description of Excavation: **None**	Description of Arisings: **None**
Description of Access Road: **Floating road**	Description of Dewatering: **None**
Description of Watercourses/Drainage on Site: **V-ditch running NE-SW some 10m from proposed location for base.** **Natural drainage line runs N-S and passes 35m to west of proposed location of base. Downstream drainage line comprises some 20m wide wet ground with standing water.**	
Description/Cause of Failure: **None**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **N/A**
Description of Material above Failure Plane: **N/A**	
Description of Incipient Instability: **None**	
Location/Ref. of Instability: **N/A**	Length: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T57**	Mapped/Date: **ML & DB 23/10/03**

Description of Site: **Site is located on the northern slope of mountain, in cleared ground adjacent (east) to an access road intersection and west of dense forest. To the north of T57 the site slopes northward at 4°. Peat depths range between 1.3 and 1.7m. At T57 peat depth is generally 1.0m. To the south, the ground rises at 6/7° (a break in slope). The peat thins to less than 0.5m at the base of this slope and thickens to 1.2m higher up the slope**.

Westward along the west/east access road, the ground is generally level. Eastward the site is densely forested.

Description of Excavation: **None**	Description of Arisings: **None**
Description of Access Road: **None**	Description of Dewatering: **None**

Description of Watercourses/Drainage on Site: **A south to north drainage ditch commences adjacent to T57 and runs parallel to the access road. This appears to follow a natural drainage path northward. A west/east drain links into the north/south drain immediately north of T57. A natural drainage line (disturbed) feeds into the west/east drain 27m west of T57. The west/east drain sides have slumped on both sides at this point.**

Description/Cause of Failure: **None**

Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **N/A**

Description of Material above Failure Plane: **N/A**

Description of Incipient Instability: **N/A**

Location/Ref. of Instability: **N/A**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T58**	Mapped/Date: **ML & DB 23/10/03**

Description of Site: **Site is located on the northern slope of mountain, in dense forest. The ground is relatively uniform, sloping 3°generally from north to south. Peat depths range between 1.7 to greater than 2.0m.**

Location of T58 is approximate, as it has not been set out. No tree clearing or construction of access roads has been undertaken.

Description of Excavation: **None**	Description of Arisings: **None**
Description of Access Road: **None**	Description of Dewatering: **None**

Description of Watercourses/Drainage on Site: **A natural drainage path occurs approximately 50/100m east of the T58, striking 009°/025°.**

Description/Cause of Failure: **None**

Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **N/A**

Description of Material above Failure Plane: **N/A**

Description of Incipient Instability: **N/A**

Location/Ref. of Instability: **N/A**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T59**	Mapped/Date: **DB & AL 22/10/03**
Description of Site: **Site is forested and is located on the western boundary of wind farm. Site slopes to northwest at 2°. Proposed base for T59 is west of T60.** **Peat thickness is >2m thick on shallow slope.**	
Description of Excavation: **N/A**	Description of Arisings: **N/A**
Description of Access Road: **N/A**	Description of Dewatering: **N/A**
Description of Watercourses/Drainage on Site**: Drainage channel offset 4m from access road running in a northeast to southwest location.**	
Description/Cause of Failure: **None**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **N/A**
Description of Material above Failure Plane: **N/A**	
Description of Incipient Instability: **N/A**	
Location/Ref. of Instability: **N/A**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T60**	Mapped/Date: **DB & AL 22/10/03**
Description of Site: **Site is forested and is located on the west of wind farm. Site is flat.** **Peat thickness is >2m thick.**	
Description of Excavation: **N/A**	Description of Arisings: **N/A**
Description of Access Road: **Depression in access road south of proposed location for T60.**	Description of Dewatering: **N/A**
Description of Watercourses/Drainage on Site**: Drainage channel offset 4m from access road running in a east to west location.**	
Description/Cause of Failure: **None**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **N/A**
Description of Material above Failure Plane: **N/A**	
Description of Incipient Instability: **Tension crack north of access road from settlement of road.**	
Location/Ref. of Instability: **N/A**	Length of Crack: **4m**
Average Width of Crack: **0.10m**	Average Depth of Crack: **1m**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T61**	Mapped/Date: **DB & AL 22/10/03**
Description of Site: **Site is forested and is located on the west of wind farm. Site slopes at 2 to 3 degrees.** **Peat thickness is >2m thick.**	
Description of Excavation: **N/A**	Description of Arisings: **N/A**
Description of Access Road: **Depression in access road south of proposed location for T60.**	Description of Dewatering: **N/A**
Description of Watercourses/Drainage on Site**: Drainage channel offset 4m from access road running in a east to west location. Flat saturated area to the south of proposed excavation, localised ponding.**	
Description/Cause of Failure: **None**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **N/A**
Description of Material above Failure Plane: **N/A**	
Description of Incipient Instability: **Localised tension crack north of access road from settlement of road.**	
Location/Ref. of Instability: **N/A**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T62**	Mapped/Date: **DB & AL 22/10/03**
Description of Site: **Site is witin forested area and is located towards centre of wind farm. Site is flat. Proposed base for T62 is east of T61** **Peat thickness is >2m thick on shallow slope.**	
Description of Excavation: **Partially excavated**	Description of Arisings: **Arisings to the north, south and east of excavation.**
Description of Access Road: **N/A**	Description of Dewatering: **N/A**
Description of Watercourses/Drainage on Site**: Drainage channel for pumping in an east direction**	
Description/Cause of Failure: **None**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **Saturated flat area.**
Description of Material above Failure Plane: **N/A**	
Description of Incipient Instability: **N/A**	
Location/Ref. of Instability: **N/A**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T63**	Mapped/Date: **DB & AL 22/10/03**
Description of Site: **Site is within forested area and is located towards centre of wind farm. Site is flat to 4 degrees. Locally minor steep slope at 8 degrees to east.** **Peat thickness is 2.5m thick on shallow slope.**	
Description of Excavation: **Excavation in 2.5m of peat over rock.**	Description of Arisings: **To the east of the excavation and north of the access road.**
Description of Access Road: **N/A**	Description of Dewatering: **N/A**
Description of Watercourses/Drainage on Site**: N/A**	
Description/Cause of Failure: **None**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **Localised ponding of water around arisings.**
Description of Material above Failure Plane: **N/A**	

Description of Incipient Instability: **N/A**	
Location/Ref. of Instability: **N/A**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T64**	Mapped/Date: **DB & AL 22/10/03**
Description of Site: **Site is forested and is located on the towards the east of wind farm. Site slopes in a east to northeast direction 2°.** **Peat thickness is >2m thick.**	
Description of Excavation: **N/A**	Description of Arisings: **N/A**
Description of Access Road: **N/A**	Description of Dewatering: **N/A**
Description of Watercourses/Drainage on Site**: N/A**	
Description/Cause of Failure: **None**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **N/A**
Description of Material above Failure Plane: **N/A**	
Description of Incipient Instability: **N/A**	
Location/Ref. of Instability: **N/A**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T65**	Mapped/Date: **DB & AL 22/10/03**
Description of Site: **Site is forested and is located on the east of wind farm. Site slopes in an east to northeast direction 2°. Borrow pit no. 3 located 30m north of proposed excavation.** **Peat thickness is 2.5m thick.**	
Description of Excavation: **N/A**	Description of Arisings: **N/A**
Description of Access Road: **N/A**	Description of Dewatering: **N/A**
Description of Watercourses/Drainage on Site**: N/A**	
Description/Cause of Failure: **None**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **N/A**
Description of Material above Failure Plane: **N/A**	
Description of Incipient Instability: **N/A**	
Location/Ref. of Instability: **N/A**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 2

Site Reference: **T66**	Mapped/Date: **DB & ML 22/10/03**
Description of Site: **Site is forested and is located towards the centre of the wind farm. Site slopes to south at 3 to 5 degs. and is immediately upslope of the failure at site T68. Base has been constructed.** **Peat depth greater than 2m.**	
Description of Excavation: **N/A**	Description of Arisings: **N/A**
Description of Access Road: **N/A**	Description of Dewatering: **N/A**
Description of Watercourses/Drainage on Site: **Possibly natural drainage valley north of T68 . Water appears to follow furrows within the forestry which drain downslope.**	
Description/Cause of Failure: **Bearing failure of underlying intact peat. Arisings have slumped and flowed a small distance into forestry forming a lobe. The lobe has caused bearing failure of the underlying peat which has been displaced vertically upwards and outwards from under lobe.**	
Failure Location & Orientation: **South of road, within forestry.**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **greater than 2m**	Description of Failure Plane: **Shallow circular/ translational in disturbed and intact peat**
Travel Distance of Failed Material: **(1) 2-3 m downslope, (2) 1m upward and about 1m horizontal**	Seepage/Water Description: **Ponded water presumed from over-pumping of water from excavation.**
Description of Material above Failure Plane: **Very soft black fibrous peat**	
Description of Incipient Instability: **Tension cracking and bulging of excavated peat slope. Repaired slip in excavated peat slope. Subsidence of road behind failure.**	
Location/Ref. of Instability: **Tension cracks N of excavation within 2m of crest. Bulging and repaired slip in N face**	Length of Crack: **Cracks are several metres in length. Subsidence is about 5m long**
Average Width of Crack: **Subsidence is about 1m wide**	Average Depth of Crack: **Cracks 1.0m with water at 0.4m bgl. Subsidence 0.2 m deep.**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide

T66 – Heave of Intact Peat.

T66 – Bearing Failure South of Access Road and Arisings.

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T67**	Mapped/Date: **DB & ML 22/10/03**
Description of Site: **Site is within the forest and is located in the centre of wind farm. Site slopes to south at 4°. Site is mostly on shallow slope. Base for T67 is located east of T66. Base is constructed**. **Peat thickness is 2.5m thick on a shallow slope.**	
Description of Excavation: **Excavation in 2.5m thick of peat.**	Description of Arisings: **Arisings to the east and west of the excavation and to the south of the access road.**
Description of Access Road: **Running west to east then turning to a north direction. Depression valley where the road turns from east to north.**	Description of Dewatering: **Pumping was carried out at the east of the excavation close to depression.**
Description of Watercourses/Drainage on Site**: Drainage channel to the north east of the excavation, pond present 20 to 30m north of excavation.**	
Description/Cause of Failure: **None**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **Ponding within the forest from over pumping.**
Description of Material above Failure Plane: **N/A**	

Description of Incipient Instability: **N/A**	
Location/Ref. of Instability: **N/A**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 2

Site Reference: **T68**	Mapped/Date: **DB & ML 20/10/03**
Description of Site: **Site is within the forest and is location of failure of 16 October 2003. Site slopes to south at 2 to 6°. Base for T69 is located east of T68. Base excavation is partially excavated**. **Peat thickness is 3.5m thick on a shallow slope.**	
Description of Excavation: **Excavation is 3.5m thick of peat.**	Description of Arisings: **Arisings to the west and east of the excavation and also probably to the south of the access road.**
Description of Access Road: **Running west to east direction. Horizontal and vertical displacement.**	Description of Dewatering: **Not Known**
Description of Watercourses/Drainage on Site**: Drainage channel running from west around the north of the excavation and turning to the south along the east of the failure.** **Shallow valley running north-south through site.**	
Description/Cause of Failure: **Slip failure, possibly from loading to south of access road.**	
Failure Location & Orientation: **Failure in a south direction**	Width Dimension of Failure Scar: **45 to 275m**
Length Dimension of Failure Scar: **1.75km**	Angle/Shape of Failure Plane: **2 to 8 deg**
Failure Material Thickness: **1.5 to 2.5m**	Description of Failure Plane: **Failure on base of peat**
Travel Distance of Failed Material: **1.3km**	Seepage/Water Description: **Water within failure scar, partly fed by drains intercepted by failure**
Description of Material above Failure Plane: **Very soft fibrous peat**	
Description of Incipient Instability: **Localised tension cracks south of excavation and in access road.**	
Location/Ref. of Instability: **North to northeast of excavation.**	Length of Crack: **5 to 6m**
Average Width of Crack: **0.5 to 0.7m**	Average Depth of Crack: **0.8m**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide

T68 – Crest of Failure, Bowing of Access Road.

T68 – Failure Plane Approximately 50m South of Base.

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T69**	Mapped/Date: **DB & ML 20/10/03**
Description of Site: **Site is within the forest and is located in the centre of wind farm. Site slopes to south at 8°. Site is mostly on shallow slope. Base for T69 is located east of T68. Base is partially constructed**. **Peat thickness is >2m thick on a shallow slope.**	
Description of Excavation: **Excavation in greater than 2m thick of peat.**	Description of Arisings: **Arisings to the west of the excavation and to the south of the access road.**
Description of Access Road: **Running west to east direction.**	Description of Dewatering: **Over pumping was carried out at the south of the excavation, pump water follow furrows which ran into a water channel. Water channel runs to the east of T71.**
Description of Watercourses/Drainage on Site**: Drainage channel to the north west of the excavation.**	
Description/Cause of Failure: **None**	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **Ponding within the forest from over pumping.**
Description of Material above Failure Plane: **N/A**	

Description of Incipient Instability: **Localised tension cracks around excavation. Slumping of arisings, but no apparent signs of failure of underlying ground.**	
Location/Ref. of Instability: **North to northeast of excavation.**	Length of Crack: **5 to 6m**
Average Width of Crack: **0.5 to 0.7m**	Average Depth of Crack: **0.8m**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T70**	Mapped/Date: **ML/DB 20/10/03**
Description of Site: **Site located on southern boundary of wind farm. Site is immediately downslope of the failure and was wiped out during failure. Base was not constructed.**	
Description of Excavation: **N/A**	Description of Arisings: **N/A**
Description of Access Road: **Access road was taken downslope with failure.**	Description of Dewatering: **N/A**
Description of Watercourses/Drainage on Site: **N/A**	
Description/Cause of Failure: **Failure of intact peat.**	
Failure Location & Orientation:**Orientated southeast.**	Width Dimension of Failure Scar: **Approximately 50m**
Length Dimension of Failure Scar:	Angle/Shape of Failure Plane: **5 to 8 degrees.**
Failure Material Thickness: **up to 2.5m**	Description of Failure Plane: **Translational in disturbed and intact peat**
Travel Distance of Failed Material: **30 to 40m**	Seepage/Water Description: **Seepage along failure plane and areas of ponding.**
Description of Material above Failure Plane: **Islands of very soft black fibrous (near surface) peat.**	
Description of Incipient Instability: **Tension cracking laterally to the east and west of failure.**	
Location/Ref. of Instability: **Tension cracks E and W occurring along furrows within forestry.**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

Geotechnical Mapping Sheet

Project: Derrybrien Landslide Sheet No 1 of 1

Site Reference: **T71**	Mapped/Date: **ML/DB 20&21/10/03**
Description of Site: **Site is forested and is located towards the southeast of phase 3 of the wind farm. Site slopes to south at 4 to 8 degs. and is immediately downslope from T69. Excavation for base has started.**	
Description of Excavation: **Excavation approximately 3.5m deep in peat, sideslopes 45 degrees. Glacial till at east end at base. Water at base of excavation**	Description of Arisings: **Arisings stockpiled to the south of the access road, ground saturated to the east of arisings.**
Description of Access Road: **From centre line of T71, 14m east slight rise, a further 41m bowl depression.**	Description of Dewatering: **Not known**
Description of Watercourses/Drainage on Site: **Ponding to the south of the road to the east of arisings. Drainage channel to the east of excavation which channelled pumping from T69, this contributes to ponding near arisings.**	
Description/Cause of Failure: No indication of failure, 15 to 20m south of arisings ground saturated, trees leaning over and bowing, area of potential failure.	
Failure Location & Orientation: **N/A**	Width Dimension of Failure Scar: **N/A**
Length Dimension of Failure Scar: **N/A**	Angle/Shape of Failure Plane: **N/A**
Failure Material Thickness: **N/A**	Description of Failure Plane: **N/A**
Travel Distance of Failed Material: **N/A**	Seepage/Water Description: **Ponded water presumed from localised water channels from upslope.**
Description of Material above Failure Plane: **N/A**	
Description of Incipient Instability: **N/A**	
Location/Ref. of Instability: **N/A**	Length of Crack: **N/A**
Average Width of Crack: **N/A**	Average Depth of Crack: **N/A**
Sketches Attached: (List)	Photographs Taken: (List)

APPENDIX B IN SITU VANE RESULTS

In Situ Vane Results

In situ vane results were obtained from both the Geonor H-60 25.4mm diameter hand vane and the Geonor H-10 55mm diameter mechanical vane.

Vane results are presented in the following tables. Hand vane tests were carried out by AGEC within mostly turbine base excavations.

Mechanical vane tests were carried out by Fugro Ltd using a 3 tonne mini crawler mounted. Mechanical vane testing was carried out by pushing the vane, which is within a protected sleeve, into peat at selected locations (see Appendix E). Note Fugro Ltd have prefixed their vane test reference with ‘CPT’, this should be replaced with ’V’.

Grid Cell T1

Depth (m bgl)	cu (kPa)	Comments
0.5	12,8	excavation east face
1	11,17	
1.5	11,13	
1.7	47,33	Mineral Soil
2	70,66,78	Mineral Soil

Grid Cell T2

Depth (m bgl)	cu (kPa)	Comments
0.5	17,19.5	excavation south east vertical
1	8,9	
1.5	9,8	
2	12,8.5	

Grid Cell T3

Depth (m bgl)	cu (kPa)	Comments
0.6	6.5,22	V-ditch north east of exc.(vertical)
1	9,12.5	
1.5	12,19	
2	15,22	
2.5	32,42.5	Mineral Soil

Grid Cell T5

Depth (m bgl)	cu (kPa)	Comments
0.5	14,9	excavation north east face
1	4.5,8	1.3m deep peat

Grid Cell T6

Depth (m bgl)	cu (kPa)	Comments
0.5	21,9,12	
1	11,11,12.5	
1.5	13,12,16	
2	15,14,15	

Grid Cell T9

Depth (m bgl)	cu (kPa)	Comments
1	10,10	v-ditch north east of excavation
1.5	9,9	
2	15,10	
2.3	15,15	

Grid Cell T10

Depth (m bgl)	cu (kPa)	Comments
0.5	11,10	excavation north face vertical
1	8,10	
1.5	8.5,10	
2	13,27	Mineral Soil
2.4	58	

Grid Cell T11

Depth (m bgl)	cu (kPa)	Comments
0.5	10,9	excavation east face vertical
1	7.5,10	
1.5	9,10	
2	13,14	
2.4	13,13.5	

Grid Cell T12

Depth (m bgl)	cu (kPa)	Comments
0.5	20,11	v-ditch west of excavation (vertical)
1	15,9	
1.5	11.5,7.5	
2	11,12	

Grid Cell T13

Depth (m bgl)	cu (kPa)	Comments
0.5	7.5,5.5	excavation north face
1	12,11	
1.5	10,11.5	
2	12,9	

Grid Cell T14

Depth (m bgl)	cu (kPa)	Comments
0.5	6.5,9	v-ditch
1	6,5	
1.5	6,8	
2	4.5,7	

Grid Cell T17

Depth (m bgl)	cu (kPa)	Comments
0.5	8,9.5	north of access road
1	7.5,6.5	
1.5	7.5,8	
2	10,11	

Grid Cell T18

Depth (m bgl)	cu (kPa)	Comments
0.5	25,8,9	v-ditch
1	4,6.5	
1.5	4,8	
2	10.5,13	

Grid Cell T19

Depth (m bgl)	cu (kPa)	Comments
0.5	18,19	excavation east face
1	14,15	
1.5	14,13.5	
2	17,21	

Grid Cell T20

Depth (m bgl)	cu (kPa)	Comments
0.5	7,5	excavation east face
1	6,5	
1.5	12,7	
2	17,14	

Grid Cell T21

Depth (m bgl)	cu (kPa)	Comments
0.5	12,13	excavation north face
1	11,14	
1.5	15,15	
2	10	
2.1	54	Mineral Soil

Grid Cell T22

Depth (m bgl)	cu (kPa)	Comments
0.5	16,14	v-ditch south east of base
1	14,16	
1.5	17,25	
1.7	60	Mineral Soil

Table: Shear Vane Results from Open Excavations using 25mm (25.4mm) Hand-held Vane
Note : Vane testing carried out in turbine excavation unless otherwise stated

Grid Cell T23

Depth (m bgl)	cu (kPa)	Comments
0.5	16,13	excavation north face
1	11,8	
1.5	18,12	
1.6	62,85	Mineral Soil

Grid Cell T25

Depth (m bgl)	cu (kPa)	Comments
1.4	9.4	

Grid Cell T25

Depth (m bgl)	cu (kPa)	Comments
0.7	13.2	
1.7	11.3	
2.2	10.4	

Grid Cell T25

Depth (m bgl)	cu (kPa)	Comments
0.7	9.4	
1.2	3.8	

Grid Cell T26

Depth (m bgl)	cu (kPa)	Comments
0.5	18,16	beside excavation
1	10,12.5	

Grid Cell T26

Depth (m bgl)	cu (kPa)	Comments
0.7	12.3	
1.7	6.6	

Grid Cell T28

Depth (m bgl)	cu (kPa)	Comments
1	6.6	
1.5	5.7	

Grid Cell T28

Depth (m bgl)	cu (kPa)	Comments
1	6.6	

Grid Cell T29

Depth (m bgl)	cu (kPa)	Comments
0.5	7,6	beside excavation
1	8	
1.5	6	

Grid Cell T31

Depth (m bgl)	cu (kPa)	Comments
0.7	13.2	
1.7	33	

Grid Cell T32

Depth (m bgl)	cu (kPa)	Comments
0.5	25	access road excavation
1	12,15,11	
1.5	9,9	

Grid Cell T34

Depth (m bgl)	cu (kPa)	Comments
0.7	2.8	

Grid Cell T34

Depth (m bgl)	cu (kPa)	Comments
1	8.5	

Grid Cell T35

Depth (m bgl)	cu (kPa)	Comments
0.5	15,15	excavation west face
1.2	50	mineral soil

Grid Cell T37

Depth (m bgl)	cu (kPa)	Comments
0.7	9.4	
1.6	5.7	

Grid Cell T37

Depth (m bgl)	cu (kPa)	Comments
0.7	9.4	
1.6	5.7	

Grid Cell T37

Depth (m bgl)	cu (kPa)	Comments
1	12.3	

Grid Cell T38

Depth (m bgl)	cu (kPa)	Comments
0.5	17.5,15,11.5	excavation north face
0.9	40	mineral soil

Table: Shear Vane Results from Open Excavations using 25mm (25.4mm) Hand-held Vane
Note : Vane testing carried out in turbine excavation unless otherwise stated

Grid Cell T41

Depth (m bgl)	cu (kPa)	Comments
0.5	12.5	excavation west face
1	10	
1.4	17	base of peat
1.6	30	mineral soil

Grid Cell T43

Depth (m bgl)	cu (kPa)	Comments
0.5	15.5	v-ditch 15m west of base
1	10	
1.2	11.5	

Grid Cell T46

Depth (m bgl)	cu (kPa)	Comments
0.5	25, 25	v-ditch 5m north of base
1	19	
1.5	14	
1.75	17	

Grid Cell T53

Depth (m bgl)	cu (kPa)	Comments
0.5	12,9	v-ditch
1	10,7.5	
1.2	6,5	
1.5	6,5	
1.8	5,4.5	

Grid Cell T66

Depth (m bgl)	cu (kPa)	Comments
0.5	13,14	excavation west face (vertical)
1	6,9	
1.5	5.5,9	
2	7.5,10	
2.3	6,8	

Grid Cell T67

Depth (m bgl)	cu (kPa)	Comments
0.5	12,8	excavation North west face (Vertical)
1	16,11	
1.5	13,11	
2	20,25	
2.3	40	Mineral soil

Grid Cell T68

Depth (m bgl)	cu (kPa)	Comments
0.5	13.5,12	excavation east (vertical)
1	11,10	
1.5	9,11	

Grid Cell T69

Depth (m bgl)	cu (kPa)	Comments
0.5	22,13,15	excavation west (vertical)
1	7,17,9	
1.5	12,14.5,12	

Grid Cell T71

Depth (m bgl)	cu (kPa)	Comments
0.5	19,14	peat depth 1.7
		v-ditch 15m n&s of road

Grid Cell T71

Depth (m bgl)	cu (kPa)	Comments
1.2	7.5	
1.7	10.4	
2.2	7.5	

Table: Shear Vane Results from Open Excavations using 25mm (25.4mm) Hand-held Vane
Note : Vane testing carried out in turbine excavation unless otherwise stated

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Location	Depth (m)	Natural Shear Strength (kPa)
CPT03	1.2	7.5
	1.7	10.4
	2.2	7.5
CPT05	0.7	12.3
	1.7	6.6
CPT06	1.4	9.4
CPT06A	0.7	13.2
	1.7	11.3
	2.2	10.4
CPT07	0.7	9.4
	1.2	3.8
CPT08	1.0	6.6
CPT08A	1.0	6.6
	1.5	5.7
CPT09	0.7	13.2
	1.7	33.0
CPT10	1.0	8.5
CPT11	0.7	2.8
CPT12	0.7	9.4
	1.6	5.7
CPT12A	1.0	12.3
CPT13	0.7	8.5
	1.5	19.8

NATURAL VANE TESTS

Location	Depth (m)	Natural Shear Strength (kPa)
CPT14	1.0	12.3
	2.0	11.3
	3.0	7.5
CPT15	1.0	8.5
	2.0	8.5
	3.0	6.6
CPT16	1.0	6.6
	2.0	8.5
	3.0	5.7
CPT17	0.7	9.4
	1.7	6.6
	2.3	6.6
	2.8	9.4
CPT18	0.7	6.6
	1.7	5.7
	2.2	9.4
CPT19	1.0	9.4
	2.0	4.7
	2.4	6.6
CPT20	1.0	5.7
	1.5	7.5
	2.2	10.4
CPT21	0.7	10.4
	1.7	5.7
CPT22	1.0	7.5
	1.4	7.5

NATURAL VANE TESTS

Location	Depth (m)	Natural Shear Strength (kPa)
CPT23	1.0	9.4
	1.4	9.4
CPT24	0.7	5.7
	1.4	6.6
CPT25	1.0	8.5
	1.5	5.7
	2.0	7.5
	2.4	13.2
CPT26	0.7	7.5
	1.7	6.6
	2.4	14.1
CPT27	1.0	8.5
	1.5	9.4
CPT28	0.7	11.3
CPT29	1.0	7.5
	1.4	8.5
	2.0	6.6
	2.4	9.4
CPT30	0.7	7.5
	1.3	5.7
	2.0	8.5
	2.5	6.6
	3.5	7.5

NATURAL VANE TESTS

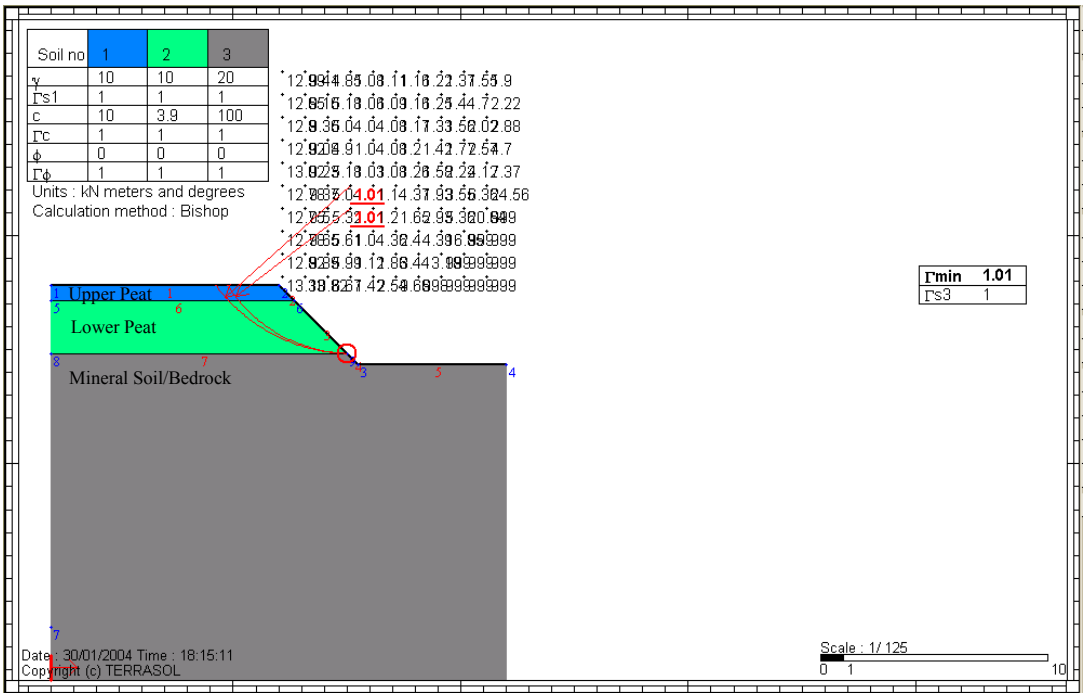
Location	Depth (m)	Natural Shear Strength (kPa)
CPT31	1.0	8.5
	1.4	5.7
	2.0	7.5
	2.6	6.6
	3.1	9.4
	3.5	10.4
CPT32	1.0	7.5
	1.9	6.6
	2.4	6.6
CPT33	1.0	12.3
	2.0	10.4
	2.4	8.5
	3.4	7.5
CPT34	1.0	6.6
	1.7	5.7
	2.3	7.5
CPT35	0.7	13.2
	1.4	13.2
CPT36	0.7	9.4
CPT37	0.7	11.3
	1.1	7.5
	2.1	8.5
	3.1	6.6
CPT38	1.0	6.6
	1.5	7.5
	2.1	6.6
	3.1	5.7

NATURAL VANE TESTS

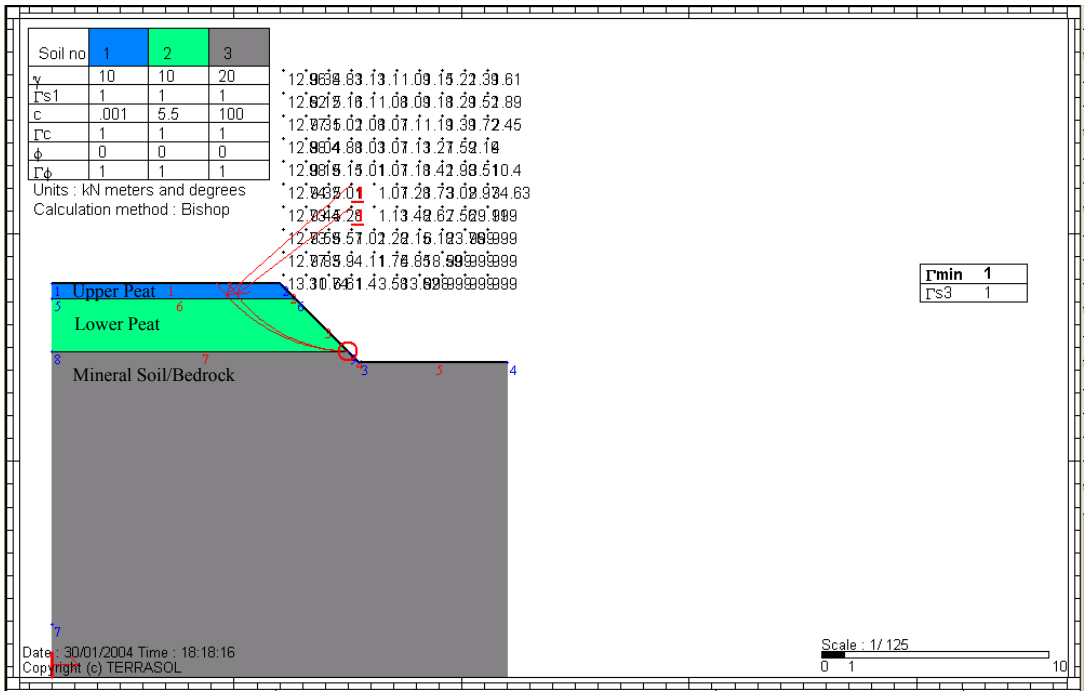
Location	Depth (m)	Natural Shear Strength (kPa)
CPT39	1.0	8.5
	1.7	6.6
	2.2	7.5
	3.2	5.7
	4.2	6.6
CPT40	1.0	6.6
	2.0	5.7
CPT41	0.7	8.5
	1.7	6.6
	2.7	6.6
CPT42	0.7	7.5
	1.6	8.5
CPT43	1.0	9.4
CPT44	0.7	9.4
	1.3	5.7
	2.5	6.6
CPT45	0.7	10.4
	1.3	6.6
	2.5	7.5
CPT46	0.7	4.7
	1.2	8.5
	2.5	9.4
	3.5	7.5
	4.5	10.4

NATURAL VANE TESTS

APPENDIX C BACK-ANALYSED EXCAVATION FAILURES



(a) Analysis with intact upper peat



(b) Analysis with upper peat assumed to be cracked

Figure: Back-analysis of Side-wall Failure of Turbine Base Excavations

Notes: Analysis assumes a 45 degree excavation face with 3m high face

APPENDIX D STABILITY RESULTS FOR CELLS

Grid no.	Slope	Instability	In situ c_u measurement		Design c_u	Bulk unit weight	Depth of In situ Peat	Surcharge Equivalent Placed Fill Depth	Factor of Safety for Load Condition	
	β (deg)		$c_{u\,25}$	$c_{u\,55}$	c_u (kPa)	γ (kN/m^3)	(m)	Condition (2)	Condition (1)	Condition (2)
West Side										
T1	4.0		8.0	9.4	8.0	10.0	2.43	1.0	**4.73**	**3.35**
T2	6.0	T	8.0	6.6	4.0	10.0	3.22	1.0	**1.19**	**0.91**
T3	4.0		6.5	7.5	6.5	10.0	2.09	1.0	**4.47**	**3.02**
T4	2.5	T	4.5	5.7	4.0	10.0	2.76	1.0	**3.33**	**2.44**
T5	5.0		9.0	13.2	4.5	10.0	3.75	1.0	**1.38**	**1.09**
T6	1.5			6.6	6.6	10.0	2.92	1.0	**8.64**	**6.43**
T7	2.0			5.7	5.7	10.0	3.39	1.0	**4.82**	**3.72**
T8	2.0			5.7	5.7	10.0	3.49	1.0	**4.68**	**3.64**
T9	4.0		9.0	7.5	7.5	10.0	2.23	1.0	**4.83**	**3.34**
T10	0.5		8.0	5.7	5.7	10.0	1.95	1.0	**33.50**	**22.14**
T11	1.0		7.5	5.7	5.7	10.0	3.34	1.0	**9.78**	**7.53**
T12	3.0	T	7.5	5.7	4.0	10.0	3.25	1.0	**2.35**	**1.80**
T13	3.0	T	5.5	5.7	4.0	10.0	3.96	1.0	**1.93**	**1.54**
T14	2.0	C	4.5		4.0	10.0	3.62	1.0	**3.17**	**2.48**
T15***	3.0				4.0	10.0	3.00	1.0	**2.55**	**1.91**
T16***	2.0				4.0	10.0	2.70	1.0	**4.25**	**3.10**
T17	4.0	F	6.5	4.7	2.5	10.0	2.49	1.0	**1.44**	**1.03**
T18	6.0		4.0	9.4	4.0	10.0	2.19	1.0	**1.76**	**1.21**
T19	6.0		13.5	5.7	5.7	10.0	2.48	1.0	**2.21**	**1.58**
T20	4.0		5.0	5.7	5.0	10.0	2.32	1.0	**3.10**	**2.16**
T21	3.0		10.0	6.6	6.6	10.0	2.86	1.0	**4.42**	**3.27**
T22	3.0		14.0	8.5	8.5	10.0	1.76	1.0	**9.24**	**5.89**
T23	4.0	B	8.0	11.3	4.0	10.0	1.59	1.0	**3.62**	**2.22**
East Side										
T24***	4.0				4.0	10.0	1.60	1.0	**3.59**	**2.21**
T25	3.0		3.8		3.8	10.0	1.77	1.0	**4.11**	**2.62**
T26	6.0		6.6	7.5	6.6	10.0	1.99	1.0	**3.19**	**2.12**
T27***	3.0	T			4.0	10.0	3.20	1.0	**2.39**	**1.82**
T28	3.0		5.7		4.6	10.0	1.86	1.0	**4.73**	**3.08**
T29	4.0	B	6.0	8.5	4.0	10.0	1.46	1.0	**3.94**	**2.34**
T30***	3.0				4.0	10.0	2.15	1.0	**3.56**	**2.43**
T31	2.0		4.0		4.0	10.0	3.27	1.0	**3.51**	**2.69**
T32	5.0		9.0	5.7	5.7	10.0	1.16	1.0	**5.66**	**3.04**
T33	3.0	T		4.7	4.0	10.0	3.65	1.0	**2.10**	**1.65**
T34	6.0		2.8		2.8	10.0	2.45	1.0	**1.10**	**0.78**
T35	4.0		15.0	2.8	2.8	10.0	1.41	1.0	**2.85**	**1.67**
T36	3.0			6.6	6.6	10.0	3.55	1.0	**3.56**	**2.78**
T37	3.5	T	5.7		5.7	10.0	1.97	1.0	**4.75**	**3.15**
T38	3.0		11.5	8.5	8.5	10.0	1.26	1.0	**12.91**	**7.20**
T39	3.0			5.7	5.7	10.0	2.20	1.0	**4.96**	**3.41**
T40	3.0			6.6	6.6	10.0	1.94	1.0	**6.51**	**4.30**
T41	1.0		10.0	13.2	10.0	10.0	1.80	1.0	**31.84**	**20.47**
T42	4.0	T		9.4	4.0	10.0	2.45	1.0	**2.35**	**1.67**
T43	5.0		10.0	5.7	5.7	10.0	1.96	1.0	**3.35**	**2.22**
T44	3.0			7.5	7.5	10.0	2.70	1.0	**5.31**	**3.88**
T45	2.0	T		9.4	4.0	10.0	2.12	1.0	**5.41**	**3.68**
T46	3.0		14.0	3.8	3.8	10.0	2.20	1.0	**3.30**	**2.27**
Central Area										
T47***	2.0				4.0	10.0	1.94	1.0	**5.91**	**3.90**
T48***	2.0				4.0	10.0	2.06	1.0	**5.57**	**3.75**
T49**	2.0				4.0	10.0	2.68	1.0	**4.28**	**3.12**
T50***	2.0				4.0	10.0	1.51	1.0	**7.60**	**4.57**
T51***	4.0				4.0	10.0	2.37	1.0	**2.43**	**1.71**
T52***	3.0				4.0	10.0	1.86	1.0	**4.11**	**2.68**
T53	2.0	C	4.5		4.0	10.0	2.89	1.0	**3.97**	**2.95**
T54	1.0			5.7	4.0	10.0	3.03	1.0	**7.57**	**5.69**
T55	4.0	C		6.6	4.0	10.0	2.83	1.0	**2.03**	**1.50**
T56***	4.0				4.0	10.0	3.05	1.0	**1.88**	**1.42**
T57***	3.0	C			4.0	10.0	1.99	1.0	**3.85**	**2.56**
T58***	3.0				4.0	10.0	2.05	1.0	**3.73**	**2.51**
T59***	2.0				4.0	10.0	2.50	1.0	**4.59**	**3.28**
T60***	0.1	T			4.0	10.0	3.86	1.0	**59.37**	**47.16**
T61***	0.1	T			4.0	10.0	1.89	1.0	**121.26**	**79.30**
T62***	0.1				4.0	10.0	3.77	1.0	**60.79**	**48.05**
T63***	0.1				4.0	10.0	2.58	1.0	**88.83**	**64.02**
T64***	2.0				4.0	10.0	3.08	1.0	**3.72**	**2.81**
T65***	2.0				4.0	10.0	2.73	1.0	**4.20**	**3.07**
T66	3.0	B	5.5	6.6	4.0	10.0	3.59	1.0	**2.13**	**1.67**
T67	4.0		8.0	5.7	5.7	10.0	1.99	1.0	**4.12**	**2.74**
T68	4.0	F	9.0	5.7	2.5	10.0	2.63	1.0	**1.37**	**0.99**
T69	8.0	T	7.0	6.6	4.0	10.0	3.00	1.0	**0.97**	**0.73**
T70	4.0	F		6.6	2.5	10.0	2.70	1.0	**1.33**	**0.97**
T71	4.0		7.5	7.5	7.5	10.0	2.50	1.0	**4.31**	**3.08**

Notes:

(1) *** No ground investigation assuming c_u of (kPa) — 4.0

(2) Assuming a bulk unit weight of peat (kN/m^3) — 10.0

(3) Assuming a surcharge equivalent to fill depth of (m) — 1.0

(4) β angles are based on Abney level readings

(5) Cells that have already failed due to peat slide (T17, T66 and T70) are assumed to have FoS of unity or less following loading

(6) Instability definitions: T - tension crack adjacent excavations, B - bearing failure, C - sidewall collapse

(7) Where instability has been identified as denoted by T, B or C then c_u of 4 kPa is assumed as operating strength unless a lower strength has been recorded.

(8) For load conditions see Report text.

Cell where FoS is less than 1.4

Table: Analysis of 200m by 200m Cells

Grid no.	Slope	Instability	In situ c_u measurement		Design c_u	Bulk unit weight	Depth of In situ Peat	Surcharge Equivalent Placed Fill Depth (m)	Factor of Safety for Load Condition	
	β (deg)		$c_{u\,25}$	$c_{u\,55}$	c_u (kPa)	γ (kN/m^3)	(m)	Condition (2)	Condition (1)	Condition (2)
West Side										
T1	4		8.0	9.4	8.0	10.0	2.6	1.0	**4.42**	**3.19**
T2	6	T	8.0	6.6	4.0	10.0	3.5	1.0	**1.10**	**0.86**
T3	4		6.5	7.5	6.5	10.0	3.2	1.0	**2.92**	**2.22**
T4	2.5	T		5.7	4.0	10.0	2.9	1.0	**3.17**	**2.35**
T5	5		4.5	13.2	4.5	10.0	2.2	1.0	**2.36**	**1.62**
T6	1.5			6.6	6.6	10.0	2.7	1.0	**9.34**	**6.82**
T7	2			5.7	5.7	10.0	3.8	1.0	**4.30**	**3.40**
T8	2			5.7	5.7	10.0	4.5	1.0	**3.63**	**2.97**
T9	4		9.0	7.5	7.5	10.0	3.5	1.0	**3.08**	**2.40**
T10	0.5		8.0	5.7	5.7	10.0	2	1.0	**32.66**	**21.77**
T11	1		7.5	5.7	5.7	10.0	3.3	1.0	**9.90**	**7.60**
T12	3	T	7.5	5.7	4.0	10.0	3	1.0	**2.55**	**1.91**
T13	3	T	5.5	5.7	4.0	10.0	4	1.0	**1.91**	**1.53**
T14	2	C	4.5		4.0	10.0	4.7	1.0	**2.44**	**2.01**
T15***	3				4.0	10.0	4	1.0	**1.91**	**1.53**
T16***	2				4.0	10.0	4.2	1.0	**2.73**	**2.21**
T17	4	F	6.5	4.7	2.7	10.0	2.9	1.0	**1.34**	**0.99**
T18	6		4.0	9.4	4.0	10.0	2.5	1.0	**1.54**	**1.10**
T19	6		13.5	5.7	5.7	10.0	2.2	1.0	**2.49**	**1.71**
T20	4		5.0	5.7	5.0	10.0	2.4	1.0	**2.99**	**2.11**
T21	3		10.0	6.6	6.6	10.0	2.1	1.0	**6.01**	**4.07**
T22	3		14.0	8.5	8.5	10.0	2.6	1.0	**6.26**	**4.52**
T23	4	B	8.0	11.3	4.0	10.0	1.6	1.0	**3.59**	**2.21**
East Side										
T24***	4				4.0	10.0	1.4	1.0	**4.11**	**2.40**
T25	3		3.8		3.8	10.0	2	1.0	**3.64**	**2.42**
T26	6		6.6	7.5	6.6	10.0	2	1.0	**3.17**	**2.12**
T27***	3	T			4.0	10.0	4	1.0	**1.91**	**1.53**
T28	3		5.7	6.6	5.7	10.0	2.6	1.0	**4.19**	**3.03**
T29	4	B	6.0	8.5	4.0	10.0	1.4	1.0	**4.11**	**2.40**
T30***	3				4.0	10.0	1.7	1.0	**4.50**	**2.83**
T31	2		4.0		4.0	10.0	5	1.0	**2.29**	**1.91**
T32	5		9.0	5.7	5.7	10.0	1	1.0	**6.56**	**3.28**
T33	3	T		4.7	4.0	10.0	2.8	1.0	**2.73**	**2.01**
T34	6		2.8		2.8	10.0	2.8	1.0	**0.96**	**0.71**
T35	4		15.0	2.8	2.8	10.0	1.3	1.0	**3.10**	**1.75**
T36	3			6.6	6.6	10.0	3	1.0	**4.21**	**3.16**
T37	3.5	T	5.7		5.7	10.0	2.2	1.0	**4.25**	**2.92**
T38	3		11.5	8.5	8.5	10.0	1.2	1.0	**13.55**	**7.39**
T39	3			5.7	5.7	10.0	2.4	1.0	**4.54**	**3.21**
T40	3			6.6	6.6	10.0	2.4	1.0	**5.26**	**3.71**
T41	3		10.0	13.2	10.0	10.0	1.2	1.0	**15.94**	**8.70**
T42	4	T		9.4	4.0	10.0	2.2	1.0	**2.61**	**1.80**
T43	5		10.0	5.7	5.7	10.0	2.6	1.0	**2.52**	**1.82**
T44	3			7.5	7.5	10.0	2.2	1.0	**6.52**	**4.48**
T45	4	T		9.4	4.0	10.0	2.4	1.0	**2.40**	**1.69**
T46	3		14.0	3.8	3.8	10.0	2.5	1.0	**2.91**	**2.08**
Central Area										
T47***	5				4.0	10.0	2.8	1.0	**1.65**	**1.21**
T48***	2				4.0	10.0	2.3	1.0	**4.99**	**3.48**
T49**	2				4.0	10.0	3.2	1.0	**3.58**	**2.73**
T50***	2				4.0	10.0	5.4	1.0	**2.12**	**1.79**
T51***	4				4.0	10.0	4.2	1.0	**1.37**	**1.11**
T52***	3				4.0	10.0	1.9	1.0	**4.03**	**2.64**
T53	2	C	4.5		4.0	10.0	3	1.0	**3.82**	**2.87**
T54	2			5.7	5.7	10.0	3.2	1.0	**5.11**	**3.89**
T55	4	C		6.6	4.0	10.0	2.6	1.0	**2.21**	**1.60**
T56***	4				4.0	10.0	3	1.0	**1.92**	**1.44**
T57***	4	C			4.0	10.0	1.2	1.0	**4.79**	**2.61**
T58***	3				4.0	10.0	1.5	1.0	**5.10**	**3.06**
T59***	2				4.0	10.0	2.8	1.0	**4.10**	**3.02**
T60***	0.1	T			4.0	10.0	3.2	1.0	**71.62**	**54.57**
T61***	3	T			4.0	10.0	2.6	1.0	**2.94**	**2.13**
T62***	0.1				4.0	10.0	4.7	1.0	**48.76**	**40.21**
T63***	2				4.0	10.0	3.7	1.0	**3.10**	**2.44**
T64***	2				4.0	10.0	3.6	1.0	**3.19**	**2.49**
T65***	2				4.0	10.0	2.9	1.0	**3.95**	**2.94**
T66	5	B	5.5	6.6	4.0	10.0	3	1.0	**1.54**	**1.15**
T67	4		8.0	5.7	5.7	10.0	2.7	1.0	**3.03**	**2.21**
T68	6	F	9.0	5.7	4.5	10.0	3.4	1.0	**1.27**	**0.98**
T69	8	T	7.0	6.6	4.0	10.0	3.5	1.0	**0.83**	**0.64**
T70	6	F		6.6	4.6	10.0	3.5	1.0	**1.26**	**0.98**
T71	8		7.5	7.5	7.5	10.0	3.5	1.0	**1.55**	**1.21**

Notes:

(1) *** No ground investigation assuming c_u of (kPa)	4.0
(2) Assuming a bulk unit weight of peat (kN/m^3)	10.0
(3) Assuming a surcharge equivalent to fill depth of (m)	1.0

(4) β angles are based on Abney level readings

(5) Cells that have already failed due to peat slide (T17, T66 and T70) are assumed to have FoS of unity or less following loading

(6) Instability definitions: T - tension crack adjacent excavations, B - bearing failure, C - sidewall collapse, F - sliding failure

(7) Where instability has been identified as denoted by T, B or C then c_u of 4 kPa is assumed as operating strength unless a lower strength has been recorded.

(8) For load conditions see Report text.

(9) Peat depths are based on deepest recorded peat depth in cell. Where no depths are given then nearest recorded depth is used.

(10) Depth of in situ peat is based on maximum peat depth from cross-section through cell.

Cell where FoS is less than 1.4

Table: Analysis of 50m Cells

Grid no.	Slope	Instability	In situ c_u measurement		Design c_u	Bulk unit weight	Depth of In situ Peat	Surcharge Equivalent Placed Fill Depth (m)	Factor of Safety for Load Condition	
	β (deg)		$c_{u\,25}$	$c_{u\,55}$	c_u (kPa)	γ (kN/m^3)	(m)	Condition (2)	Condition (1)	Condition (2)
West Side										
T1	4		8.0	9.4	2.8	10.0	2.6	1.0	**1.55**	**1.12**
T2	6	T	8.0	6.6	2.8	10.0	3.5	1.0	**0.77**	**0.60**
T3	4		6.5	7.5	2.8	10.0	3.2	1.0	**1.26**	**0.96**
T4	2.5	T		5.7	2.8	10.0	2.9	1.0	**2.22**	**1.65**
T5	5		4.5	13.2	2.8	10.0	2.2	1.0	**1.47**	**1.01**
T6	1.5			6.6	2.8	10.0	2.7	1.0	**3.96**	**2.89**
T7	2			5.7	2.8	10.0	3.8	1.0	**2.11**	**1.67**
T8	2			5.7	2.8	10.0	4.5	1.0	**1.78**	**1.46**
T9	4		9.0	7.5	2.8	10.0	3.5	1.0	**1.15**	**0.89**
T10	0.5		8.0	5.7	2.8	10.0	2	1.0	**16.04**	**10.70**
T11	1		7.5	5.7	2.8	10.0	3.3	1.0	**4.86**	**3.73**
T12	3	T	7.5	5.7	2.8	10.0	3	1.0	**1.79**	**1.34**
T13	3	T	5.5	5.7	2.8	10.0	4	1.0	**1.34**	**1.07**
T14	2	C	4.5		2.8	10.0	4.7	1.0	**1.71**	**1.41**
T15	3				2.8	10.0	4	1.0	**1.34**	**1.07**
T16	2				2.8	10.0	4.2	1.0	**1.91**	**1.54**
T17	4	F	6.5	4.7	2.8	10.0	2.9	1.0	**1.39**	**1.03**
T18	6		4.0	9.4	2.8	10.0	2.5	1.0	**1.08**	**0.77**
T19	6		13.5	5.7	2.8	10.0	2.2	1.0	**1.22**	**0.84**
T20	4		5.0	5.7	2.8	10.0	2.4	1.0	**1.68**	**1.18**
T21	3		10.0	6.6	2.8	10.0	2.1	1.0	**2.55**	**1.73**
T22	3		14.0	8.5	2.8	10.0	2.6	1.0	**2.06**	**1.49**
T23	4	B	8.0	11.3	2.8	10.0	1.6	1.0	**2.51**	**1.55**
East Side					2.8					
T24	4				2.8	10.0	1.4	1.0	**2.87**	**1.68**
T25	3		3.8		2.8	10.0	2	1.0	**2.68**	**1.79**
T26	6		6.6	7.5	2.8	10.0	2	1.0	**1.35**	**0.90**
T27	3	T			2.8	10.0	4	1.0	**1.34**	**1.07**
T28	3		5.7	6.6	2.8	10.0	2.6	1.0	**2.06**	**1.49**
T29	4	B	6.0	8.5	2.8	10.0	1.4	1.0	**2.87**	**1.68**
T30	3				2.8	10.0	1.7	1.0	**3.15**	**1.98**
T31	2		4.0		2.8	10.0	5	1.0	**1.61**	**1.34**
T32	5		9.0	5.7	2.8	10.0	1	1.0	**3.22**	**1.61**
T33	3	T		4.7	2.8	10.0	2.8	1.0	**1.91**	**1.41**
T34	6		2.8		2.8	10.0	2.8	1.0	**0.96**	**0.71**
T35	4		15.0	2.8	2.8	10.0	1.3	1.0	**3.10**	**1.75**
T36	3			6.6	2.8	10.0	3	1.0	**1.79**	**1.34**
T37	3.5	T	5.7		2.8	10.0	2.2	1.0	**2.09**	**1.44**
T38	3		11.5	8.5	2.8	10.0	1.2	1.0	**4.46**	**2.44**
T39	3			5.7	2.8	10.0	2.4	1.0	**2.23**	**1.58**
T40	3			6.6	2.8	10.0	2.4	1.0	**2.23**	**1.58**
T41	3		10.0	13.2	2.8	10.0	1.2	1.0	**4.46**	**2.44**
T42	4	T		9.4	2.8	10.0	2.2	1.0	**1.83**	**1.26**
T43	5		10.0	5.7	2.8	10.0	2.6	1.0	**1.24**	**0.90**
T44	3			7.5	2.8	10.0	2.2	1.0	**2.44**	**1.67**
T45	4	T		9.4	2.8	10.0	2.4	1.0	**1.68**	**1.18**
T46	3		14.0	3.8	2.8	10.0	2.5	1.0	**2.14**	**1.53**
Central Area					2.8					
T47	5				2.8	10.0	2.8	1.0	**1.15**	**0.85**
T48	2				2.8	10.0	2.3	1.0	**3.49**	**2.43**
T49	2				2.8	10.0	3.2	1.0	**2.51**	**1.91**
T50	2				2.8	10.0	5.4	1.0	**1.49**	**1.25**
T51	4				2.8	10.0	4.2	1.0	**0.96**	**0.77**
T52	3				2.8	10.0	1.9	1.0	**2.82**	**1.85**
T53	2	C	4.5		2.8	10.0	3	1.0	**2.68**	**2.01**
T54	2			5.7	2.8	10.0	3.2	1.0	**2.51**	**1.91**
T55	4	C		6.6	2.8	10.0	2.6	1.0	**1.55**	**1.12**
T56	4				2.8	10.0	3	1.0	**1.34**	**1.01**
T57	4	C			2.8	10.0	1.2	1.0	**3.35**	**1.83**
T58	3				2.8	10.0	1.5	1.0	**3.57**	**2.14**
T59	2				2.8	10.0	2.8	1.0	**2.87**	**2.11**
T60	0.1	T			2.8	10.0	3.2	1.0	**50.13**	**38.20**
T61	3	T			2.8	10.0	2.6	1.0	**2.06**	**1.49**
T62	0.1				2.8	10.0	4.7	1.0	**34.13**	**28.15**
T63	2				2.8	10.0	3.7	1.0	**2.17**	**1.71**
T64	2				2.8	10.0	3.6	1.0	**2.23**	**1.75**
T65	2				2.8	10.0	2.9	1.0	**2.77**	**2.06**
T66	5	B	5.5	6.6	2.8	10.0	3	1.0	**1.07**	**0.81**
T67	4		8.0	5.7	2.8	10.0	2.7	1.0	**1.49**	**1.09**
T68	6	F	9.0	5.7	2.8	10.0	3.4	1.0	**0.79**	**0.61**
T69	8	T	7.0	6.6	2.8	10.0	3.5	1.0	**0.58**	**0.45**
T70	6	F		6.6	2.8	10.0	3.5	1.0	**0.77**	**0.60**
	8		7.5	7.5	2.8	10.0	3.5	1.0	**0.58**	**0.45**

Notes:

(1) Assuming an ultimate lower bound c_u of (kPa)	2.8
(2) Assuming a bulk unit weight of peat (kN/m^3)	10.0
(3) Assuming a surcharge equivalent to fill depth of (m)	1.0

(4) β angles are based on Abney level readings

(5) Instability definitions: T - tension crack adjacent excavations, B - bearing failure, C - sidewall collapse, F - sliding failure

(6) For load conditions see Report text.

(7) Peat depths are based on deepest recorded peat depth in cell. Where no depths are given then nearest recorded depth is used.

(8) Depth of in situ peat is based on maximum peat depth from cross-section through cell.

Cell where FoS is less than 1.4

Table: Sensitivity Analysis of 50m Cells

APPENDIX E CO-ORDINATES OF VANE LOCATIONS

Test	Test No.	Easting	Northing
Shear Vane	V3	159681	204444
Shear Vane	V5	160737	205287
Shear Vane	V6	161130	205243
Shear Vane	V7	161186	205014
Shear Vane	V8	159960	204939
Shear Vane	V9	160774	205001
Shear Vane	V10	160673	204977
Shear Vane	V11	160520	204856
Shear Vane	V12	160334	204821
Shear Vane	V13	160133	204683
Shear Vane	V14	159950	204591
Shear Vane	V15	159480	204692
Shear Vane	V16	159387	204964
Shear Vane	V17	159186	204873
Shear Vane	V18	159296	204625
Shear Vane	V19	159146	204564
Shear Vane	V20	158998	204752
Shear Vane	V21	158839	204704
Shear Vane	V22	158619	204691
Shear Vane	V23	158262	203891
Shear Vane	V24	158512	203992
Shear Vane	V25	158639	204065
Shear Vane	V26	158804	204165
Shear Vane	V27	159055	204246
Shear Vane	V28	159222	204292
Shear Vane	V29	159366	204343
Shear Vane	V30	158075	204049
Shear Vane	V31	158332	204192
Shear Vane	V32	158005	204333
Shear Vane	V33	157888	204549
Shear Vane	V34	158116	204673

Shear Vane	V35	158207	204705
Shear Vane	V36	157744	204726
Shear Vane	V37	157947	204833
Shear Vane	V38	158164	204430
Shear Vane	V39	158387	204569
Shear Vane	V40	158655	205216
Shear Vane	V41	158837	205312
Shear Vane	V42	160974	205591
Shear Vane	V43	160793	205605
Shear Vane	V44	160613	205581
Shear Vane	V45	160436	205497
Shear Vane	V46	160232	205422

APPENDIX F STRENGTH OF PEAT ABOVE PEAT/MINERAL SOIL INTERFACE

Grid no.	Hand Held Shear Vane Test	Depth of Peat at/in Vicinity of test Location (m)	Depth of Deepest Test Result in Peat (mbgl)	Vertical Distance from Deepest Test Result to Base of Peat (m)	Shear Strength from Deepest Test Result (c_u)	Lowest Recorded Shear Strength from Test in Peat if not at Deepest Test Result (c_u)	Comments
West Side							
T1	Yes	1.7	1.5	0.2	11, 13	8.0	
T2	Yes	2.5	2.0	0.5	12, 8.5	8.0	Peat depth from nearest depth probe result
T3	Yes	2.5	2.0	0.5	15, 22	6.5	Shear test possibly affected by mineral soil
T4	No						
T5	Yes	1.3	1.0	0.3	4.5, 8	4.5	
T6	Yes	2.7	2.0	0.7	15, 14, 15	9.0	
T7	No						
T8	No						
T9	Yes	2.4	2.3	0.1	15, 15	9.0	Peat depth from nearest depth probe result
T10	Yes	2	1.5	0.5	8.5,10	8.0	Mineral Soil at 2.0mbgl
T11	Yes	2.8	2.4	0.4	13, 13.5	7.5	Peat depth from nearest depth probe result
T12	Yes	2.5	2.0	0.5	11, 12	7.5	Peat depth from nearest depth probe result
T13	Yes	3.6	2.0	1.6	12, 9	5.5	Peat depth from nearest depth probe result
T14	Yes	4	2.0	2.0	4.5, 7	4.5	Peat depth from nearest depth probe result
T15	No						
T16	No						
T17	Yes	3	2.0	1.0	10, 11	6.5	Peat depth from nearest depth probe result
T18	Yes	2.5	2.0	0.5	10.5, 13	4.0	Peat depth from nearest depth probe result
T19	Yes	2.5	2.0	0.5	17, 21	14.0	Shear test possibly affected by mineral soil
T20	Yes	2.1	2.0	0.1	17, 14	5.0	
T21	Yes	2.1	2.0	0.1	10	10.0	
T22	Yes	1.7	1.5	0.2	17, 25	14.0	Shear test possibly affected by mineral soil
T23	Yes	1.6	1.5	0.1	18, 12	8.0	
East Side							
T24	No						
T25	Yes	2.2	2.2	0.0	10.4	3.8	Shear test possibly affected by mineral soil
T26	Yes	1.8	1.7	0.1	6.6		
T27	No						
T28	Yes	2.6	1.5	1.1	5.7		Peat depth from nearest depth probe result
T29	Yes	1.8	1.5	0.3	6		Peat depth from nearest depth probe result
T30	No						
T31	Yes	2.5	1.5	1.0	4	13.2	Shear test possibly affected by mineral soil
T32	Yes	1.7	1.5	0.2	9, 9	9.0	Peat depth from nearest depth probe result
T33	No						
T34	Yes	1.9	1.0	0.9	8.5	2.8	Peat depth from nearest depth probe result
T35	Yes	1.2	0.5	0.7	15, 15	15.0	Peat depth from nearest depth probe result
T36	No						
T37	Yes	2.1	1.6	0.5	5.7	5.7	Peat depth from nearest depth probe result
T38	Yes	0.9	0.5	0.4	17.5, 15, 11.5	11.5	
T39	No						
T40	No						
T41	Yes	1.4	1.0	0.4	10	10.0	
T42	No						
T43	Yes	1.3	1.2	0.1	11.5	10.0	Peat depth from nearest depth probe result
T44	No						
T45	No						
T46	Yes	1.8	1.8	0.1	17	14.0	Shear test possibly affected by mineral soil
Central							
T47	No						
T48	No						
T49	No						
T50	No						
T51	No						
T52	No						
T53	Yes	2.9	1.8	1.1	5, 4.5	4.5	Peat depth from nearest depth probe result
T54	No						
T55	No						
T56	No						
T57	No						
T58	No						
T59	No						
T60	No						
T61	No						
T62	No						
T63	No						
T64	No						
T65	No						
T66	Yes	2.5	2.3	0.2	6, 8	5.5	Peat depth from nearest depth probe result
T67	Yes	2.3	2.0	0.3	20, 25	8.0	Shear test possibly affected by mineral soil
T68	Yes	2.7	1.5	1.2	9, 11	9.0	Peat depth from nearest depth probe result
T69	Yes	3.2	1.5	1.7	12, 14.5, 12	7.0	Peat depth from nearest depth probe result
T70	No						
T71	Yes	2.7	2.2	0.5	7.5	7.5	Peat depth from nearest depth probe result

Table: Showing Deepest Shear Vane Results from Hand Vane Test

Grid no.	Mechanical Shear Vane Test	Depth of Peat at/in Vicinity of test Location (m)	Depth of Deepest Test Result in Peat (mbgl)	Vertical Distance from Deepest Test Result to Base of Peat (m)	Shear Strength from Deepest Test Result (c_u)	Lowest Recorded Shear Strength from Test in Peat if not at Deepest Test Result (c_u)	Comments
West Side							
T1	Yes	2.5	0.7	1.8	9.4		Peat depth from nearest depth probe result
T2	Yes	4.5	3.1	1.4	6.6		Peat depth from nearest depth probe result
T3	Yes	3.6	3.4	0.2	7.5		Note 1
T4	Yes	2.9	2.3	0.6	7.5	5.7	Peat depth from nearest depth probe result
T5	Yes	2	1.4	0.6	13.2		Peat depth from nearest depth probe result
T6	Yes	2.7	2.4	0.3	6.6		Peat depth from nearest depth probe result
T7	Yes	3.8	3.1	0.7	5.7		Peat depth from nearest depth probe result
T8	Yes	4.5	4.2	0.3	6.6	5.7	Peat depth from nearest depth probe result
T9	Yes	1.6	1.4	0.2	7.5		Peat depth from nearest depth probe result
T10	Yes	1.9	1.7	0.2	5.7		Peat depth from nearest depth probe result
T11	Yes	3.6	2.2	1.4	10.4	5.7	Peat depth from nearest depth probe result
T12	Yes	4.2	3.5	0.7	7.5	5.7	Peat depth from nearest depth probe result
T13	Yes	3.8	3.5	0.3	10.4	5.7	Peat depth from nearest depth probe result
T14	No						
T15	No						
T16	No						
T17	Yes	2.6	2.4	0.2	6.6	4.7	Peat depth from nearest depth probe result
T18	Yes	2.2	1.4	0.8	9.4		Peat depth from nearest depth probe result
T19	Yes	1.6	1.4	0.2	6.5	5.7	Peat depth from nearest depth probe result
T20	Yes	2.7	2.4	0.3	13.2	5.7	Peat depth from nearest depth probe result
T21	Yes	3.0	2.4	0.6	14.1	6.6	Peat depth from nearest depth probe result
T22	Yes	2	1.5	0.5	9.4	8.5	Peat depth from nearest depth probe result
T23	Yes	1.7	0.7	1.0	11.3		Peat depth from nearest depth probe result
East Side							
T24	No						
T25	No						
T26	Yes	3.2	3.0	0.2	7.5		Note 1
T27	No						
T28	Yes	2.6	1.5	1.1	5.7		Peat depth from nearest depth probe result
T29	Yes	1.8	1.5	0.3	19.8	8.5	Shear test possibly affected by mineral soil
T30	No						
T31	No						
T32	Yes	1.7	1.6	0.1	5.7		Peat depth from nearest depth probe result
T33	Yes	4.7	4.5	0.2	10.4	4.7	Note 1
T34	No						
T35	Yes	1.0	0.7	0.3	2.8		Peat depth from nearest depth probe result
T36	Yes	3.1	2.5	0.6	7.5	6.6	Peat depth from nearest depth probe result
T37	No						
T38	Yes	1.8	1.0	0.8	8.5		Peat depth from nearest depth probe result
T39	Yes	2.7	2.5	0.2	6.6	5.7	Note 1
T40	Yes	1.8	1.7	0.1	6.6		Peat depth from nearest depth probe result
T41	Yes	1.7	0.7	1.0	13.2		Shear test possibly affected by mineral soil
T42	Yes	2.2	1.0	1.2	9.4		Peat depth from nearest depth probe result
T43	No						
T44	Yes	2.7	2.5	0.2	6.6	5.7	Peat depth from nearest depth probe result
T45	Yes	1.8	1.4	0.4	9.4		Peat depth from nearest depth probe result
T46	Yes	1.8	1.2	0.6	3.8		Peat depth from nearest depth probe result
Central							
T47	No						
T48	No						
T49	No						
T50	No						
T51	No						
T52	No						
T53	No						
T54	Yes	3.0	2.0	1.0	5.7		Peat depth from nearest depth probe result
T55	Yes	4.6	2.7	1.9	6.6		Peat depth from nearest depth probe result
T56	No						
T57	No						
T58	No						
T59	No						
T60	No						
T61	No						
T62	No						
T63	No						
T64	No						
T65	No						
T66	Yes	3	2.8	0.2	9.4	6.6	Note 1
T67	Yes	3.2	3.0	0.2	5.7		Note 1
T68	Yes	2.7	2.2	0.5	9.4	5.7	Peat depth from nearest depth probe result
T69	Yes	3.2	3.0	0.2	6.6		Peat depth from nearest depth probe result
T70	Yes	2.6	2.4	0.2	9.4	6.6	Note 1
T71	Yes	3.2	2.2	1.0	7.5		Peat depth from nearest CPT

Note 1 Peat depth from nearest probe shows base of peat is at shallower depth than deepest vane test. Assume vane within 0.2m of base of peat.

Table: Showing Deepest Shear Vane Results from Mechanical Vane Test