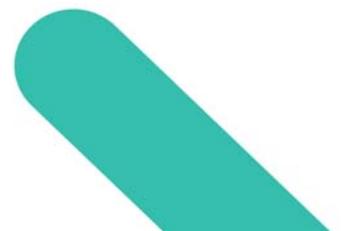
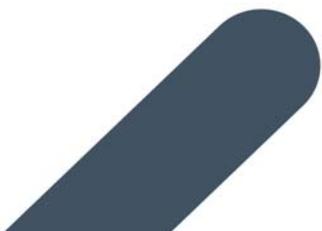


Further Information Response PI19.306706

Further Information
Response for Derrinlough
Wind Farm





DOCUMENT DETAILS

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1. INTRODUCTION

We are instructed by our clients Bord na Móna Powergen Ltd to prepare this report in response to the request for further information issued by An Bord Pleanála under PL19.306706 on the 14th of August 2020. The request for further information is being made in relation to the proposal for a wind farm development located in the townlands of Balliver, Derryad (Eglish by), Broughal, Derrymullin and Loughderry, Carrick (Garrycastle by), Drinagh, Clongawny More, Galros East, Cloonacullina, Galros West, Clooneen, Guernal, Coolreagh or Cloghanhill, Kilcamin, Cortullagh or Grove, Lumcloon, Crancreagh, Mullaghakaraun Bog, Dernafanny, Stonestown, Derrinlough, Timolin, and Ballindown, Co. Offaly. The full development description as per the public notices reads as follows:

- i. *“21 No. wind turbines with an overall blade tip height of up to 185 metres and all associated hard-standing areas.*
- ii. *2 No. permanent Anemometry Masts up to a height of 120 metres.*
- iii. *Provision of new and upgraded internal site access roads, passing bays, amenity pathways, amenity carpark and associated drainage.*
- iv. *2 No. permanent underpasses in the townland of Derrinlough. One underpass will be located beneath the N62 and one will be located beneath an existing Bord na Móna rail line.*
- v. *1 No. 110 kV electrical substation, which will be constructed in the townland of Cortullagh or Grove. The electrical substation will have 2 No. control buildings, associated electrical plant and equipment and a wastewater holding tank.*
- vi. *5 No. temporary construction compounds, in the townlands of Clongawny More, Derrinlough, Derrinlough/Crancreagh, Drinagh and Cortullagh or Grove.*
- vii. *All associated underground electrical and communications cabling connecting the turbines to the proposed electrical substation.*
- viii. *2 No. temporary security cabins at the main construction site entrances in the townland of Derrinlough.*
- ix. *All works associated with the connection of the proposed wind farm to the national electricity grid, which will be to the existing Dallow/Portlaoise/Shannonbridge 110 kV line.*
- x. *Removal of existing meteorological mast.*
- xi. *Upgrade of existing access and temporary improvements and modifications to existing public road infrastructure to facilitate delivery of abnormal loads including locations on the N52 and N62; construction access for delivery of construction materials at locations on the N62 and R357; operational access onto L7009 in the townland of Cortullagh or Grove and amenity access off R357 and L7005.*
- xii. *All associated site works and ancillary development including signage.”*

A 10-year planning permission and 30-year operational life is being sought and an Environmental Impact Assessment Report (EIAR) and Natura Impact Statement (NIS) were prepared for the project to accompany the planning application.

The planning application was lodged with An Bord Pleanála on the 20th of February 2020 where it was assigned the case reference PL19.306706. On the 14th of August 2020 An Bord Pleanála issued a request in accordance with Section 37(F)(1) of the Planning and Development Act 2000 (as amended) which sought further information on four items. Section 2 of this report presents our responses to the four individual items including third party submissions to the application.

2. FURTHER INFORMATION RESPONSES

2.1 Further Information Item No.1 – Wording

“Provide a comprehensive and detailed response to each of the issues raised in the submissions received by the Board from the planning authority (copy attached), prescribed bodies and the observers. In the preparation of the response the applicant shall consult with the planning authority/prescribed bodies as necessary, to ensure that the matters raised are adequately addressed.”

2.1.1 Item No.1 Response

This section of the RFI has been prepared to respond to the submissions/observations received by An Bord Pleanála and subsequently circulated in relation to the Derrinlough Wind Farm application. On review of the submissions/observations circulated by An Bord Pleanála it is considered that the majority of the queries and issues raised by third parties have been previously and thoroughly considered and set out within the submitted application documentation. This section of the RFI also responds to the comments and considerations raised by Offaly County Council within the Chief Executive’s report dated the 15th of June 2020. The Chief Executive’s report notes that the “*principle of the proposed development is considered acceptable to the Planning Authority*”, however, there are a number of items which the Planning Authority note require further information. These items are discussed in the below section. It is fully acknowledged, however, that the application documentation including EIAR and NIS are large documents and the detailed assessments contained within the documents are wide ranging. The issues raised in the various submissions have been grouped together under the following headings/categories to avoid repetition and to inform the decision of the Board:

- > Planning Process,
- > Ownership,
- > Noise,
- > Shadow flicker,
- > Landscape
- > Photomontages
- > Community Engagement and Public Consultation
- > Community Gain and Community Benefit
- > Tourism/Perception of Wind Farms
- > Property Value
- > Health Effects of Wind Farms
- > Health and Safety
- > Effects of Windtake
- > Project Splitting
- > Turbine Design
- > Ecology
- > Hydrology,
- > Traffic and Transport,
- > Aviation,
- > Planning Authority Policy Assessment.

2.1.1.1 Planning Process

Some third party submissions question the application process in relation to the Strategic Infrastructure Development (SID) status of the proposed development. In this regard it must be noted that the applicant has at all times engaged with the relevant authorities and have undertaken the correct

planning procedures throughout the application process. The relevant threshold for SID as established in the 7th schedule of the Planning and Development Act 2000 (as amended) (“the Act”) is “An installation for the harnessing of wind power for energy production (a wind farm) with more than 25 turbines or having a total output greater than 50 megawatts”. The proposed development represents an application for a wind farm which will have a generated output in excess of 50 megawatts. Furthermore the proposed development also satisfied the relevant criteria set out in Section 37A(2) of the Act .

An Bord Pleanála issued their determination for the proposed development in November 2019 under the case ABP-303157-28. In its determination An Bord Pleanála stated as follows:

“Please be advised that following consultations under Section 37B of the Planning and Development Act, 2000 as amended, the Board hereby serves notice under section 37B(4)(a) that it is of the opinion that the proposed development falls within the scope of paragraphs 37A(2)(a) and (b) of the Act. Accordingly, the Board has decided that the proposed development would be strategic infrastructure within the meaning of section 37A of the Planning and Development Act, 2000, as amended. Any application for permission for the proposed development must therefore be made directly to An Bord Pleanála under Section 37E of the Act.”

Accordingly, the current application has been made directly to An Bord Pleanála under Section 37E of the Planning and Development Act 2000 (as amended) in line with the correct procedures.

2.1.1.2 Ownership

A submission/observation has raised a query with regards to the ownership of the land relating to an aspect of the proposed development. With respect to the submission raised regarding land ownership of a parcel of land on Drinagh Bog, Bord na Móna Powergen Ltd. confirm ownership of all lands located within our ownership boundary as is evident from the documentation submitted as part of the proposed Derrinlough Wind Farm planning application.

2.1.1.3 Noise

A number of submissions/observations have raised general concerns in relation to the potential impacts which may arise from the proposed development with regards to noise. Please note that a full noise and vibration assessment has been carried out and included as part of the submitted EIAR. The noise assessment has been carried out by AWN Consulting Ltd. AWN have also provided a Technical Report which has been included as **Appendix 1** of this RFI document which addresses the issues raised by the various third party submissions.

The predicted noise levels for the proposed development has been calculated for all noise sensitive locations identified within a minimum radius of 2 km of the proposed turbines. As part of the background noise assessment, 7 no. noise sensitive locations (NSL)’s were identified to establish the typical background noise levels. The turbine noise assessment has identified that attenuation of the Derrinlough turbine noise emissions will be required under certain wind conditions to ensure that the cumulative turbine noise levels comply with best practice noise criteria at all NSL’s. It should be noted that modern wind turbines can be programmed to run in reduced modes of operation (or low noise modes) in order to achieve the calculated attenuation required in the specific wind conditions (i.e. wind speed and direction). Operating the turbines in reduced noise modes is generally referred to as curtailment. As is noted under Section 11.5.6.1 of the submitted EIAR:

“Should predicted exceedances be confirmed at the commissioning stage of the development, it is possible to mitigate for this through curtailment of some turbines in the relevant wind speed and directions. The curtailment strategy would ultimately be developed for the specific

turbine technology installed on the site and the associated noise emissions at the various operational wind speeds. If necessary, a detailed curtailment strategy matrix will be developed at the detailed design stage in order to achieve the relevant noise criteria (cumulative) at all NSL's."

Curtailment measures will therefore be implemented where required. Overall, the noise criteria proposed for the site is considered to be robust and in line with the relevant guidance. Accordingly, based on this robust analysis, and the mitigation measures outlined in Chapter 11 of the submitted EIAR, the amenity of residents in the vicinity of the site will not be significantly impacted by noise from the proposed development. It is fully accepted that in the event of favourable consideration that the Board will include conditions outlining the noise levels appropriate for a development of this nature and to establish a noise monitoring regime over the operational period. The imposition of any such condition which is standard practice for wind farm developments will ensure that noise does not present a significant issue in relation to residential amenity and impact on human beings.

Further to the above it should be noted that planning application Pl. Ref. 20/45, which sought permission for a wind farm development comprising of two turbines, was not included in the EIAR assessment as there was no knowledge of the proposed development at the time. The turbine noise modelling and assessment has been updated to include Pl.Ref. 20/45. The full details and results of the revised assessment, including the revised outline turbine curtailment strategy for the Derrinlough turbines, is presented in Section 4.1 of the Technical Report provided by AWN (**Appendix 1**) of this response.

2.1.1.4 Shadow Flicker

A number of third party submissions have raised concern surrounding the potential impacts which shadow flicker may have should the proposed development be granted permission. A full shadow flicker assessment has been carried out for the proposed development and is included under Section 5.7 of the submitted EIAR. Overall, the shadow flicker assessment presents a robust review of the phenomenon and demonstrates that the proposed development will not have a significant impact on residential or general amenities of the area. Accordingly, based on this comprehensive analysis, and the mitigation measures provided within the EIAR, the amenity of residents in the vicinity of the site will not be significantly impacted by shadow flicker from the proposed development.

It should be reiterated that the applicant has committed to a curtailment strategy for all turbines that cause an exceedance in the existing daily and annual shadow flicker limits at residential properties up to a distance of 10 rotor diameters from the proposed development (the accepted zone of sensitivity where shadow flicker can arise). As such it should be noted that no significant impact from shadow flicker on human beings should be experienced due to the proposed development. Based on the assessment and mitigation measures provided under Section 5.7 the EIAR concludes that *"there will be no significant effects related to shadow flicker"*. Furthermore, within Offaly County Council's Chief Executive Report the following is noted with regards to shadow flicker:

"In terms of impacts and mitigation, the applicant has committed to a curtailment strategy for all turbines that cause an exceedance of daytime or annual shadow flicker thresholds. It is considered that the mitigation proposed is likely to be adequate to address the potential adverse impacts on residential properties."

Within the Chief Executives report a number of clarifications were sought, this included the following:

"H2 is shown in Table 5.7 as exceeding the max daily SF but according to Fig 11.19 is outside of 1.5km. T2 and T13 are also not the closest turbines to this dwelling as stated. The applicant is requested to clarify."

There is a discrepancy here in Table 5.7 in relation to the *House No.* column as H3 was incorrectly labelled H2. The applicant would also like to take this opportunity to further correct this discrepancy

and state that T2 is in fact the closest turbine to H3 at 1,168 metres and not T1 as stated in Table 5.7 of the submitted EIAR. The shadow flicker duration shown in Table 5.7 for H3 are correct.

The Chief executives report also notes the following:

“Cumulatively, 5 properties are impacted. H22 is below the 30hr annual limit. H32 exceeds the 30hr annual limit with 51 hours contributed by Cloghan Wind Farm and 11 by Derrinlough. H67 is stated to be affected by 8.5 hours of Shadow Flicker from Derrinlough and 5.5. hours from Cloghan. However, Table 5.7 gives a different figure. The applicant is requested to clarify.”

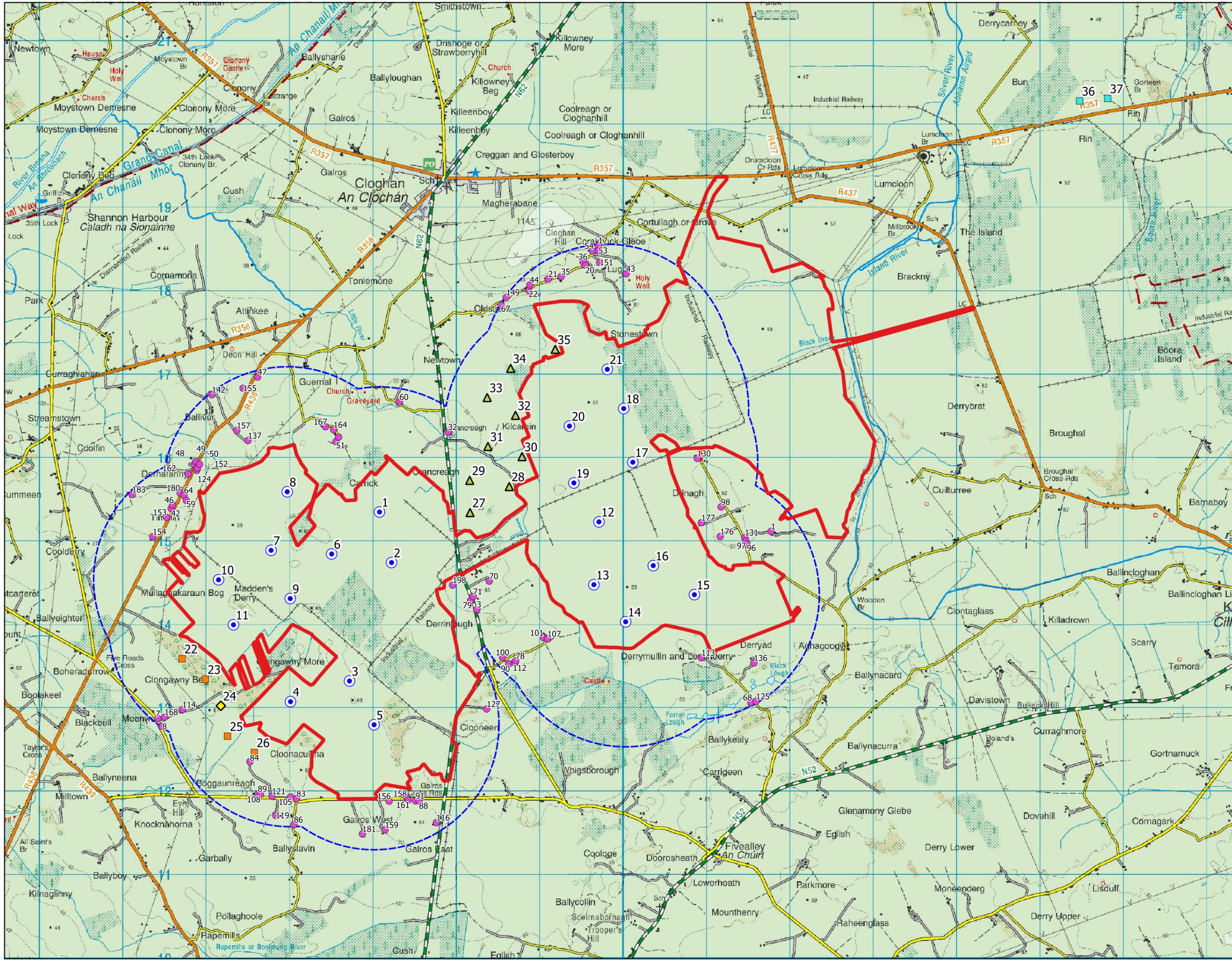
In relation to the potential cumulative shadow flicker experienced at H67, the contribution from Derrinlough should read ‘just over 3.5 hours’ as per Table 5.7 and not 8.5 hours as stated in the EIAR, this typographical error within the text of the EIAR is regretted and the design team welcome this opportunity to clarify this issue.

“H114 exceeds the 30 hour annual limit with over 30 hours contributed by Meenwaun Wind Farm and less than 4 hours contributed by Derrinlough Wind Farm. However, the second paragraph in this section concludes that 11 annual shadow flicker hours are contributed by Derrinlough. The applicant is requested to clarify.”

The first paragraph in this section of Chapter 5 of the submitted EIAR is correct in stating that, as per Table 5.7, Derrinlough Wind Farm contributes less than 4 hours of potential shadow flicker at H114. There is an error in the second paragraph of this section in that it should state that Derrinlough Wind Farm only contributes less than 4 hours of shadow flicker at this property rather than 11 hours as stated in the EIAR.

“Table 5.8 outlines which turbines give rise to a cumulative impact, however, no corresponding diagram is available to cross check which Wind Farm corresponds to which number. The applicant is requested to provide a corresponding diagram.”

A map illustrating which turbine number corresponds to which wind farm included in the cumulative shadow flicker modelling has been included in this document as Figure 2-1 in order to accompany Table 5.8 of the submitted EIAR.



Map Legend

- EIAR Site Boundary
- 1.5km Shadow Flicker Study Area
- Proposed Derrinlough
- ▲ Proposed Cloghan
- Existing Leabeg
- Existing Meenwaun
- ◆ Permitted Meenwaun
- Shadow Flicker House Locations

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Cumulative Shadow Flicker Modelling

Project Title: 171221f - BnM Derrinlough Submission Response

Drawn By: DOS	Checked By: EM
Project No: 171221f	Drawing No: Fig 2-1
Scale: 1:40000	Date: 22.09.20

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2.1.1.5 Landscape

A number of third-party submissions have expressed concern over the potential impacts of the proposed development on the landscape within the vicinity of the proposed development. In relation to this it must be acknowledged that any assessment of visual impact on a landscape is a subjective and emotive issue which is open to influence by a person's background or connection to a particular area. Any assessment as to whether a visual impact is deemed to be positive, negative or neutral, will involve a significant degree of subjectivity. Therefore, what may be deemed by one viewer to be a negative visual or landscape character impact could be deemed a neutral or positive impact by another viewer. The project team and applicant can therefore understand the concerns that have been raised by some of the submissions in relation to perceived negative visual impacts on the landscape arising from the proposed development.

Chapter 11 of the submitted EIAR addresses the landscape and visual impacts of the proposed wind energy development. The proposed development is located partially in an area which has been listed as 'Moderate' sensitivity within the Offaly County Development Plan 2014-2020. These areas are described as '*generally 'open' in character with intrinsic quality and moderate capacity to absorb new development*'. The remainder of the proposed development site is located within an area categorised as High Sensitivity, however, as noted under Section 11.1.1.1.1 of the submitted EIAR:

"...during the site visit very little difference in landscape character and elements could be found between these two areas other than revegetation of the cutover bog was at a slightly more progressed in the Drinagh land parcel. Hence the description provided in Table 7.11.1 of the CDP for 'Moderate Sensitivity' as 'generally 'open' in character with intrinsic quality and moderate capacity to absorb new development' seems more apt to both areas than having 'identified features or areas of natural beauty or interest', which is how areas of 'High Sensitivity' are described as in the same table. Hence, it could be argued that both areas could be approached in a similar manner and that the Moderate Sensitivity rating may be more appropriate."

An assessment of the visual effects of the proposed turbines was undertaken from 16 viewpoints for the proposed development. The locations chosen for photomontages follow a detailed and extensive process including review of baseline information, site visits and high-quality photo taking at multiple locations within the LVIA study area. The overall visual impact of the turbines varies depending on their location. The visual impacts represented by the photomontages numbered 1-16 range from 'No Effect' to 'Moderate', the significance of the residual visual effect was not considered to be "Profound", "Very Significant" or "Significant" at any of the 16 viewpoint locations.

Overall, the comprehensive landscape impact assessment presented in Chapter 11 of the submitted EIAR, has informed the layout design of the proposed development to ensure that any potential impacts to the receiving landscape are minimised and that the development in general does not impact on the amenity of residents in the vicinity of the site.

2.1.1.6 Photomontages

A submission was made to An Bord Pleanála which noted that the photomontages submitted as part of the application have been prepared by merging a number of photos to create a wide angled photomontage. The third party submission notes that this makes it difficult to fully evaluate the impact of the proposed development. It should be noted that montages by definition combine elements from different sources to create an image, in this case individual photos and three-dimensional modelling to create a wide angle (90 degrees) that cannot be achieved by one individual image on its own. Montages may differ in contrast and clarity due to weather conditions on the day the photos were taken. As such it should be considered that the photomontages in this regard are entirely appropriate.

A further concern was raised surrounding the colour of the turbines used within the photomontages. With regard to the colour of the Cloghan turbines, these have not yet been built, hence information on

their intended colour is not available. Furthermore, representation of colour, particularly on light surfaces is greatly dependent on weather conditions. The wind farm turbine models and colouring shown in the submitted photomontages have been chosen to show the worst-case scenario in a montage and would not compare exactly with a pre-existing wind farm in an image.

The photomontages presented in the submitted photomontages booklet have been prepared in accordance with the 2017 Scottish Natural Heritage (SNH) Visual Representation of Wind Farms guidelines. These guidelines are considered to be best practice guidance and state that *'images should be stitched together by a competent professional using suitable software'*.

These guidelines also include the following paragraph:

*'Considerable debate on visualisations in the past has revolved around making them 'true to life'. **Visualisations, whether they are hand drawn sketches, photographs or photomontages can never exactly match what is experienced in reality.** They should, however, provide a representation of the proposal that is accurate enough for the potential impacts to be fully understood.'*

2.1.1.7 Community Engagement and Public Consultation

A number of third party submissions have been made with respect to the level of community engagement/public consultation which was carried out by the applicant in the lead up to the planning application being lodged. It was suggested within observations received that not enough had been done in engaging with the local community. It should be reiterated that the applicant, throughout the design phase of the proposed development, placed a strong emphasis in engaging with the local community.

Section 2.6.4 (along with the 'Community Report' under Appendix 2.3) of the submitted EIAR details the comprehensive consultation and public participation which was carried out in respect of the proposed development. Engagement with the public, adjacent residents and local public representatives took place in many forms during the project design and preparation of the EIAR, as follows:

- *"Two 'Community Information Sessions' were held in April 2018 and November 2018, respectively.*
- *Briefing Sessions for public representatives were held on two occasions, namely on the evening before each of the two 'Community Information Sessions'.*
- *A dedicated Community Liaison Officer (CLO) was appointed for the project in April 2018.*
- *Eight 'one to one' house visits were requested and facilitated by the project team during the period from April 2018 to November 2019.*
- *Approximately 40 queries received via email, post, phone and the CLO were responded to by the project team."*

The community consultation which was carried out during the design stage of the proposed development aided in influencing the overall design of the project. Influence of the public consultation on the proposed development included amendments to the number of turbines, setback distances as well as influencing the amenity pathways which were included as part of the proposed development. As is clearly evident the applicant has made a considerable effort to engage with the local community throughout the design process of the Derrinlough Wind Farm.

2.1.1.8 Community Gain and Community Benefit

A number of submissions were received by An Bord Pleanála with regards to the community gain/community benefit of the proposed development. With respect to community gain, it should be noted that during the construction approximately 100 -120 jobs will be required. A further smaller number of longer term roles will be required for the operation and maintenance of the proposed development. Many construction workers and materials will be sourced locally, thereby helping to

sustain employment in the construction trade. As noted within the EIAR *“the injection of money in the form of salaries and wages to those employed during the construction phase of the project has the potential to result in an increase in household spending and demand for goods and services in the local area”*. As such the proposed development would result in local retailers and businesses experiencing a short-term positive impact on their cash flow

Since 2014, Bord na Móna Powergen Ltd. has managed the Community Benefit Fund for both its Mountlucas Wind Farm and Bruckana Wind Farm. The Community Benefit Fund Committee is made up of local representation for the areas in closest proximity to the wind farm. The Schemes are managed in a very structured manner whereby an annual call is made each February for applications for the fund. All applications are reviewed and scored by the local Committee and funding awarded accordingly. Bord na Móna are responsible for the administration of the scheme on behalf of the Community. To date, the fund has supported over 200 projects across Offaly, Kilkenny, and Tipperary including schools, sports clubs, general amenity, social initiatives, as well as community facilities. All beneficiaries are published on the respective wind farm’s dedicated website annually.

In addition to the support offered to local community groups and initiatives, the Community Benefit Fund also provides support to residents within a prescribed distance of the wind farm developments through the Near Neighbour Scheme. The scheme was introduced by Bord na Móna following extensive research and engagement with local communities, which indicated that the provision of direct benefit to residents who lived in close proximity to a wind farm should be considered.

The Near Neighbour Scheme has two components. The first aspect offers electricity bill payers living within a prescribed distance of a wind turbine an annual discount on their electricity bills subject to terms and conditions. The second aspect is the provision of funding for individual residential properties within a prescribed distance of a wind turbine, to either carry out energy efficiency measures on their property or to use towards education support subject to terms and conditions. In advance of commencement of works all homeowners must complete a BER assessment on their property to enable them to identify and cost energy efficiency improvement works that could be carried out on their property. To date Bord na Móna has completed 60 BER assessments on homes adjacent to Mountlucas and Bruckana Wind Farms and applicants are currently in the process of applying to draw down funding to either carry out works on their properties and/or to use for further education.

RESS 1 is the first Renewable Electricity Support Scheme by the Government of Ireland. The first RESS Auctions – RESS 1 were held in 2020. As part of the terms and conditions of the RESS 1 Scheme, all RESS 1 Projects are required to establish a Community Benefit Fund prior to commercial operation of the relevant RESS 1 Project. The contribution will be €2/MWh of Loss-Adjusted Metered Quantity for all RESS 1 Projects. Although the Derrinlough project is not a RESS1 project, the RESS1 terms and conditions are a useful indicator of potential terms and conditions that may be applied to Derrinlough Wind farm, should it reach that stage.

As part of the fund, A Good Practice Principles Handbook will be published by the Minister (or a nominated body) prior to 1 July 2021. This will lay out a range of principles, including the need to ensure community participation in fund decision-making via the establishment of a local committee. The Minister (or a nominated body) shall have oversight over all Community Benefit Funds and may audit Community Benefit Funds for compliance with these terms and conditions. The RESS-1 Community Benefit Fund has set out a number of mandatory requirements that developers must adhere to including:

The Generator or its agent will administer the funds contained in the Community Benefit Fund and shall distribute such funds for the duration of the relevant RESS 1 Project’s RESS 1 Support as follows on an annual basis:

- (a) in respect of Onshore Wind RESS 1 Projects, a minimum of €1,000 shall be paid to each household located within a distance of a 1-kilometre radius from the RESS 1 Project;

(b) a minimum of 40% of the funds shall be paid to not-for-profit community enterprises whose primary focus or aim is the promotion of initiatives towards the delivery of the UN Sustainable Development Goals, in particular Goals 4, 7, 11 and 13, including education, energy efficiency, sustainable energy and climate action initiatives;

(c) a maximum of 10% of the funds may be spent on administration. This is to ensure successful outcomes and good governance of the Community Benefit Fund. The Generator may supplement this spend on administration from its own funds should it be deemed necessary to do so; and

(d) the balance of the funds shall be spent on initiatives successful in the annual application process, as proposed by clubs and societies and similar not-for-profit entities, and in respect of Onshore Wind RESS 1 Projects, on “near neighbour payments” for households located outside a distance of 1 kilometre from the RESS 1 Project but within a distance of 2 kilometres from such RESS 1 Project.

Bord na Móna is committed to ensuring that the development of Derrinlough Wind Farm will provide a long-term economic benefit to the local communities in which it proposes to develop the wind farm and will do so by delivering a structured Community Benefit Package. The value of the fund or the Community Benefit Fund will be directly proportional to the installed capacity and/or energy produced by the wind farm, which based on current proposals, could be in the region of €10 million over the lifetime of the project.

2.1.1.9 Tourism/Perception of Wind Farms

A number of third party observations have been made to An Bord Pleanála which have expressed concern surrounding the potential for adverse effects which the proposed development might have on tourism in the area surrounding the proposed development site.

Section 5.3 of the submitted EIAR provides an overview of tourism features within the wider vicinity of the proposed development. It was noted that there are no key identified tourist attractions pertaining specifically to the site of the proposed development, however, recreational and amenity facilities have been proposed as part of the proposed development itself. Section 5.3 provides an overview of tourism and amenity features within the wider vicinity of the proposed development. Section 5.3.3 of the submitted EIAR provides an overview of the findings of a number of studies which were carried out with regards to tourists opinions/views surrounding the impact of wind farms in tourism. Under ‘*Wind Farms and Tourism Trends in Scotland 2016*’ it was demonstrated that there is no adverse relationship between the development of onshore wind farms and tourism employment at the level of the Scottish economy, at local authority level, nor in the areas immediately surrounding wind farm development. Further to this a study was carried out by Fáilte Ireland which assessed whether or not the development of wind farms impacts on the enjoyment of the Irish scenery by holidaymakers. The Fáilte Ireland survey results indicate that most visitors are broadly positive towards the idea of building wind farms in Ireland. With regard to the perceived impact of wind farms on sightseeing, the Fáilte Ireland report (2007) states:

“Despite the fact that almost half of the tourists interviewed had seen at least one wind farm on their holiday, most felt that their presence did not detract from the quality of their sightseeing, with the largest proportion (45%) saying that the presence of the wind farm had a positive impact on their enjoyment of sightseeing, with 15% claiming that they had a negative impact.”

Overall, it is not considered that the proposed development would have an adverse effect on tourism in the vicinity of the proposed development.

2.1.1.10 Property Value

A number of observations have been made surrounding the potential of the proposed development to impact on individuals property values in the vicinity of the development site.

Section 5.6 of the submitted EIAR provides clarification in this regard, examines and sets out a number of relevant studies which have been carried out internationally surrounding the impact of wind farm developments on property values. The largest study of the impact of wind farms on property values has been carried out in the United States. ‘The Impact of Wind Power Projects on Residential Property Values in the United States: A multi-Site Hedonic Analysis’, December 2009, the main conclusion of this study is as follows:

“Based on the data and analysis presented in this report, no evidence is found that home prices surrounding wind facilities are consistently, measurably, and significantly affected by either the view of wind facilities or the distance of the home to those facilities. Although the analysis cannot dismiss the possibility that individual or small numbers of homes have been or could be negatively impacted, if these impacts do exist, they are either too small and/or too infrequent to result in any widespread and consistent statistically observable impact.”

‘Impact of wind Turbines on House Prices in Scotland’ (2016) was published by Climate Exchange in October 2016. The key findings from the study are:

- No evidence of a consistent negative effect on house prices: Across a very wide range of analyses, including results that replicate and improve on the approach used by Gibbons (2014), we do not find a consistent negative effect of wind turbines or wind farms when averaging across the entire sample of Scottish wind turbines and their surrounding houses. Most results either show no significant effect on the change in price of properties within 2km or 3km or find the effect to be positive.
- Results vary across areas: The results vary across different regions of Scotland. Our data does not provide sufficient information to enable us to rigorously measure and test the underlying causes of these differences, which may be interconnected and complex.

Based on Chapter 5 of the submitted EIAR and the above studies it is a reasonable assumption based on the available international literature that the provision of a wind farm at the proposed location would not impact on the property values in the area. To reiterate the findings of the EIAR:

“it is a reasonable assumption based on the available international literature, that the provision of a wind farm at the proposed location would not impact on the property values in the area”.

2.1.1.11 Health Effects of Wind Farms

A number of third party submissions made to An Bord Pleanála have raised concern regarding the potential for health impacts from the proposed development.

While there are anecdotal reports of negative health effects associated with wind turbines, peer-reviewed research has not supported these statements. There is currently no published scientifically proven evidence to definitively link wind turbines with adverse health effects. Section 5.5 and appendix 5.1 of the submitted EIAR provides a summary of the main publications supporting the view that there is no evidence of any direct link between wind turbines and health.

2.1.1.12 Health and Safety

A number of third party submissions have raised concerns surrounding the safety of the proposed development. It should be reiterated that turbines pose no threat to the health and safety of the general public.

Section 5.5.2 of the submitted EIAR notes that the Department of the Environment, Heritage and Local Government (DoEHLG)'s 'Wind Energy Development Guidelines for Planning Authorities 2006' and the 'Draft Revised Wind Energy Development Guidelines' (Department of Housing, Planning and Local Government (DoHPLG), December 2019), state that there are no specific safety considerations in relation to the operation of wind turbines. Fencing or other restrictions are not necessary for safety considerations and should be kept to a minimum.

As set out under Section 5.5.2 of the submitted EIAR there is a very remote possibility of injury to people from flying fragments of ice or from a damaged blade, however, most blades are composite structures with no bolts or separate components and the danger is therefore minimised. Furthermore, the following is also set out:

"The wind turbines will be fitted with anti-vibration sensors, which will detect any imbalance caused by icing of the blades. The sensors will cause the turbine to wait until the blades have been de-iced prior to resuming operation."

Turbine blades are manufactured of glass reinforced plastic which will prevent any likelihood of an increase in lightning strikes within the site of the proposed development or the local area. Lightning protection conduits will be integral to the construction of the turbines. Lightning conduction cables, encased in protection conduits, will follow the electrical cable run, from the nacelle to the base of the turbine. The conduction cables will be earthed adjacent to the turbine base. The earthing system will be installed during the construction of the turbine foundations."

2.1.1.13 Effects of Windtake

A number of submissions/observations raised concern with regards to the potential impact of windtake on the Cloghan Wind Farm, a consented development which will be located in the vicinity of the proposed development.

As outlined in Section 3.3.5.1 of the submitted EIAR, design distances from adjacent wind farms (constructed and consented) were considered as part of the turbine layout design to ensure that turbulence and wake effects were addressed in accordance with relevant guidance requirements which includes the following:

- Wind Energy Development Guidelines for Planning Authorities (Department of the Environment, Heritage and Local Government, 2006);
- *Best Practice Guidelines for the Irish Wind Energy Industry* (Irish Wind Energy Association, 2012).

Cognisance was also given to the following guidelines:

- *Proposed Revisions to Wind Energy Development Guidelines 2006 - Targeted Review in relation to Noise, Proximity and Shadow Flicker*, (Department of the Environment, Community and Local Government 2013); and
- *Review of the Wind Energy Development Guidelines 2006 - "Preferred Draft Approach"* (Department of Housing, Planning, Community and Local Government and Department of Communications, Climate Action and the Environment, 2017).

The Wind Energy Development Guidelines for Planning Authorities (Department of the Environment, Heritage and Local Government, 2006) states the following with respect to turbulence and windtake:

“In general, to ensure optimal performance and to account for turbulence and wake effects, the minimum distances between wind turbines will generally be three times the rotor diameter ($=3d$) in the crosswind direction and seven times the rotor diameter ($=7d$) in the prevailing downwind direction. Bearing in mind the requirements for optimal performance, a distance of not less than two rotor blades from adjoining property boundaries will generally be acceptable, unless by written agreement of adjoining landowners to a lesser distance. However, where permission for wind energy development has been granted on an adjacent site, the principle of the minimum separation distances between turbines in crosswind and downwind directions indicated above should be respected”.

The Cloghan Wind Farm development was considered at an early stage in the wind turbine layout design process. A minimum separation distance of three times the largest rotor diameter in the crosswind direction and seven times the rotor diameter in the prevailing downwind direction was applied during the proposed turbine layout design. In addition, as outlined in Section 3.3.5.2 of the submitted EIAR, the turbine layout design also had regard to cumulative noise and shadow flicker requirements which increased the separation distances beyond that specified in the guidance for turbulence and wind take.

The submitted EIAR also states in Section 3.3.5.2 that *“Following the lodgement of a planning application for proposed amendments to Cloghan Wind Farm in August 2019 the layout was further revised to a 21-turbine layout as the proposed amendments (which comprised an increase in rotor diameter and the micro-siting of 6 No. turbines) impacted on turbines in an upwind and downwind direction.”*

Therefore it is our view that the proposed development will not have an impact on the operation of either the consented Cloghan Wind Farm or its proposed amendments.

2.1.1.14 Project Splitting

A third-party submission was made which raised concern surrounding the potential for project splitting to arise in relation to the proposed development. Project splitting is a term that is used to describe the process of breaking up larger scale projects into smaller constituent parts in order to avoid the Environmental Impact Assessment Report (EIAR) process and can be raised as a concern for a Habitats Directive Assessment. In this regard it is evident that project splitting has not occurred for the proposed development as a full and comprehensive EIAR and NIS have been submitted as part of the application documentation. Accordingly, the proper planning procedures have been followed.

2.1.1.15 Turbine Design

Within the Chief Executives Report issued by Offaly County Council with regards to ‘Turbine Design’ the following was noted:

‘It is considered that the Board should consider the ratio of rotor diameter to hub height. A ratio in the order of 1:1 gives rise to the typical tall, slender and proportional appearance of the machines. When the rotor diameter exceeds by a significant margin the hub height, the entire structure can become excessively dominant and chunky in views. Considering the stated dimensions of the proposed turbines, the maximum possible rotor diameter is proposed as 150m and the maximum potential hub height is proposed at 110m. This puts the potential ratio of tip height to hub height at considerably more than 1:1, more in the order of 1.4:1. This is also considered relevant given the proximity of the proposal to the other permitted wind farm development, and the difference in the tip and hub heights between the developments, may

impact upon the visual order and legibility of the developments when viewed in the landscape.'

A literature search found no specific guidance on the preferred rotor diameter to hub height ratio. In the 2017 Scottish Natural Heritage (SNH) *Siting and Designing Wind Farms in the Landscape*: guidelines, factors to consider when choosing the most appropriate turbine dimensions for a site included 'the proportion of blade length to tower height' and 'consistency with other existing and consented turbines in the vicinity'.

To that end the rotor diameter to hub height ratios of adjacent and nearby turbines were analysed as shown in Table 2-1 below:

Table 2.1 Landscape Receptors – Landscape Designations

Wind Farm Turbines	Rotor Diameter	Hub Height	Rotor Diameter to Hub Height Ratio
Proposed Derrinlough	150	110	1.363 : 1
Cloghan (permitted subject to appeal – Pl. Ref 19/404)	137	100.5	1.363 : 1
Cloghan (permitted - PL19.244053)	100	100	1 : 1
Meenwaun	120	109	1.1 : 1
Leabeg	92	78	1.18 : 1

The optimised Cloghan turbines recently granted permission by Offaly County Council have the same ratio as that of the proposed Derrinlough turbines. The other adjacent, existing Meenwaun turbines also have a ratio above 1 : 1.

Additionally, the relative hub heights of the adjacent permitted and existing turbines should be considered. The hub height of the optimised Cloghan turbines is 100.5 (the previously permitted hub height is 100m) and the existing Meenwaun turbines have a hub height of 109m. The currently proposed Derrinlough hub height is 110m. Should a ratio of 1 : 1 be sought at a tip height of 185m then this would result in a hub height of 123.3 m. It is considered that such inconsistency of hub height between the proposed turbines to the existing and permitted adjacent turbines would give rise to greater cumulative visual effects than having a slightly greater rotor diameter to hub height ratio than the adjacent existing and permitted turbines.

As part of the LVIA chapter an alternative turbine design of 120m hub height and 130m rotor diameter was also modelled from Viewpoint 12 and both the photomontages at hub heights of 110m and 120m from this viewpoint are presented in the Photomontage Booklet. Viewpoint 12 was chosen as all the proposed Derrinlough turbines could be clearly seen next to the existing Meenwaun turbines and the permitted Cloghan turbines. Comparison of the two photomontages showed that the two different turbine designs would have an imperceptible visual impact.

A further issue was raised in the Chief Executive's report with regard to the adjacent Cloghan turbines:

'While Chapter 12 makes reference to the amended height permitted to the Cloghan Wind Farm i.e increase in tip height from 150m to 169m, it is uncertain whether this revised height has been taken into account with respect to the photomontages presented. As mentioned previously this application is currently under appeal to the Board but this it is considered that this item requires clarification.'

Both the photomontage booklet of the submitted EIAR (Volume 2) and the amended photomontage booklet (included as part of this response to further information) include the revised turbine height of 169m for the Cloghan Wind Farm (Pl. Ref 19/404). For clarity, the Cloghan Wind Farm turbines, shown in the photomontage booklet, have been relabelled as ‘Permitted Cloghan Turbines (subject to appeal)’.

2.1.1.16 Hydrology

Hydro-Environmental Services (HES) have been appointed to review and respond to geological and hydrological/hydrogeological issues that were raised in submissions in relation to the proposed Derrinlough Wind Farm. The report provided by HES has been included under **Appendix 2** of this report and provides detailed responses to the Offaly County Council Chief Executives Report along with submission made by Inland Fisheries Ireland, Irish Water, Geological Survey of Ireland, and the Development Applications Unit of the Department of Culture, Heritage and the Gaeltacht.

Within their submission Irish Water noted the presence of infrastructure within the proposed site boundary and that the applicant shall submit a diversion enquiry to Irish Water. With regards to this please note that Irish Water will be consulted should permission for the proposed Derrinlough Wind Farm be granted favourable permission.

2.1.1.17 Traffic and Transport

Alan Lipscombe Traffic and Transport Consultants Limited have been appointed to review and respond to the perceived issues relation to traffic and transport raised by third party submissions for proposed Derrinlough Wind Farm application. The report provided by Alan Lipscombe Traffic and Transport has been included under **Appendix 3** of this RFI document.

2.1.1.18 Aviation

Within the submission issued by the Irish Aviation Authority (IAA) the IAA observed that the wind farm is within Wolfrap DME Flight inspection orbit and might have an adverse effect on flight inspection procedures and profiles. A report has been prepared by Cyrrus Aviation Consultancy to respond to the query raised by the Irish Aviation Authority and is included under **Appendix 4** of this RFI document. It was the finding of this report that:

- The Area Minimum Altitude (AMA), in the vicinity of the proposed wind farm, is 2,700 feet. The highest turbine within the wind farm does not impact the existing AMA.
- The Vertical and Horizontal requirements for conducting a flight calibration of Distance Measuring Equipment (DME) provide more than sufficient vertical separation from the highest turbine.

As a result, the report noted that *“the proposed Derrinlough Wind Farm will not impact the flight calibration requirements for the Wolfrap DME”*.

2.1.1.19 Ecology

The following section has been prepared in response to the third party submissions which have been made with regards to the Derrinlough Wind Farm application.

2.1.1.19.1 Response to submission made by DoCH&G

The comments made by the National Parks and Wildlife Service (NPWS) are set out in a submission made on the 11th June 2020 by the Department of Culture, Heritage and the Gaeltacht. Where relevant and applicable, these comments have been addressed under the various headings in the submission.

Matters relating to the Environmental Impact Assessment Report

Do Nothing Scenario

The NPWS submission briefly describes the requirements of a ‘Do Nothing Scenario’ from the EIA Directive (and in the Planning and Development Regulations 2011 – 2019). The point is made that the requirement is for an assessment of the evolution of the baseline environmental conditions. i.e. how the situation would be expected to develop over time (rather than a static description of the state of the environment at the time of the assessment).

The submission then goes on to quote from Section 6.6.1, Chapter 6, Page 6-58 of the EIAR and selects the following text from the chapter:

‘The biodiversity on the site would likely remain similar to its current state as activity levels and land use would not change significantly.’

In response to the submission, it is noted that the text quoted above refers to a situation where the site continues to be managed for commercial peat production (briquette factory), forestry and other existing land uses. The NPWS submission does not quote the following paragraph from the EIAR, which follows the previously quoted sentence and clearly sets out the ‘Do Nothing Scenario’ in the absence of the existing land uses on the site.

‘When peat extraction activity ceases, a Rehabilitation Plan will be implemented in accordance with the IPC licence requirements, to environmentally stabilise the site through encouragement of re-vegetation of bare peat areas. This rehabilitation plan is designed to result in an overall increase in biodiversity on the site when compared to the existing situation, following cessation of peat extraction.’

This clearly show that an assessment has been made of the ‘Do Nothing Scenario’ in the EIAR. This assessment has not only taken account of the scenario whereby the existing land uses continue in the absence of the windfarm, but also takes account of the scenario whereby the current activity ceases and the site will be rehabilitated in accordance with the IPC licence. It is the case that although peat production has ceased at the site it will in the short term continue to supply peat to the briquette factory as stockpiles are removed and that after this, the site will be rehabilitated in accordance with the IPC licence.

Draft Rehabilitation Plans

Absence of inclusion of Rehabilitation Plans that do not integrate the windfarm

The NPWS submission notes that the IPC licence requires that, following termination of use or involvement of all or part of the site in the licenced activity, the licensee shall implement the agreed cutaway bog rehabilitation plan (Condition 10.1). The submission notes that the draft rehabilitation plans that are provided in Appendix 6.8 of the EIAR have the windfarm integrated within them and states that no information is provided about the measures that would have been undertaken in the absence of the windfarm development and therefore it is not known whether the rehabilitation plans have been undermined by the proposed development. The submission then goes on to note that Draft Rehabilitation Plans are available for this site, dating from 2013.

In response, it is confirmed that a draft Rehabilitation Plans (Clongawny Bog and Drinagh Bog) are available and provides the information required by the NPWS to demonstrate that the construction of the proposed windfarm in no way undermines the proposed rehabilitation of the site. This Draft Rehabilitation Plans dates from 2017 and seeks only to meet the requirements of the IPC Licence which is to stabilise the site and prevent risks to the environment following the cessation of licenced activities on the site. This plans are attached as **Appendix 5** to this document. The 2017 Draft Rehabilitation Plans are the most recent plan for rehabilitation in the absence of any windfarm. However Bord na

Móna are planning to undertake enhanced rehabilitation on much of their landholding following the cessation of peat extraction, and this enhanced rehabilitation may include many of the measures that are included in the Draft Rehabilitation Plan that is provided in Appendix 6-8 to the EIAR and integrates the windfarm. It is worth noting that the proposed windfarm will not undermine the potential of any such rehabilitation plan for the site for the following reasons:

- The footprint of the windfarm will result in the loss of approximately 32 hectares of cutover and revegetating bog habitats and this represents only 1.98% of the total area of this habitat type on the site.
- The windfarm has been specifically designed to minimise impacts on the wettest habitats within the site and those with most potential to rewet in the future.
- The drainage design plan for the development that is described in full within Chapters 4 & 9 of the EIAR will ensure that the effect of the windfarm development will be restricted to its footprint and a small zone of influence that includes its immediate surroundings, with no significant impact on the surrounding lands.

Lack of Detail in the Current Draft Rehabilitation Plans

The NPWS submission considers that the current plans are not sufficiently clear and detailed about the rehabilitation measures to be undertaken.

In response, it can be confirmed that some rehabilitation works have commenced on the site already (as described in the Rehabilitation Plan 2020) and further rehabilitation work will commence immediately following the cessation of peat harvesting and associated activities on the site. The Draft Rehabilitation Plan that was submitted in 2020 and included as Appendix 6-8 to the EIAR provides a description of the site and its ecology. It also provides a framework and outline of the works that will be undertaken to achieve the aims of successful rehabilitation (the criteria for which are defined in the plan). It provides a timescale for when the various elements of the plan will be implemented (e.g. short term – pre construction of the windfarm, during wind farm construction (2024 -2026), medium term - post wind farm construction (2026 -2031) and Long term - (post 2031)). The plan does not provide details of exactly where rewetting will occur and the details of exactly how this will be achieved. However, it is acknowledged that there were maps omitted from Appendix 6-8 of the EIAR and these maps, including the Habitats Map, Potential Future Habitats Map and Landuse Map are provided as **Appendix 6** to this RFI response document. The potential future habitats map provides details of areas that are suitable for rewetting and where this management will be undertaken. This is based on the existing habitats present and the topography of the site. The details necessary to achieve the aims set out in the 2020 Rehabilitation Plan (and shown on the potential future habitats map) will include the exact locations of the drains to be blocked and bunds to be constructed etc. This level of detail will only be available and will be included in the final rehabilitation plan once the current operations on the site have ceased. It should be noted that the entire wind farm site, with the exception of Derrinlough Briquette Factory, is located within the IPC licenced area. The extent of the IPC licenced area in relation to the proposed wind farm study area is shown in **Appendix 6**.

It is fully intended that the rehabilitation of the site as part of the wind farm development will include the implementation of measures that are over and above those required by Condition 10.1 of the IPC licence. This is evidenced in the difference between the 2017 and 2020 Rehabilitation Plans. The 2017 draft rehabilitation plan commits to stabilise the site and prevent risks to the environment following cessation of operations. The 2020 Draft Plan, which includes the wind farm is designed specifically to rewet the cutaway where possible, primarily through drain blocking, bunding and management of the pumping regime to provide optimum conditions for peat formation (i.e. water level close to the surface). It also includes measures for water treatment, maintenance of remnant Raised Bog habitats, management of woodland and nature-based amenity. The plan provides an outline of the enhanced measures that will be undertaken and it is predicted that 44% of the site will be rehabilitated to support wetland habitats. This would offset any potential loss of cutover and revegetating peatland as a result of the wind farm by a factor of 20 and facilitates the undertaking of a robust environmental assessment.

Bord na Móna is fully committed to the provision of rehabilitation of this site to ensure that the biodiversity, climate, water regulation and water cleanliness are maximised. It is similarly committed to providing a significant source of green energy at the site, without undermining the rehabilitation objectives.

Detail of Rehabilitation Measures

The measures to be undertaken will follow standard procedures that are regularly undertaken by Bord na Móna and known to be effective. Some additional details of the proposed measures that are proposed as part of the wind farm development are provided below.

Drain Blocking

Drains will be blocked using a number of methods depending on the size and type of drain. Methods will include:

- Peat dams within small drainage channels on the cutover bog,
- Trench blocking using plastic sheet piles on larger drains (see Plate 2-1)
- Removal or blocking of drainage pipes where required.

These methods are fully described in the Irish Wildlife Manual ‘*Best Practice in raised bog restoration in Ireland*’ (Mackin *et al*, 2017).



Plate 2-1 Partially blocked drain, with level of blocking determined by driving plastic piles in the centre of the drain further into the peat (Source: NPWS, 2017). Such measures will ensure a rise in the water table while not creating open waterbodies.

Cell Bunding

Another option to re-wet cutaway bog and maintain suitable hydrology to encourage the establishment of vegetation is cell-bunding. This technique has been trialled on several peatland restoration LIFE projects in the UK to maintain wetness on peat with minor slopes (Anon, 2016). Bord na Móna used this technique during the Oweninny rehabilitation programme (Bord na Móna 2002, Farrell and Doyle, 2003) and it has also been recently trialled at Lodge Bog and at Longfordpass Bog. The Bord na Móna experience at Oweninny found that this technique worked best where ground was relatively flat and where water-levels were already close to the bog surface. Such conditions occur within the proposed rewetting areas at Derrinlough.

As part of this Clongawny and Drinagh Rehabilitation Plans, Bord na Móna will carry out a cell-bunding trial. Cell-bunding will be carried out in selected areas that have potential to re-establish water levels at the bog surface, as well as in somewhat drier areas where Heather has become established. The objective here will be to see if these techniques can re-wet drier peat more successfully than drain-blocking on its own. The methodology will follow techniques used by Natural England (Anon, 2016). The application of this technique should be seen as innovative and positive in the context of developing new techniques and methodology to re-wet bog and develop peat-forming conditions. The locations where this cell bunding trial will be undertaken will be determined following the initial drain blocking exercises and will be overseen by Bord na Móna ecologists.

Monitoring

Prior to the commencement of drain blocking works, permanent vegetation monitoring plots will be established along transects within the rewetted areas. The monitoring plot locations will be selected using stratified random sampling. This will allow the monitoring plots to be representative of microtopography and vegetation cover, sampling areas from the wettest, intermediate and driest parts of the site. Monitoring plots will be surveyed and classified using the relevé method as per the National Survey of Upland Habitats with plot sizes being 2m x 2m. Biotic and abiotic parameters that form baseline indicators of ecological and hydrological condition of the bog will be recorded. Monitoring plots will be marked out permanently using fencing posts and their location recorded using GIS. The number of monitoring plots will be determined by the level of plant community heterogeneity identified during the baseline survey. However, it is envisaged that a minimum of fifteen 2m x 2m monitoring plots will be established in the enhanced area. Monitoring plots will be surveyed once annually during the first five years of the wind farm and at 5 year intervals for the lifespan of the wind farm.

Results will be analysed by Bord na Móna and a report of the findings will be produced. The rehabilitation plan will be regularly reviewed and amended if necessary during its implementation to improve the efficacy of the enhancement work. The number of monitoring plots may change depending on the results of the initial surveys.

The monitoring survey design will take into consideration the following:

- *Vegetation Description and Data Analysis: A Practical Approach*, 2nd Edition (Kent, 2011)
- *Detailed habitat and ecotype classification based on The National Survey of Upland Habitats* (Perrin *et al.*, 2014)
- *A Manual for the Production of Grazing Impact Assessments in Upland and Peatland Habitats* (NPWS and DAFM, 1999).
- *Blanket Bog, Heath and upland grassland exclosures, baseline surveys and monitoring* (Dunne, 2000).
- *Peatland Restoration* (Lunt *et al.* 2010).

Revegetation of Areas that Cannot be Rewetted

In areas that cannot be re-wetted, i.e. areas that are higher due to the nature of the peat milling process and underlying geology, these areas will be revegetated using the following two management options:

1. The establishment of grassland habitat through a formalised management regime and mowing.
2. Encourage the establishment of birch dominated scrub through the use of fertiliser where mowing is not practical.

Grassland Establishment

In higher areas where rewetting measures will not result in sufficient elevation in the local water table to promote natural revegetation, it may be more advantageous to speed up re-vegetation with the use of fertilisers, lime and nursery crops [sheeps fescue (*Festuca ovina*), red fescue (*Festuca rubra*) or bent species (*Agrostis* spp.)] to speed-up natural colonisation. The use of a one-off fertiliser treatment can be very effective in enhancing natural colonisation as one of the key limiting factors is poor nutrient status,

particularly the lack of Phosphorus (Renou-Wilson 2008). Seed sources are generally not a constraint once fertiliser is applied. Trials by the Bord na Móna Ecology Team have found that the use of green hay on bare peat can also be an effective aid to natural colonisation (see the Kilmacshane green hay trial).

At the proposed Derrinlough Wind Farm development site, the drier raised areas of milled peat will be enhanced for pollinating insects as part of the environmental stabilisation. Re-vegetation will be facilitated through the establishment of semi-natural grassland using a wild flower pollinator-friendly seed mix and/or by using ‘Green Hay’ in combination with fertiliser and/or lime and a nursery crop. The species mix will comprise of a variety of plant species that will grow on peatland habitats found in the Derrinlough study area and contribute to an enhancement in biodiversity. The use of wild flower/native species that are also locally common will be incorporated into the seed mixes. The management of the habitat in these areas in this way will be beneficial for other wildlife, particularly pollinators (bees, butterflies and other invertebrates) by providing more wildflowers, food and space. Such measures will also tie in with the objectives of the Lepidoptera Management Plan for the enhancement and creation of marsh fritillary supporting habitat. Where conditions allow, sensitive wildflower meadow management will be employed along some of the new verges that will be created along access tracks. A combination of a suitable wildflower seed mix and a sensitive mowing regime could be used to manage particular portions of the site verges as pollinator friendly verges.

A similar approach has been used before by Bord na Móna at Lough Boora Discovery Park carpark, using a bespoke wildflower seed mix during the landscaping of the former cutaway bog site. The landscaped areas within the carpark has now established to a sward dominated by ox-eye daisy. A bespoke seed mix was used for the carpark landscaping. The seed mix was developed in consideration of the specific environment of the landscaping area. This was relatively dry, with shallow fen peat and significant sub-soil influence meaning a relatively higher pH. This type of environment was suitable for the development of a calcareous grassland type seed mix (which would be suitable in some areas within Derrinlough).

The management undertaken will vary across the site and will be tailored to the requirements of the varying habitats and the specific on-site environment where there will be a variety of peat depths, hydrological conditions and nutrient status. Management (e.g. mowing) will not be uniform. Where mowing is possible (and required to prevent the establishment of scrub on these grassland areas), non-annual (e.g. 3-5 year) mowing cycle will be implemented. This will ensure a suitably diverse sward is maintained as well as avoiding significant disturbance to invertebrate lifecycles. Different actions in different places will enhance the natural diversity of habitats already developing on site.

Bord na Móna will oversee the design, implementation and monitoring of the reseeded and stabilisation works following the installation of the development footprint. The management of these areas will be monitored along with the monitoring of the rewetting and habitat enhancement annually for the first five years and on a five yearly basis thereafter for the lifetime of the project (30 years).

Establishment of Birch Dominated Scrub

The establishment of birch dominated scrub through the use of fertiliser, as described above, where mowing is not practical will speed up the revegetation of these drier areas within the site. Such promotion of the establishment of scrub within the site will result in the formation of a mosaic of habitats while also ensuring that extensive areas of open water do not form.

Other Rehabilitation Measures

- Field re-profiling to improve the overall topography and optimise re-wetting
- Using controlled weir outfalls to manage water levels on cutaway
- Creating new drainage channels (swales) to manage excess water
- Targeted blocking of outfalls within a site to re-wet cutaway

- Trench drain blocking to re-wet cutaway
- Fertiliser application to accelerate natural colonisation of vegetation
- Inoculation of Reeds and other vegetation from donor sites to accelerate vegetation establishment
- Sphagnum inoculation to accelerate vegetation establishment
- Install Solar Powered Pumping System to elevate water within site

Carbon Balance of the Site

The NPWS submission states that no evidence was submitted to support the statement that the integration of the proposed Derrinlough Wind Farm into the rehabilitation plans for Clongawny and Drinagh bogs will have no significant impact on the carbon balance of the site.

In Section 1.4 Brief Description of the Proposed Development of the EIAR it states that the combined area of the Clongawny and Drinagh bogs is 2,360ha. It also states that the total area of the permanent footprint of the proposed development is 34.2ha or 1.45% of the entire site. In order to demonstrate robustly that the proposed development will not have a significant impact on the carbon balance a number of conservative assumptions are made:

- 100% of the area beneath the wind farm footprint will actively sequester carbon continuously over the 30-year period and will begin to sequester carbon in 2021;
- The highest recorded rate of carbon sequestration for rewetted peatlands is utilised in the calculation¹.
- A total of 50% of the area outside of the windfarm footprint will actively sequester carbon at the stated rate and the remainder will be carbon neutral
- The windfarm footprint is buffered by 25m around all of the permanent infrastructure to allow for any possible impact on habitat formation in those areas adjacent to the footprint

It should be noted that the rehabilitation plans for Clongawny and Drinagh bogs recognise that the surface topography for the bogs is heterogeneous. Therefore, it is not possible to re-wet all areas within the bogs and hence create the optimum conditions for carbon sequestration. In the drier areas, this will result in the formation of dry woodland areas or similar drier habitats in those parts of the bogs. Furthermore, in those areas where the optimum conditions for carbon sequestration will be created by the rehabilitation plan it will require time to transition to the desired habitat. This applies to both the areas within and outside the windfarm footprint. Finally, the application of a 25m buffer around the windfarm infrastructure is a very conservative assumption as there are a number of examples on existing Bord na Móna windfarms where habitat formation is unaffected immediately adjacent to the infrastructure.

The projected worst-case impact is outlined in Table 2-2.

Table 2-2 Assessment of potential loss of carbon sequestration due to Proposed Derrinlough Wind Farm development

¹ EPA (2018). Network Monitoring Rewetted and Restored Peatlands/organic Soils for Climate and Biodiversity Benefits (NEROS), EPA Research Programme 2014-2020, P23, Table 5.2.

Table 2-2: Assessment of potential loss of carbon sequestration due to Proposed Derrinlough Wind Farm development		
	Windfarm	Windfarm plus 25m Buffer ^{Note 1}
Total Footprint (Ha)	34.2	167
Carbon sequestration factor (tCO ₂ /ha/yr)	3.82 ²	3.82 ³
Rewetted Footprint carbon savings (tCO ₂ /ha/30yr)	3,916	19,160
Area of the Site (Ha)	2,360	2,360
Area of the site assume to actively sequester carbon (Ha)	1,180	1,180
Wind farm Site Carbon savings Total (tCO ₂ /30yr)	135,115	135,115
% loss of carbon sequestration (30yr)	2.9	14.2

Note 1: 25m is considered to be a worst-case buffer.

In conclusion, on the basis of a number of conservative assumptions the percentage loss of carbon sequestration arising from the construction of the windfarm is determined to be range between 2.9% and 14.2% and therefore it does not have a significant impact on the do-nothing scenario (as defined by NPWS) carbon balance of the site. It should be noted that large areas of the windfarm infrastructure will be rehabilitated at the end of the 30-year lifespan and therefore will be available to sequester carbon at that stage.

With respect to the carbon payback period determined for the development of the windfarm, the calculations carried out and highlighted in Appendix 10.1 have been reviewed. The appendix clearly indicates that the calculations are based on a 21 turbine layout as indicated in the ‘Technology Lifecycle Emission ‘ section.

Disturbance Impacts on Bird Species

The NPWS submission notes the potential for the approximately 18km of amenity pathways that are proposed as part of the wind farm to result in impacts on ground nesting birds and roosting hen harrier within the site.

In response, the trails cover only a very small section of the site and have been specifically designed to avoid areas of sensitivity such as wetlands and rich fen habitat. They have also been designed to utilise existing tracks throughout the site to minimise any loss of habitat. The trails do come in close proximity to the Drinagh wetlands at one location but are located on existing tracks at this location.

Whilst no significant disturbance to any species as a result of the proposed amenity pathways was identified during the environmental impact assessment, the concerns of the NPWS have been taken into account and Bord na Móna commit to the following measures to ensure that there is no adverse effect on ground nesting and/or roosting hen harrier as a result of the amenity pathways:

² EPA (2018). Network Monitoring Rewetted and Restored Peatlands/organic Soils for Climate and Biodiversity Benefits (NEROS), EPA Research Programme 2014-2020, P23, Table 5.2.

³ EPA (2018). Network Monitoring Rewetted and Restored Peatlands/organic Soils for Climate and Biodiversity Benefits (NEROS), EPA Research Programme 2014-2020, P23, Table 5.2.

1. Signage will be erected around the pathways, informing the public of the wildlife in the area and the importance of staying on the path and keeping dogs on leads to avoid impacts on nesting birds.
2. Bird monitoring proposals that are additional to those provided in Appendix 7.9 to the EIAR will be undertaken and will include specific surveys of the areas surrounding the amenity walkways during the operational monitoring.
3. If this monitoring records any sign of disturbance resulting from the use of the amenity pathways, sanctions will be enforced to ensure that it does not continue. These may include:
 - a. Banning of dogs
 - b. Closure of the path or sections of it on a temporary basis to avoid disturbance at certain critical times of year.
 - c. Permanent closure of a path in the unlikely event that significant disturbance would be unavoidable at any time.

With the above measures in place it will be ensured that there is no potential for the proposed amenity pathways to result in significant effects on bird species.

Impacts of Existing Drainage Systems on Water Dependant Ecological Receptors

This comment has been comprehensively and fully addressed in **Appendix 2** by the project hydrologist.

Having given the comments of the NPWS due consideration in the document, the hydrological submission makes the clear point that the footprint of the proposed development covers (and affects) only a tiny percentage of the site area. It also notes that wind farm drainage will only be associated with the access roads, the turbines and the substation and will be the subject of an extensive suite of mitigation to ensure that it will not significantly affect the existing drainage regime and any effect on water quality will be negligible.

The response to this submission that was completed by the project hydrologist and is included as **Appendix 2** to this document concludes:

It is our opinion that the proposed wind farm drainage will not significantly alter the existing drainage regime within the bogs that comprise the wind farm development (Drinagh and Clongawny bogs), and as such, the cumulative effects on drainage (either by quantity or quality) will be negligible. Indeed, with the implementation of Bog Rehabilitation Plans, there will likely be an improvement in downstream water quality.

With specific regard to the potential impact on protected and sensitive aquatic habitats and species, Table 6.15 in Section 6.6.3.1.1 of the EIAR provides a detailed examination of the environmental effects on these receptors and finds that following the implementation of mitigation, there will be no significant effect on aquatic habitats or species as a result of the proposed development. It further concludes that it cannot contribute to any cumulative effect in this regard. This is entirely consistent with the findings of the hydrological assessment that is presented in the EIAR and in **Appendix 2** to this document. The sensitivity of the downstream watercourses (including the downstream European Sites) is fully considered in the EIAR and NIS and the assessment has taken this into account throughout.

Additionally, it should be noted that the measures set out in the 2020 Rehabilitation Plan that is provided in Appendix 6-8 to the EIAR are designed to have a positive effect on water quality, retention and attenuation. These measures are part of a wider enhanced programme of rehabilitation that is being undertaken as an ancillary element to the wind farm project.

Measures in the Biodiversity Management Plan (Appendix 6.7)

Residual Loss of Peatland Habitats

The NPWS submission points to the fact that the impact assessment in the EIAR states that the ecological enhancement of areas of cutover bog through rewetting to promote the development of wetland vegetation are fully described in the Biodiversity Management Plan provided as Appendix 6-7 to the EIAR, when Appendix 6-7 does not in fact provide this information.

In response, the information regarding the ecological enhancement of cutover bog is provided in Appendix 6-8 to the EIAR. This is the 2020 Draft Rehabilitation Plan, which has been discussed at length above. As described above, the plan provides an outline of the enhanced measures that will be undertaken and it is predicted that 44% of the site will be rehabilitated to support wetland habitats. This would offset any potential loss of cutover and revegetating peatland as a result of the wind farm by a factor of 20 and facilitates the undertaking of a robust environmental assessment to conclude that there is no significant residual impact on this receptor.

Planting of Native Woodland

The NPWS submission questions the need for the replanting of any native woodland, given that it is likely to increase on the site through natural regeneration and succession.

In response, approximately 7.24 ha of this non-Annex I woodland habitat will be lost to facilitate the proposed development. Whilst it is indeed likely that the habitat will, in time, replace itself through natural regeneration, the planting of a defined area of native woodland on an area of dry and bare peat that is unlikely to be successfully rewetted and very slow to revegetate, will speed up the process in this area and lead to a biodiversity gain in a shorter period of time. Areas that could potentially be rewetted will not be planted with woodland, but wet woodland is likely to form as part of the ensuing biodiverse habitat mosaic.

Lepidoptera Management Plan

The NPWS submission raises an issue in relation to the side casting of material on the opposite side of the proposed infrastructure to where the suitable habitat occurs and suggests that such side casting could have significant effects on the site's hydrology and hydrogeology and conflict with the planned restoration through rewetting.

In response, marsh fritillary habitat was recorded close to the wind farm infrastructure in few locations throughout the site (around T9 and T10) and the windfarm infrastructure has avoided these areas entirely. The measures set out in the Lepidoptera Management Plan (Appendix 6-6 to the EIAR) are designed specifically to ensure that the species and its habitat are retained and if possible enhanced on the site following the construction of the wind farm.

In relation to the side casting of material, this will be undertaken as part of the road construction methodology where floating roads are not proposed. This methodology is set out in Section 4.8.2.2 in Chapter 4 of the EIAR. This involves placing excavated material immediately adjacent to the road. This will only be undertaken in areas where the peat is shallow (<2m), and thus the excavated material will be minimised. Should side casting be required in the areas surrounding suitable marsh fritillary habitat, the mitigation requires that the placement of material immediately adjacent to the road will be on the side that does not include the identified marsh fritillary habitat. This will not involve any additional land take or in any way conflict with the planned rewetting of the site. It will simply ensure that the infrastructure does not encroach onto the identified marsh fritillary habitat.

In addition to the above, the NPWS submission notes that marsh fritillary conservation is dependant on active management of vegetation and that there is no description of the current management practices and the likelihood of such management continuing.

In response, following discussions with Bord na Móna, it is confirmed that there is no active management of the areas of suitable marsh fritillary habitat being undertaken at present. The majority of the identified habitat for the species on the site is located alongside existing tracks or in areas where stone material has been brought into the site. These areas are not managed in any way but may be subject to occasional disturbance (if vehicles leave the trackway, which is very infrequent) or through grazing by wild animals such as fallow deer, that were seen occasionally during the site surveys. The EIAR commits to the ongoing monitoring of the marsh fritillary habitat on the site to ensure that it does not deteriorate. If, following monitoring of the site, management is recommended, any such management will be undertaken in consultation with Butterfly Conservation Ireland.

Impacts of Aviation and other Lighting on Biodiversity, in particular bat species

The NPWS submission notes that no assessment of the impact of aviation lighting on biodiversity has been included in the EIAR or in the bat survey report in Appendix 6-2.

In response, it is noted that two years of bat survey work has been undertaken to inform the EIAR. During all the surveys undertaken, low levels of bat activity were recorded during the walked transects and no significant loss of commuting, foraging or roosting habitat is predicted. In addition, it is noted that surveys at height were undertaken in 2018 and recorded very low levels of activity at height (as evidenced in Appendix 6 of Appendix 6-2 of the EIAR). As such, given the low levels of activity recorded at the site in general, the lack of significant impacts predicted at ground level, and the extremely low levels of activity recorded at height, the potential for the aviation lighting to result in any significant effect on bat species can be excluded.

Similarly, in relation to other lighting associated with the proposed wind farm, the only permanent lighting is associated with the substation and will be very small scale and rarely used and any lighting that may be required during construction will be temporary in nature and most likely during the winter months when works may begin or end in darkness. Whilst the implementation of any such lighting does not have the potential to result in any significant impacts on biodiversity without any form of mitigation, it is still proposed to ensure that the measures that are set out in Section 6.1.2 of Appendix 6-2 of the EIAR are implemented. These include the use of directional lighting to avoid any illumination of any ecologically sensitive areas such as woodland edge or forestry habitat. Bord na Móna note the Dark Sky Ireland Lighting Recommendations as advised by the NPWS and where possible will implement the recommendations during construction, operation and decommissioning (such that they are necessary):

1. Every light needs to be justifiable
2. Limit the use of light to when it is needed
3. Direct the light to where it is needed
4. Reduce the light intensity to the minimum needed
5. Use light spectra adapted to the environment
6. When using white light, use sources with a “warm” colour temperature (less than 3000K)

In conclusion, the proposed lighting associated with the Derrinlough Wind Farm will be small scale in nature and has been specifically designed to avoid effects on biodiversity during construction, operation and decommissioning. There is no potential for the proposed lighting either individually or cumulatively to result in any significant effect of biodiversity during any stage of the project lifetime.

Matters Relating to Appropriate Assessment and the Natura Impact Statement

The in-combination effect on water quality of the proposed wind farm development along with the existing drainage on the site is comprehensively and fully addressed in **Appendix 2** by the project hydrologist.

Having given the comments of the NPWS due consideration in the document, the hydrological submission makes the clear point that the footprint of the proposed development covers (and affects)

only a tiny percentage of the site area. It also notes that wind farm drainage will only be associated with the access roads, the turbines and the substation and will be the subject of an extensive suite of mitigation to ensure that it will not significantly affect the existing drainage regime and any effect on water quality will be negligible.

The response to this submission that was completed by the project hydrologist and is included as **Appendix 2** to this document concludes:

It is our opinion that the proposed wind farm drainage will not significantly alter the existing drainage regime within the bogs that comprise the wind farm development (Drinagh and Clongawny bogs), and as such, the cumulative effects on drainage (either by quantity or quality) will be negligible. Indeed, with the implementation of Bog Rehabilitation Plans, there will likely be an improvement in downstream water quality.

With specific regard to the potential impact on downstream European Sites, the pathway for effect is clearly identified as being via downstream connectivity in the watercourses that drain the site and a suite of mitigation measures is set out in the CEMP and the EIAR hydrology chapter (both of which are appended to the NIS). The NIS concludes that the development will not have any adverse effect on any European Sites when considered in combination with any other plans and projects. This is entirely consistent with the findings of the hydrological assessment that is presented in the EIAR and in **Appendix 2** to this document. The sensitivity of the downstream watercourses (including the downstream European Sites) is fully considered in the EIAR and NIS and the assessment has taken this into account throughout.

For clarity, it should be stated here that the proposed development will not in itself result in any adverse effects on water quality and as such, it cannot contribute to any cumulative or in combination effects on any European Sites when considered alongside any other plans or projects or when taking full account of the existing drainage regime on the Clongawny or Drinagh Bogs. Additionally, it should be noted that the measures set out in the 2020 Rehabilitation Plan that is provided in Appendix 6-8 to the EIAR are designed to have a positive effect on water quality, retention and attenuation within the wider bog complex. These measures are part of a wider enhanced programme of rehabilitation that is being undertaken as an ancillary element to the wind farm project.

2.1.1.19.2 Response to IFI Submission

A submission from Inland Fisheries Ireland was received in relation to the project on 23rd April 2020. This submission made general recommendations with regard to the protection of water quality and fisheries habitat.

In response, the wind farm has been specifically designed to avoid adverse impacts on water quality and fisheries habitat and this is fully described in the EIAR and in the NIS and their associate appendices. Measures that are in place to avoid any significant impact during construction, operation and decommissioning are included in the submitted application.

The project hydrologist has addressed the points raised in the IFI submission (see **Appendix 2**) and the main points are provided below:

- *The development does not include for any direct in stream works on natural watercourses (streams or rivers). However, the applicant is familiar with the requirement of IFI regarding in-stream works and is happy to comply with the specified open season period as referenced in the letter.*
- *We confirm that the planned wind farm layout and setting of the turbines and road network will not affect future works to restore Little Croghan and other associated tributaries to good status. As outlined in the submitted EIAR (Section 9.5.4.1) the proposed development footprint only comprises 1.45% (34.2 Ha) of the total site area of 2,360 Ha.*

- *All mitigation outlined in the EIAR will be implemented during the construction period and for the lifetime of the wind farm.*
- *Settlement Ponds: we note IFI comments regarding settlement ponds. Details regarding proposed site drainage management are outlined and assessed at Sections 9.4.2 and 9.5.3.1, and detailed drainage drawings for the development are provided in Appendix 4.5.*
- *Roads and Drainage: No weak shale rocks will be used during access track/site road construction. (Note limestone is a sedimentary rock, and it is a very competent road construction material). Where required BnM is happy to agree on any water related “road-crossing” works with IFI in advance.*
- *Biodiversity Management Plan:*
 - *The Rehabilitation Plans for Clongawny and Drinagh Bogs (both of which comprise the Derrinlough WF) will be agreed with the EPA, and in consultation with IFI.*
 - *All mitigation outlined in the submitted EIAR will be included in the final CEMP, and the final CEMP will include post-construction monitoring.*
 - *The list of mitigation outlined for the construction phase are already included in the submitted EIAR, and the Applicant is happy to implement same.*

A full and thorough description of the aquatic habitat at the site of the proposed development and in the receiving downstream waterbodies is provided in Section 6.5.2.3.5 of the EIAR and in the associated Appendix 6-3 of the EIAR. This baseline information is used to inform the impact assessment on aquatic habitats and species that is provided in Sections 6.6.3.1.1 (Table 6.15) and Section 6.6.4.1.1 (Table 6.21) of the EIAR. This impact assessment concludes that:

Following the implementation of the mitigation measures outlined above, no potential for significant effect has been identified at any geographic scale as a result of the proposed development.

Bord na Móna are satisfied that the measures that are in place in the EIAR are sufficient to prevent any significant on water quality, fisheries habitat and aquatic species. They are further satisfied that the measures suggested by the IFI have already been set out in the EIAR and as such are happy to include all measures as set out in the IFI submission.

2.1.1.19.3 **Offaly County Council Submission**

The submission from Offaly County Council includes some recommendations and observations in relation to Biodiversity and Ornithology.

Biodiversity

Offaly County Council recommend that:

The applicant should be Conditioned, that a pre commencement multidisciplinary ecological walk over surveys must be carried out to identify changes in baseline conditions which construction may have an impact on. These surveys must not be more than 3 days prior to construction of any and each phase of development. Any finding of note must be communicated to the project manager and works must cease in that area until agreed with the relevant body (Local Authority, NPWS or IFI). All mitigation and enhancement plans must proceed as outlined in the EIAR.

Bord na Móna are happy to comply with any such condition.

Ornithology

Offaly County Council suggest that an error has been made with regard to the determination of the importance of the flocks of breeding and wintering lapwing.

In response, following the extensive bird surveys that were carried out, the importance of all KOR species was set out in accordance with the criteria set out in Section 7.2.5.2 of Chapter 7 of the EIAR. In the case of Lapwing, the breeding population were considered to be of County importance (with reference to the breeding population within Co. Offaly) and the large flocks that were encountered during the winter were considered to be of National Importance (with reference to the National population).

Offaly County Council suggest that no information is presented in relation to displacement of Red Necked Phalarope, Lapwing and Black Headed Gull during construction. However, an assessment has been made in relation to displacement in regard of each of these species in Section 7.6 of the EIAR and in Confidential Appendix 7.5 (in respect of Red Necked Phalarope).

Notwithstanding the above, Bord na Móna are happy to undertake the recommended surveys and implement the necessary restrictions on construction activity if required to do so.

2.1.1.20 Planning Authority Policy Assessment

Within the Chief Executives (CE) report which has been prepared by Offaly County Council the Planning Authority have noted that a number of the wind turbines which have been proposed as part of the planning application are sited outside of the area deemed suitable for wind energy development Wind Energy Strategy for County Offaly (WES) adopted as part of the Offaly County Development Plan 2014-2020. The following is noted within the CE report:

“Following a review of the proposed turbine locations in light of the designated wind areas as specified in the WES, it is assessed that 7 no. of the proposed turbines are wholly located outside the area deemed suitable for wind energy development. These turbines are listed as follows; T3, T5, T8, T13, T14, T15 and T16.”

It was the consideration of the Planning Authority that the above noted turbines are “*non-compliant with the WES and therefore would represent a material contravention of the CDP*” and furthermore the listed turbines should be omitted from the proposed development should permission be granted.

The consideration of the Planning Authority is acknowledged and it is recognised that Offaly County Council are bound by the provisions of the current designations of the Offaly County Development Plan 2014-2020. However, as noted within the submitted EIAR the current wind energy strategy has been based on a high level examination of the overall County, as is set out under Section 2.7.2 of the submitted EIAR the WES is a strategic document and the areas designated as being appropriate for wind farm development have arisen from applying strategic constraints across the County. This sieve process establishes general areas which may be considered suitable for the provision of a wind farm development on a County wide basis. The current application is supported by an Environmental Impact Assessment Report (EIAR) which has facilitated a much finer and focused local area based assessment.

The applicant, as part of the planning application, has prepared a vast array of documentation including an Environmental Impact Assessment Report (EIAR) and Natura Impact Statement (NIS) in which the site of the proposed development has been examined in much greater detail. Based on the wide range of studies and assessments undertaken and presented within the submitted documentation including ecological, hydrological and landscape studies the site should be considered as wholly appropriate for the provision of a wind farm development. The assessments point to the fact the proposed development site as a whole shares similar characteristics throughout, and as such the entirety of the site based on the detailed assessments carried out should be considered as suitable for the

provision of wind energy. While the provisions of the current WES are acknowledged it is critically assessed that they are based on an overall larger scale sieve approach in assessing the appropriate locations for wind energy developments, the current application has applied a finer level approach in examining the potential for the provision of the proposed development.

Rational has also been provided under Section 2.4.7.2 of the submitted EIAR which further emphasis that the proposed development is entirely appropriate in the context of the proposed development site with regards to the current Offaly County Development Plan 2014-2020. It is broadly considered that the rational provided is also appropriate when considering the provisions of the draft WES.

It is also acknowledged that following the lodgement of the planning application Offaly County Council have published the Draft Offaly County Development Plan 2021-2027 which includes a revised Wind Energy Strategy. The draft CDP remains broadly in favour of the development of wind energy along with the development of renewable energy in general. A summary of the relevant policies and objectives of the Draft Offaly County Development Plan 2021-2027 (draft CDP) have been included as **Appendix 7** of this report. The following policy is listed within the draft Wind Energy Strategy:

“It is the policy of the Council to assess proposals for new wind energy developments in accordance with Map No. 10 ‘Wind Energy Strategy Designations’, Climate Action Energy Objective 03(Chapter 3 Climate Action and Energy) and the following parameters:

1.Areas Deemed Open for Consideration for Wind Energy Developments

These areas are open for consideration for wind energy development as these areas are characterised by low housing densities, do not conflict with European or National designated sites and have the ability by virtue of their landscape characteristics to absorb wind farm developments. Notwithstanding this designation, wind farm developments in these areas will be evaluated on a case by case basis subject to criteria listed in Development Management Standard 109 contained in Chapter 13 of Volume 1 of this County Development Plan and the Section 28 Wind Energy Development Guidelines.

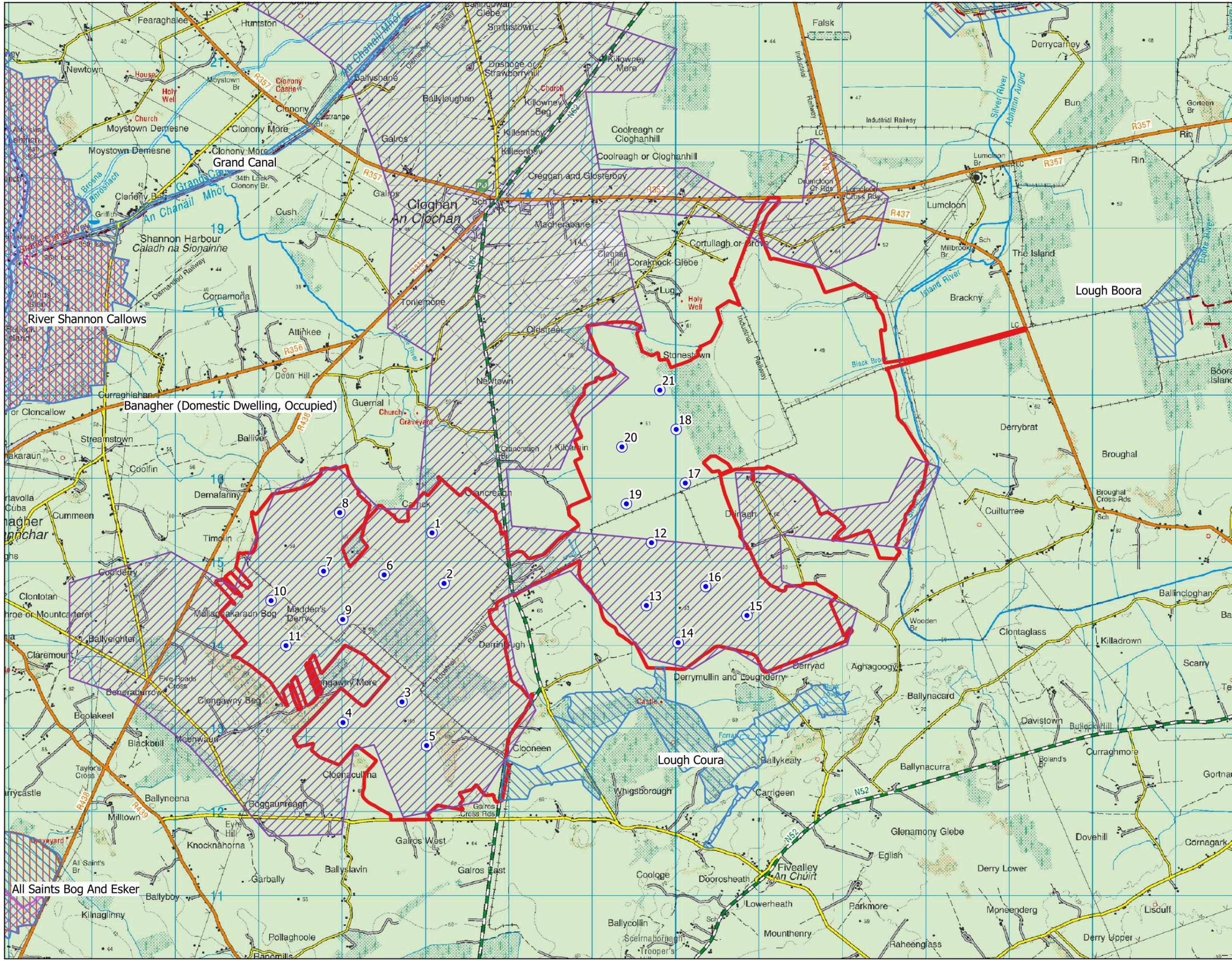
2.Areas Not Deemed Suitable for Wind Energy Developments

(a) This area is considered to be generally unsuitable for wind farm development due to significant environmental, heritage and landscape constraints and housing density.

(b) Individual small scale turbines will be considered on a case by case basis having regard to relevant exemption provisions in the Planning and Development Regulations 2001 as amended.

(c) Applications for re-powering (by replacing existing wind turbines) and extension of existing and permitted wind farms will be assessed on a case by case basis and will be subject to criteria listed in Development Management Standard 109 contained in Chapter 13 of Volume 1 of this County Development Plan and the Section 28 Wind Energy Development Guidelines.”

Figure 2-2 below depicts the draft WES designations along with the outline of the proposed developments boundary.



Map Legend

- EIAR Site Boundary
- Proposed Turbine Layout
- Offaly County Council Wind Energy Strategy Areas Open for Consideration
- Special Protection Area (SAC)
- Special Area of Conservation (SAC)
- Proposed Natural Heritage Area (pNHA)

River Shannon Callows

Banagher (Domestic Dwelling, Occupied)

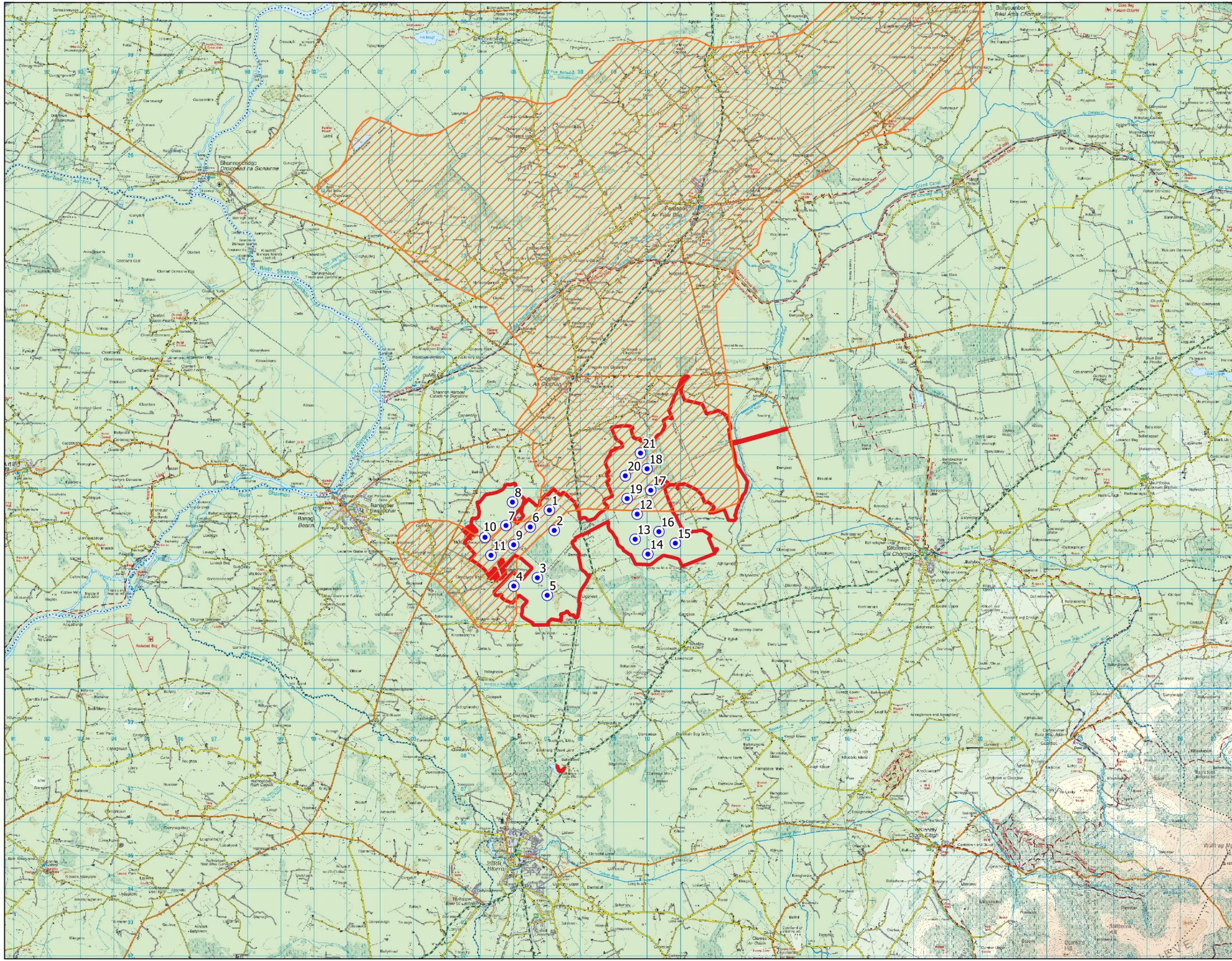
All Saints Bog And Esker

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Drawing Title	
Wind Energy Development Area & Designated Sites	
Project Title	
171221f - BnM Derrinlough Submission Response	
Drawn By	Checked By
DOS	EM
Project No.	Drawing No.
171221f	Fig 2-2
Scale	Date
1:40000	22.09.20

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Map Legend

-  EIAR Site Boundary
-  Proposed Turbine Layout
-  Offaly County Council - Wind Energy Development Area

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Wind Energy Development Area with EIAR Site Boundary

Project Title
171221f - BnM Derrinlough Submission Response

Drawn By: DOS Checked By: EM

Project No.: 171221f Drawing No.: Fig 2-3

Scale: 1:100000 Date: 24.09.20

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Following review of both the draft WES and the current WES it is evident that there are proposed changes to the areas which have been deemed suitable for the provision of wind energy. When directly compared the changes which have been made between the current WES and the draft WES areas can be summarised as follows:

➤ **Current Wind Energy Strategy**

Under the current wind energy strategy the proposed development site is partially located within an area which is deemed a “suitable area for wind energy development”. However there are a number of turbines which are located outside of the an ‘area suitable for wind energy development’. As noted the Planning Authority have considered that based on the current WES that T3, T5, T8, T13, T14, T15 and T16 are outside of a suitable area for the provision of a wind energy development. Further, the remaining turbines T1, T2, T4, T6, T7, T9, T10, T11, T12, T17, T18, T19, T20 and T21 are located within a “suitable area for wind energy development”.

While this is the case as has been demonstrated both within the RFI document along with the documentation submitted as part of the planning application the proposed development is located within a site that is appropriate for the provision of a wind energy development.

➤ **Draft Wind Energy Strategy**

Under the draft wind energy strategy a number of provisions have been made to the wind energy development area with regards to the proposed development site. While T3, T5, T8, T13, T14, T15 and T16 under the current WES designation are located outside of an area deemed suitable for the provision of wind energy under the draft WES they are all located within an “area deemed open for consideration for wind energy development”. T1, T2, T4, T6, T7, T9, T10, T11 and T12 are also located within an “area deemed open for consideration for wind energy development”. The designation of the noted turbines under the draft plan reiterates the assessments which were carried and submitted as part of the planning application and demonstrate that the area is suitable for the provision of a wind farm development.

Under the draft WES turbines T17, T18, T19, T20 and T21 are located outside of an area deemed suitable for the provision of a wind farm development. As noted the overall site of the proposed development comprises of similar characteristics throughout. Based on the information contained within the RFI document along with the submitted planning application pack the proposed development in its entirety is appropriate.

With the provisions of the draft WES taken into consideration the turbines noted within the CE report as being located outside of the area deemed suitable for wind energy development (T3, T5, T8, T13, T14, T15 and T16) are now clearly located within an area which is proposed to be designated as an “area open for consideration for wind energy development”. This proposed change in designation also reflects analysis demonstrated within the ELAR and the submitted documentation. According turbines T3, T5, T8, T13, T14, T15 and T16 are located within lands suitable for wind energy development.

Further review of the draft WES turbines T17, T18, T19, T20 and T21 although currently within an area deemed appropriate for the provision of a wind energy development have now been designated within an area which is deemed “areas not deemed suitable for wind energy development”. In this regard it should be reiterated that following the local scale assessments which have been carried out by the applicant and presented within the submitted documentation the site is wholly acceptable for the provision of a wind energy development. As evidenced by their current designation within an area which has been deemed suitable for wind energy development. On review it would appear that this re-designation has been revised based on the proximity to Lough Boora, however, as is assessed within the EIAR there will be no significant impacts on the Lough Boora area either in terms of ecology or landscape.

Furthermore, the remaining turbines (T1, T2, T4, T6, T7, T9, T10, T11, T12, T17) between the provisions of the current and draft WES along with submitted assessments should also be considered

appropriate and as such favourable consideration should be given by An Bord Pleanála. It should also be noted that the applicant, Bord na Móna, is at present preparing a submission with regards to the Draft Offaly County Development Plan 2021-2027 which outlines that the proposed development site is wholly appropriate for the provision of a wind energy development.

Notwithstanding the designation within the draft WES it is evident (from any site inspection and considering the strategy's methodology) that the entirety of the proposed development site benefits from the same characteristics and meets key criteria for 'areas deemed open for consideration for wind energy developments':

- **Low housing densities;**
The subject site which comprises a mixture of active and cut away bogs are surrounded primarily by a mixture of agricultural land and forestry and comprise low densities of adjacent residential development.
- **Do not conflict with European or National Designated Sites;**
Figure 2-2 identifies the locations of the various sensitivities in the vicinity of the proposed development site along with the outline of the draft 'areas open for wind energy development' area outlined. The draft WES is a strategic document and at that level and in order to ensure impacts are minimised it is appropriate and necessary to apply standardised buffers from designated areas and as the WES is a county-wide strategy it is not practical, feasible or appropriate for the local authority to carry out a finer grain review. The preparation of the submitted EIAR has involved carrying out a range of focused and detailed environmental reports and assessments, including a full range of site-specific ecological, hydrological and landscape studies which have facilitated a greater level of understanding of the site and its surroundings than could be achieved in any strategic county-wide assessment.
- **Have the ability by virtue of their landscape characteristics to absorb wind farm developments.**
Chapter 12 of the submitted EIAR addresses the landscape and visual impacts of the proposed wind energy development.

The site of the Derrinlough Wind Farm is located in Area 7- Area generally south of Cloghan and Birr Environs, within this area it has been acknowledged that the "*flat peatlands in this area offer potential to accommodate a wind farm*".

It should also be reiterated that the proposed development was confirmed as a Strategic Infrastructure Development (SID) under the provisions of Section 37E of the Planning and Development Act 2000 (as amended). As such this application has been made directly to An Bord Pleanála as an SID application. Accordingly, the current application has been made directly to An Bord Pleanála under Section 37E of the Planning and Development Act 2000 (as amended) in line with the correct procedures. Section 37G Subsection (2)(c) states that "Without prejudice to the generality of subsection (1), the Board shall consider "... *the provisions of the development plan or plans for the area*" however subsection 6, notes that the Board may;

"decide to grant a permission for development, or any part of a development, under this section even if the proposed development, or part thereof, contravenes materially the development plan relating to any area in which it is proposed to situate the development."

Accordingly, and as noted within Chapter 2 of the submitted EIAR, An Bord Pleanála are not bound by the provisions of the development plan and/or draft development plan in determining SID applications and can grant permission for the development of wind turbines outside of the area deemed appropriate for wind farm developments. The applicant considers that the proposed development is entirely appropriate for the development site and should be given favourable consideration.

2.2 Further Information Item No.2 – Wording

“Submit revised photomontage booklet with images presented on one-side only (as opposed to two-sided) for ease of assessment. The new booklet should include additional photomontages and wireframes from the following locations and illustrate the worst-case scenario in each case:

- > *The L3006 to the south of the site.*
- > *The R438 to the west of the site in the townland of Timolin.*
- > *The closest dwelling along the west of the local road in the townland of Drinagh.*

The response should address the issues raised by the planning authority/observers regarding the quality of the images received.”

2.2.1 Item No. 2 Response

A revised photomontage booklet will be submitted as requested. This revised booklet will include the three additional viewpoints listed in Table 2-3 and shown on Figure 2-4, below.

Table 2-3 Viewpoints

Viewpoint	Description	Grid Ref.
17	View from the L3006 local road in the townland of Cloonacullina, approximately 1.16 km south of the nearest turbine.	E 205,874 N 211,920
18	View from the R438 regional road in the townland of Timolin, approximately 1.08 km north-west of the nearest turbine.	E 204,645 N 215,419
19	View from the access track to the closest dwelling along the west of the local road in the townland of Drinagh, approximately 0.96 km east of the nearest turbine.	E 211,125 N 215,282

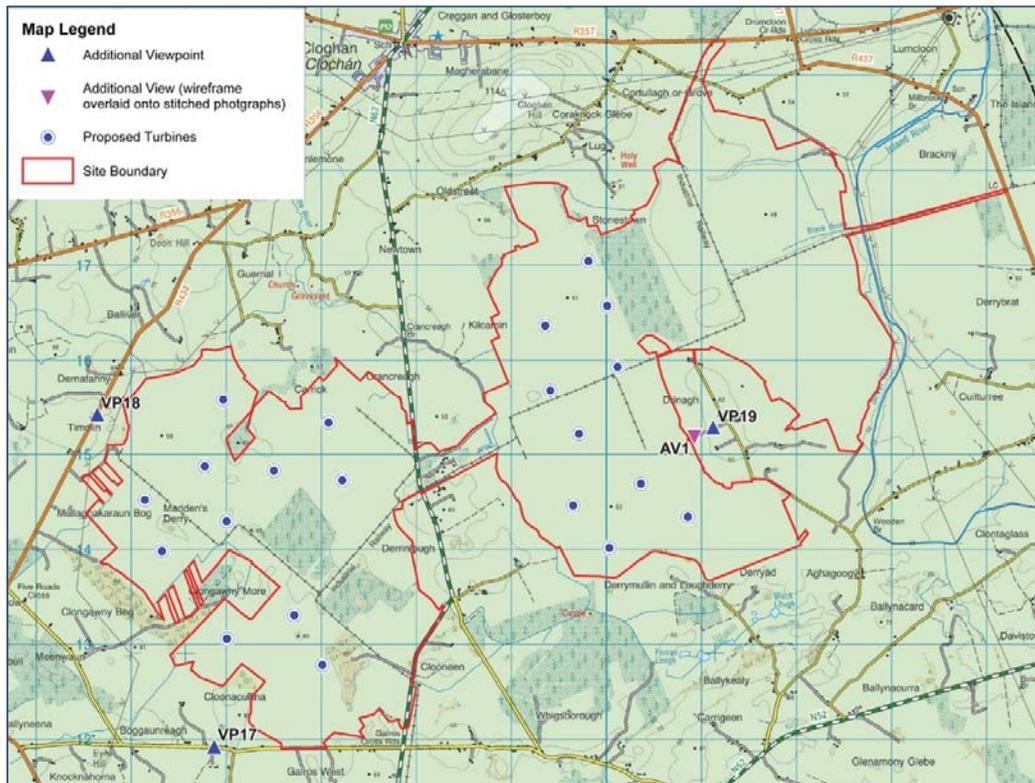


Figure 24 Location of Additional Viewpoints

2.2.11 Viewpoint Assessment

The assessment tables below for all three of the additional viewpoints, should be read along with the photomontage booklet (Volume 2) and Appendix 12.1 of the submitted EIAR which describes, in detail, the landscape and visual impact assessment methodology.

2.2.11.1 Viewpoint 17- L3006 (Cloonacullina)

Table 24 Viewpoint 17

Viewpoint 17 – L3006 (Cloonacullina)			
Viewpoint Description and Details	<ul style="list-style-type: none"> ➤ View from the L3006 local road in the townland of Cloonacullina ➤ 1.16 km south of the nearest proposed Derrinlough turbine ➤ Grid Reference: E 205,874, N 211,920 ➤ No. of turbines visible: 19/21 		
LCA and Sensitivity	Central Wetlands - Moderate	Visual Receptor(s) and Sensitivity	Residents – High Motorised Traffic - Low
Description of ‘Do Nothing Scenario’	<p>A farm building and adjacent hard stand can be seen to the left of the view with mature trees to the left and rear of the building. Grassed fields separated by post and wire fencing can be seen in the near view tree lines and hedgerows on the far side of these fields make up the horizon. In the ‘Do Nothing’ scenario, the Cloghan turbines can be seen in a cluster in the centre of the image, to the rear of a mature tree line. The existing Meenwaun are not visible in the 90 degree baseline image.</p>		

Viewpoint 17 – L3006 (Cloonacullina)	
Proposed Photomontage Description	From this location on the L3006 local road the proposed Derrinlough turbines to the west (Clongawny cluster) can be seen in the foreground with the proposed Derrinlough turbines to the east (Drinagh cluster) located in the background to the right of the photomontage. There is substantial screening particularly to the left of the view by mature trees and farm buildings, however many of the eastern turbines are also concealed by intervening trees to the right of the view. Only two turbines are prominently visible. All others are either partially or substantially screened or appear smaller than adjacent trees or utility infrastructure. The Drinagh cluster is aligned as a continuous line, adjoining the permitted Cloghan turbines to the right.
Cumulative Effects	The Meenwaun turbines are not visible in this view. The Drinagh cluster of the proposed wind farm and the Cloghan turbines appear at a similar distance and height and therefore read as one wind farm. The layout of the entire 21 No. Derrinlough turbines visible in this view 9 No. Cloghan turbines reads visually as one project in two clusters. The existing Meenwaun turbines are not visible in the 90 degree baseline image.
Sensitivity of Visual Receptor(s)	Medium: Includes viewers who may have some susceptibility to a change in view, such as those from views which are not designated but may have local recreational uses or those travelling along routes or at view which are considered moderately scenic.
Magnitude of Change	Substantial: Substantial change, where the proposals would result in large-scale, prominent or very prominent change, leading to substantial obstruction of existing view or complete change in character and composition of the baseline through removal of key elements or addition of uncharacteristic elements which may or may not be visually discordant. This includes viewpoints where the proposed development is fully or almost fully visible over a wide extent, at close proximity to the viewer. This change could be long term or of a long duration.
Significance of Effect	Medium X Substantial = Moderate = Significant (EPA, 2017) An effect, which by its character, magnitude, duration or intensity alters a sensitive aspect of the environment
Mitigation Factors	<ul style="list-style-type: none"> ➤ Open and expansive view in a location designated for wind turbines ➤ Considerable screening obscures views of the project and distance over the flat landscape reduces the perceived scale. ➤ Sparsely populated section of local road. ➤ The Route Screening Assessment map for this road shows mainly intermittent screening, hence, views of the turbines will only be available from some locations along this road.
Residual Effect (incl. mitigating factors)	Moderate (EPA, 2017) An effect that alters the character of the environment in a manner consistent with existing and emerging baseline trends

2.2.1.1.2 Viewpoint 18 – R438 (Timolin)

Table 2-5 Viewpoint 18

Viewpoint 18 – R438 (Timolin)			
Viewpoint Description and Details	<ul style="list-style-type: none"> ➤ View from the R438 regional road in the townland of Timolin ➤ 1.08 km north-west of the nearest proposed Derrinlough turbine ➤ Grid Reference: E 204,645, N 215,419 ➤ No. of turbines visible: 16/21 		
LCA and Sensitivity	Central Wetlands - Moderate	Visual Receptor(s) and Sensitivity	Residents – High Road users - Low
Description of ‘Do Nothing Scenario’	<p>This view looks across a hedgerow to a recently cut pastoral field finishing in a mature tree line in the short to medium distance. To the left of the field a residential property partially screened by boundary vegetation can be seen. Power lines can also be seen in the view. In the ‘Do Nothing’ scenario, the existing Meenwaun turbines are not visible. The Cloghan turbines will be located to the left of the view and apart from one or two blade tips be nearly entirely screened by the mature tree lines.</p>		
Proposed Photomontage Description	<p>The eleven western turbines (Clongawny cluster) are with a few exceptions prominently visible, while the eastern turbines are nearly entirely screened by the mature vegetation. The proposed Derrinlough turbines extend the existing spatial extent of the permitted Cloghan turbines to the right of the view. The view is relatively open and expansive, helping to assimilate the proposed turbines into the landscape.</p>		
Cumulative Effects	<p>The Meenwaun turbines are not visible. The Cloghan turbines are barely perceptible behind the dense tree line from this location. Where the blade tips of the Cloghan will be appear above the trees they will be seen alongside the proposed eastern turbines of the Drinagh cluster as one visual unit. Hence, the combined wind turbines will visually appear as one project in two clusters.</p>		
Sensitivity of Visual Receptor(s)	<p>Medium: Includes viewers who may have some susceptibility to a change in view, such as those from views which are not designated but may have local recreational uses or those travelling along routes or at view which are considered moderately scenic.</p>		
Magnitude of Change	<p>Substantial: Substantial change, where the proposals would result in large-scale, prominent or very prominent change, leading to substantial obstruction of existing view or complete change in character and composition of the baseline though removal of key elements or addition of uncharacteristic elements which may or may not be visually discordant. This includes viewpoints where the proposed development is fully or almost fully visible over a wide extent, at close proximity to the viewer. This change could be long term or of a long duration.</p>		
Significance of Effect	<p>Medium X Substantial = Moderate = Significant (EPA, 2017) An effect, which by its character, magnitude, duration or intensity alters a sensitive aspect of the environment</p>		
Mitigation Factors	<ul style="list-style-type: none"> ➤ Open and expansive view in a location designated for wind turbines 		

Viewpoint 18 – R438 (Timolin)	
	<ul style="list-style-type: none"> ➤ Screening obscures views of the project and distance over the flat landscape reduces the perceived scale. ➤ Sparsely populated section of road. ➤ The Route Screening Assessment map for this road shows that there is intermittent screening, hence, views of the turbines will only be available from some locations along this road. ➤ Road users will be travelling at speeds close to the speed limit of 80 kmph on this straight section of road with the direction of travel broadly perpendicular to views of the turbines, hence any views are likely to be fleeting and in the peripheral vision
Residual Effect (incl. mitigating factors)	<p>Moderate (EPA, 2017) An effect that alters the character of the environment in a manner consistent with existing and emerging baseline trends</p>

2.2.1.1.3 Viewpoint 19 –Drinagh

While the further information request asks for a photomontage from ‘the closest dwelling along the west of the local road in the townland of Drinagh’, when visited this building was found to be derelict. None the less, photographs were taken for photomontage preparation, stitched together and a wireframe overlaid, shown in Plate 2-2 below. This image shows that extensive mature vegetation will substantially screen the views from this property. Views towards the proposed development were more open from the track approaching this property and hence this was selected for photomontage preparation as it represents the worst-case scenario at a distance of approximately 210 metres east of the ‘closest dwelling’. In this photomontage the proposed turbines extend beyond the width of the paper, hence a Viewpoint 19a and 19b are presented in the photomontage booklet. These viewpoints look south-west and north-west, respectively, with a considerable overlap.



Plate 2-2 Image showing a wireframe of the proposed turbines overlaid onto a view taken at point AV1 from the closest dwelling along the west of the local road in the townland of Drinagh

Table 2-6 Viewpoint 19

Viewpoint 19 –Drinagh			
Viewpoint Description and Details	<ul style="list-style-type: none"> ➤ View from the access track to the closest dwelling along the west of the local road in the townland of Drinagh. ➤ 0.96 km north-east of the nearest proposed Derrinlough turbine ➤ Grid Reference: E 211,125, N 215,282 ➤ No. of turbines visible: 19/21 		
LCA and Sensitivity	The Birr Plains Low	Visual Receptor(s) and Sensitivity	Residents – Medium Road users - Low

Viewpoint 19 –Drinagh	
Description of ‘Do Nothing Scenario’	A grassed field can be seen in the foreground of the view bordered by a track and hedgerows on all visible sides Beyond the far hedge there are tree lines and a dense group of deciduous and coniferous trees can be seen towards the end of the track in amongst which buildings can just be made out. In the ‘Do Nothing’ scenario, the existing Meenwaun turbines are fully screened by vegetation and the Cloghan turbines will be seen to the right of the view with the lower parts of the towers screened by tree lines. Utility poles can also be seen lining the track.
Proposed Photomontage Description	While the wireframe indicates that the majority of turbines from all three projects should be visible, this is not the case in as relatively low-level screening, in the form of hedgerows and trees has a significant influence on the perceptibility of the scale of the project. From this location looking westwards, the nearer proposed Derrinlough turbines to the east (Drinagh cluster) will all be visible, albeit most of the lower turbine towers will be screened. Most of the western turbines (Clongawny cluster) will be screened by the mature vegetation and those visible adjoin the Cloghan turbines to the left and visually appear as a continuation of the Cloghan wind farm. Given the close proximity of this viewpoint location to the site, the scale and extent of the turbines can be absorbed into what is a relatively open expansive view with various vertical elements present in the view.
Cumulative Effects	Cumulatively, the addition of the proposed Derrinlough turbines increases the number of turbines visible, increasing the spatial extent of the Cloghan turbines. The layout of the entire 28 No. turbines reads visually as one project in two clusters. The existing Meenwaun turbines are fully screened by vegetation.
Sensitivity of Visual Receptor(s)	Medium: Includes viewers who may have some susceptibility to a change in view, such as those from views which are not designated but may have local recreational uses or those travelling along routes or at view which are considered moderately scenic.
Magnitude of Change	Substantial: Substantial change, where the proposals would result in large-scale, prominent or very prominent change, leading to substantial obstruction of existing view or complete change in character and composition of the baseline though removal of key elements or addition of uncharacteristic elements which may or may not be visually discordant. This includes viewpoints where the proposed development is fully or almost fully visible over a wide extent, at close proximity to the viewer. This change could be long term or of a long duration.
Significance of Effect	Medium X Substantial = Moderate = Significant (EPA, 2017) An effect, which by its character, magnitude, duration or intensity alters a sensitive aspect of the environment
Mitigation Factors	<ul style="list-style-type: none"> ➤ The house for which this viewpoint is intended is derelict, hence there are currently no visual receptors at that location ➤ Relatively open and expansive view in a location designated for wind turbines ➤ Screening obscures some views of the project and distance over the flat landscape reduces the perceived scale.

Viewpoint 19 –Drinagh	
	<ul style="list-style-type: none"> ➤ Coherent wind farm layout for all two visible projects, cumulatively reading as one contiguous project in two clusters ➤ Sparsely populated area and nearest house derelict ➤ Road is a cul-de-sac serving a small number of properties, hence visual receptor numbers are limited.
Residual Effect (incl. mitigating factors)	<p>Moderate (EPA, 2017) An effect that alters the character of the environment in a manner consistent with existing and emerging baseline trends</p>

2.2.1.2 Conclusion

Three additional photomontages were prepared from the three locations requested in the further information request. In the case of the third location ‘*the closest dwelling along the west of the local road in the townland of Drinagh*’, when visited extensive screening adjacent to the house precluded views of the proposed turbines, hence, a location on the approach road to the building was chosen, exhibiting far greater visibility and being more representative of the area as a whole.

Due to the proximity of the turbines at all three locations the magnitude of change was found to be ‘Substantial’, however, at Viewpoint 17 on the L3006 local road and Viewpoint 18 on the R438 regional road in the townland of Timolin the residual visual effects were found to be ‘Moderate’, due to mitigating factors of not just considerable screening in the views, but also along nearby sections of the same roads found in the Route Screening Assessment. At Viewpoint 19, in the townland of Drinagh, due to the mitigating factor that the intended buildings for this photomontage are derelict and hence currently do not house any visual receptors here the residual visual effect is also considered ‘Moderate’.

2.3 Further Information Item No.3 – Wording

“It is acknowledged in the EIAR that noise monitoring locations are spread out over a relatively large area (section 11.3.71). Having regard to the significant geographical extent of the site and the clusters of dwellings in the locality, the applicant is requested to provide a more detailed rationale for the low number of monitoring locations (7 no.). It is unclear, for example, why no monitoring was conducted at noise sensitive locations to the west of the site (Timolin/Dernatanny/Balliver). The noise monitoring locations should provide confidence that all areas are fully considered to establish potential variations in background noise levels in the study area.”

2.3.1 Item No.3 Response

The response to Item no.3 has been prepared by Awn Noise Consulting, Awn are the noise consultants for this project and prepared the Noise and Vibration Chapter of the submitted Environmental Impact Assessment Report (EIAR). Awn is a multidisciplinary consultancy offering specialist design advice, expert witness, and litigation support in respect of a wide range of engineering and environmental disciplines. The company has extensive experience in issues relating to wind farm noise having been involved numerous wind farm projects across the island of Ireland. The response is outlined within this section with the Technical Note prepared by Awn included as **Appendix 1** of this RFI document.

With regards to Item no. 3 it should be noted that following an initial review of the preliminary turbine layout undertaken by Awn, nine noise monitoring locations were identified, including a number of alternatives for each location. The project Community Liaison Officer contacted each of the identified homeowners and/or an alternative location as required and secured consent for 8 of the 9 locations. At the time of installation of the monitors one of the eight homeowners withdrew consent. A review was carried out at this time to determine if there were any additional suitable locations and it was determined that additional locations would not be required given the coverage provided by the seven remaining locations and the noise environment in the area. The nine locations originally identified are shown in Plate 2-3 and as outlined in the preceding paragraph monitoring did not take place at locations ‘G’ and ‘I’ (note some of these references are different to the locations referred to in the EIAR).

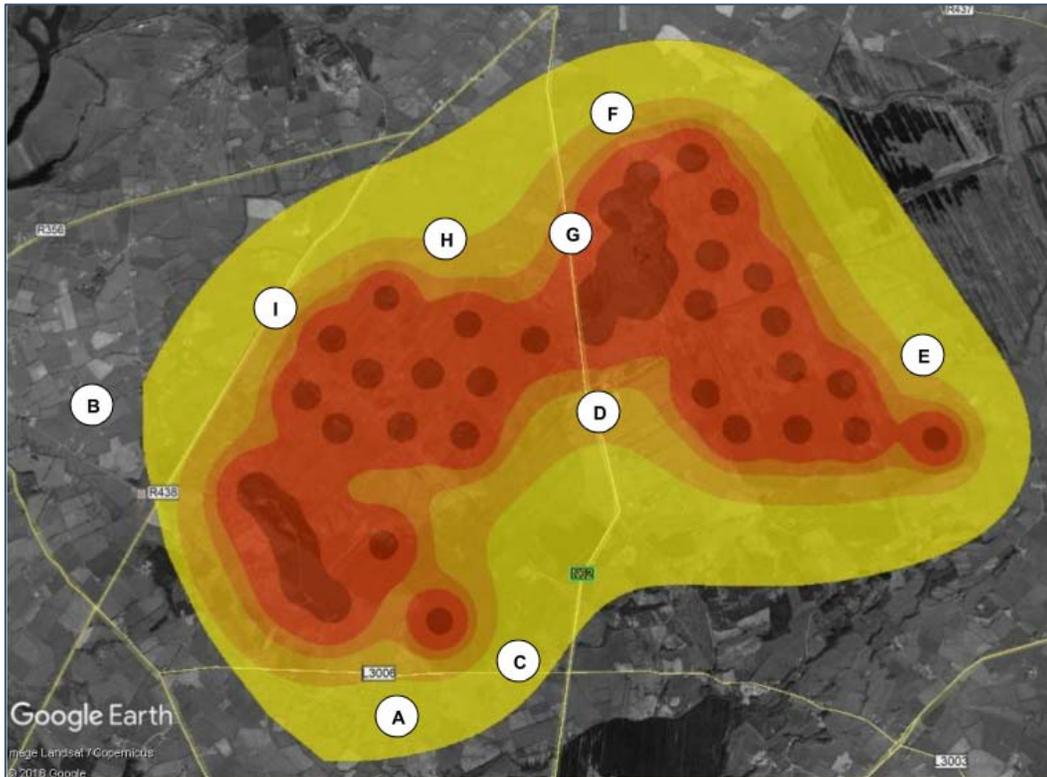


Plate 2-3 Initial Proposed Noise Monitoring Locations

As is noted within the Technical Note provided by AWN (**Appendix 1**) it is reasonable to expect that Location G would have similar background noise levels to Location D, and Location B would serve as a proxy location for Location I. Given that Location I is situated closer to a regional road, it is likely that the background noise levels would be higher at this location.

It is the view of AWN that:

“...having completed, the analysis of the background noise data, inspections and observation made at the site and review of aerial photographs and mapping software, that the seven survey locations selected provided a representative depiction of typical background noise experiences at NSL’s across the study area for the purpose of the planning assessment. Although the noise locations are spread out over a large geographical area, the noise sources that form the background noise are similar, and mostly determined by the distance from the surrounding road network.”

As stated in Section 11.5.3.1 of the EIAR, an initial screening of the cumulative omni-directional noise levels was undertaken by comparing the worst-case predicted turbine noise levels against the worst-case criteria curves based on the lowest background noise level envelope for day and night. Following this, appropriate noise limits were assigned to each of the relevant NSL’s based on professional judgement in line with best practice guidance of representative background noise levels measured as part of the survey. The noise criteria curves for Location C were deemed to be appropriate for all the remaining NSL’s. Only two of the seven locations included in the background noise survey attracted lower noise criteria curves than Location C, namely Location E and G. As described in Section 11.3.7.1 of the EIAR, both these locations were isolated from any significant environmental noise source which is not deemed to be representative of the list of NSL’s in Table 11.12. All other locations in the background noise survey attract a higher noise criteria curve. Therefore, adopting the background noise from Location C is robust and appropriate for this assessment

As is set out within the Technical Note (**Appendix 1**) it is important to note that the proposed criteria are couched relative to the background noise levels, and any planning condition issued by the relevant authority should maintain this statement. Furthermore, the background noise levels are specific to the assessment hub height and any change in hub height of the proposed turbines will require the background noise data to be re-analysed to determine the appropriate background noise levels.

Background noise levels can only strictly apply to the specific location at which they were made. As it is not possible to monitor at all NSL's, it is important that when selecting noise monitoring locations and siting equipment, that the location is suitable to serve as a representation for other locations in the area. AWN confirms that the methodology for the background noise surveys, the analysis and the assigning of representative noise limits has been undertaken with respect to best practice guidance outlined in the IOA GPG Supplementary Guidance Notes 14 and 25.

⁴ *Supplementary Guidance Note 1: Data Collection.*

⁵ *Supplementary Guidance Note 2: Data Processing & Derivation of ETSU-R-97 Background Curves.*

2.4 Further Information Item No.4 – Wording

“In relation to the submitted noise assessment (Chapter 11 of the EIAR), it is noted that reliance is placed on the 2006 Wind Energy Guidelines. The applicant is requested to clarify that the noise assessment is robust and is supported by up to date information and guidance to ensure that residential amenity is adequately protected. In responding the applicant is requested to identify any such up to date guidance.”

2.4.1 Item No.4 Response

The response to Item no.4 has been prepared by AWN Consulting, and their Technical Note on this issue has been included as **Appendix 1** of this RFI document. As noted within the Technical Note AWN’s confirm that the submitted noise impact assessment is robust and has been carried out in line with current standards and best practice guidelines, which includes ETSU and Institute of Acoustics methodologies as described above and including the requirements outlined in Section 5.6 of the Wind Energy Development Guidelines for Planning Authorities, 2006. The original ETSU-R-97 concepts on which both the WEDG06 and the Draft Revised Wind Energy Development Guidelines (DRWEDG19) are based underwent a thorough standardisation and modernisation in 2013 with the Institute of Acoustics publication of the Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise including 6 Supplementary Guidance Notes, all of which bring together the combined experience of acoustic consultants in the UK and Ireland in the application of these methods. Numerous improvements in the accuracy and robustness are described, in particular the treatment of wind shear and the general adaptation to larger wind turbines. The assessment in the EIAR is therefore in full accordance with the latest best-practice methods.

Where particular noise impact assessment reports have been referred to in other third party submissions, these have been addressed in Section 2.1.1.3 and Appendix 1 of this RFI response.





APPENDIX 1

**AWN CONSULTING- TECHNICAL
NOTE**

TECHNICAL NOTE

Project **Derrinlough Wind Farm**

Subject **Response to Third-party
Submissions and Further
Information Requests**

Author **Dermot Blunnie**

Date **23 September 2020**

Ref. **DB/20/10418NT06**

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1.0 BACKGROUND

AWN Consulting Ltd (AWN) have been requested to review and respond to third-party submissions received by An Bórd Pleanála (ABP) in relation to a Strategic Infrastructural Development (SID) application for the Derrinlough Wind Farm (the Proposed Development), planning reference ABP-306706-20.

AWN are the noise consultants for this project and prepared the Noise and Vibration Chapter of the submitted Environmental Impact Assessment Report (EIAR). In addition to the third-party submissions, this document addresses items raised in relation to Noise within the Offaly County Council Chief Executives' Report and two requests for further information / clarification from ABP which relate to the Noise assessment submitted for the Proposed Development.

The noise and vibration assessment carried out as part of the submitted EIAR is considered robust; however, appropriate clarifications and further comments are presented in the following sections of this technical note to clarify, expand, and reiterate previous statements within the submitted EIAR.

AWN is a multidisciplinary consultancy offering specialist design advice, expert witness, and litigation support in respect of a wide range of engineering and environmental disciplines. It is an Irish owned company with its Head Office in Dublin. AWN hosts Ireland's largest acoustic consultancy team with fourteen full-time consultants working in the field. The company has extensive experience in issues relating to wind farm noise having been involved numerous wind farm projects across the island of Ireland.

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The following staff were involved in the preparation of the Wind Farm assessment:

Dermot Blunnie (Senior Acoustic Consultant) holds a BEng(Hons) in Sound Engineering, MSc in Applied Acoustics and has completed the Institute of Acoustics (IOA) Diploma in Acoustics and Noise Control. He has been working in the field of acoustics since 2008 and is a member of the Institute of Engineers Ireland (MIEI) and the Institute of Acoustics (MIOA). He has experience in both building and environmental acoustics and has extensive knowledge in all aspects of environmental surveying, noise modelling and impact assessment. Dermot specialises in wind farm noise modelling, compliance, and compliant investigations.

2.0 INVOLVEMENT IN PROPOSED DEVELOPMENT

AWN was commissioned to conduct a detailed appraisal of the noise and vibration impacts associated with both the construction and operation of the proposed Wind Farm. AWN carried out the baseline noise monitoring aspect of the assessment, conducted detailed noise modelling with consideration of cumulative impacts and prepared the noise and vibration section of the submitted EIAR.

3.0 AWN RESPONSE TO MATTERS RAISED BY THIRD PARTIES

Several issues have been raised via submissions to ABP from third parties. A portion of these refer to the potential environmental noise impact from the Proposed Development. The primary issues raised in respect of the noise impact of the Proposed Development refer to the following topics:

- Applicability of the current guidelines;
- Amplitude modulation;
- Infrasound and Low Frequency Noise;
- Health and Wind Turbine Syndrome;
- Noise Limits;
- Predicted Turbine Noise Levels; and,
- Indoor Noise Levels;

Comment in relation to the issues raised above is provided in the following sections.

3.1 Applicability of the Current Guidelines

Within the third-party submissions, the Guidelines used for the assessment, i.e. *Wind Energy Development Guidelines for Planning Authorities, 2006 (WEDG06)* have been queried as to their suitability, stating that “...the 2006 *Wind Energy Development Guidelines are obsolete*”.

Response: The WEDG06 Guidelines are not obsolete and remain current Irish guidance in relation to the issue. Section 11.3.2.2.5 of the EIAR refers to the *Draft Revised Wind Energy Development Guidelines* December 2019, prepared by the Department of Housing, Planning and Local Government and confirmed that “*In line with best practice, the assessment presented in the EIAR is based on the current guidance outlined in Section 5.6 of the Wind Energy Development Guidelines for Planning Authorities, 2006*”. Section 5.0 of this document presents further discussion on the Guidelines adopted for the assessment.

3.4 Amplitude Modulation

Amplitude modulation has been raised as a concern in several third-party submissions.

AWN can confirm that the information provided in Section 11.3.3.2 and 11.5.6.3 of the submitted EIAR presents a discussion on the issue of Amplitude Modulation associated with the operation of wind turbines. The following comments are noted in addition to the EIAR.

Should a credible complaint be received which indicates potential amplitude modulation (AM) associated with turbine operation, the operator shall employ an independent acoustic consultant to assess the level of AM in accordance with the methods outlined in the Institute of Acoustics (IOA) Noise working Group (Wind Turbine Noise) Amplitude Modulation Working Group (AMWG) namely, *A Method for Rating Amplitude Modulation in Wind Turbine Noise* (August 2016), (The Reference Method) or subsequent revisions and mitigate as necessary.

The 'Reference Method', will provide a robust and reliable indicator of AM and yield important information on the frequency and duration of occurrence, which can be used to evaluate different operational conditions including mitigation. The turbine manufacturer and operator shall investigate the potential causes and implement appropriate adjustments to mitigate the AM.

3.5 Infrasound and Low Frequency Noise

The issue of Infrasound and low frequency noise has been raised in several third-party submission documents. AWN can confirm that the information provided in Section 11.3.3.1 and 11.3.4 of the submitted EIAR presents a discussion on the issue of low frequency noise and infrasound associated with the operation of wind turbines. The following comments are provided by way of summary on the topic as discussed within the EIAR.

Published documents from the Environmental Protection Agency (EPA) Ireland, UK Heath Protection Agency, South Australian EPA and the World Health Organisation have shown that there is no credible evidence that infrasound from wind turbines can be perceived or that it is associated with any negative health impacts. Review of the literature presented in Section 11.3.3.1 of the submitted EIAR confirms that there is a significant body of evidence to show that the infrasound associated with wind turbines will be below perceptibility thresholds and typically in line with existing baseline levels of infrasound within the environment.

On a number of wind farm sites where AWN Consulting has conducted infrasound measurements there was no evidence of perceptible infrasound associated with operation of the wind turbines found.

Additional comments are presented below in response to the concerns raised in the third-party submissions.

3.5.1 Comment on Claims by Mariana Alves-Pereira

A number of the third-party submissions make reference to a presentation by Mariana Alves-Pereira on her claims of serious negative health effects associated with wind turbine noise, in particular, infrasound.

Contained within the third-party submissions is an article by Mariana Alves-Pereira published on www.engineersjournal.ie and included within the third-party submissions "*Infrasound and low-frequency noise – does it affect human health?*"

Following review of this article, AWN has the following response. The article claims that infrasound and low frequency noise are harmful to health, there is no evidence presented that the levels of low frequency noise or infrasound associated from the operation of the wind turbines are harmful, nor does it suggest an appropriate limit for same.

We note the article referenced above and refer to the caveat from Engineers Journal at the end of the document which states:

"The opinions expressed in this article are the authors' own and do not represent the views of Engineers Ireland. For details of the Australian Administrative Appeals Tribunal Decision into the effects, if any, of ILFN on human health, please read the following document (PDF): [waubra-and-acnc-decision](#). The section of the Australian decision that deals with Prof Alves-Pereira's testimony is on pages 123-124."

The following text is taken directly from pages 123-124 of the *Australian Administrative Appeals Tribunal Decision into the effects, if any, of ILFN on human health*, [waubra-and-acnc-decision](#):

"Professor Mariana Alves-Pereira

398. *Professor Alves-Pereira provided a written report, dated 28 April 2016, 278 and also gave oral evidence during the hearing.*
399. *We found the evidence of Professor Alves-Pereira to be of limited assistance except to the extent that it was consistent with that of other experts. However, her evidence sharply diverged from that of the other experts in two key respects.*
400. *Based on very limited studies, she postulated the existence of a phenomena known as "vibroacoustic disease" due to exposure to low-frequency noise, the "hallmark" of which was the thickening of the pericardium. She expressed the opinion that this thickening could only be detected through the use of forms of investigation such as echocardiography or ultrasound imaging.*
401. *As she acknowledged, Professor Alves-Pereira is not a medical doctor and her opinion as to the existence of this disease and its cause was not supported by any of the other experts, including those with medical qualifications. In these circumstances, we do not accept her evidence as to the existence of vibroacoustic disease being potentially related to the emissions of wind farms.*
402. *Professor Alves-Pereira also postulated that the phenomenon of noise annoyance was attributable to prior excessive exposure to infrasound and low-frequency noise resulting in a fusing of the cochlear cilia. Again, this theory was not supported by any of other experts and, indeed, Professor Alves-Pereira conceded that it could only be proved through extensive autopsies combined with detailed histories of the deceased's lifetime noise exposure.*

403. *On the evidence before us, we do not accept that the phenomena of noise annoyance is explained, in whole or in part, by prior excessive exposure to infrasound and/or low frequency noise.*
404. *Having regard to these and other matters, we are not prepared to attach much weight to the evidence of Professor Alves-Pereira.”*

The following comments are noted from an article published in the Institute of Acoustics Bulletin¹ by Dick Bowdler FIOA. Mr. Dick Bowdler is a Chartered Engineer, a Chartered Physicist and one of the original members of the Institute of Acoustics when it was founded in 1974. Mr. Bowdler regularly works on behalf of residents objecting to wind energy development and Councils in the UK and Ireland. The article was composed following his attendance at a similar presentation held in Glasgow on 22nd September 2017, one of the speakers at this conference was Mariana Alves-Pereira. The following extracts are taken from the article:

“Organised by some objectors in Scotland, it sought to counter the “misinformation” put out by governments, health services, acousticians and the wind industry world-wide. The misinformation we were told they disseminate is that there no evidence that infrasound causes a wide range of illnesses in humans and animals and, what is more, the probability of there being any causal effect is vanishingly small. The seminar was started by Melvin Grosvenor of the Independent Noise Working Group explaining how members of the Establishment all over the world tell us that there are no health effects from infrasound from wind turbines. People here, he said, will tell you differently because they are ill from infrasound. There was a conspiracy to hide the real facts which he likened to cover-ups in the past of asbestos, the radium girls, tobacco, Thalidomide and Primodos.”

In relation to the presentation by Mariana Alves-Pereira the article states:

“Finally, Mariana Alves-Pereira, a specialist in vibro-acoustic disease, explained how in a sound field we were bombarded with mechanical forces, and she demonstrated this by punching her body with her fist.”

“Readers of this publication will have noticed that certain basic technical details had been glossed over during the meeting. There was no evidence that dead animals were killed by infrasound – no post mortem.”

“Mariana’s example of mechanical forces pounding the body is right in principle though the fist is something of an exaggeration. In reality, it is more like a gentle fanning of the face with a sheet of paper”

“It is a fact that turbines, like most mechanical things, produce infrasound. It is also a fact that some people living near turbines are ill. The biggest scientific flaw to the evening was that not one shred of evidence was put forward to show any causal link between the two.”

¹ Wind turbine noise: the search for an alternative truth Acoustics Bulletin Vol 42 No 6 November/December 2017, Institute of Acoustics

3.6 Health and Wind Turbine Syndrome

There is general reference to “Wind Turbine Syndrome” within the third-party submissions. In response to the issue of “Wind Turbine Syndrome we refer to the following published research.

Research by Simon Chapman and Fiona Crichton in *Wind Turbine Syndrome, A communicated disease*, published by the Sydney University Press in 2017, presents critical review of the evidence of Wind Turbine Syndrome. In this book, they present evidence that Wind Turbine Syndrome has evolved through dissemination of false claims accessed via the media or disseminated by anti-windfarm campaigners.

Their hypothesis is that the belief that wind turbine noise can impact on health may in-turn generate anxiety in some individuals causing them to needlessly worry and fear. One of the most interesting findings of this research is that the international pattern of complaints is most frequently reported in English speaking countries, the following text is taken from this book:

“The ‘individual susceptibility’ argument faces its biggest test when we look at the international pattern of complaints. It has been frequently noted that complaining about wind turbines is very obviously an Anglophone phenomenon. Modern multi-megawatt wind turbines have operated since 1978 in the USA and Europe. Today, there are an estimated 314,000 turbines in operation globally. European nations with windfarms include Belgium, Cyprus, Denmark, England, France, Germany, Greece, Ireland, Italy, Lithuania, the Netherlands, Poland, Portugal, Romania, Scotland, Spain, and Sweden. The turbines are often located very near cities, towns and villages (see Figures 3.1 and 3.2), thus exposing a huge number of people across Europe to their putative sickening sound emissions on a daily basis. Anyone who has spent time in these nations will have seen many of them. Yet windfarm health complaints have nearly all occurred in English-speaking nations. In Canada, parts of English-speaking Ontario have experienced many complaints while neighbouring Francophone Quebec sees little opposition. In Australia, complaints have been concentrated around farms targeted by anti-windfarm groups, suggesting the phenomenon is a ‘communicated disease’.”

It is AWN’s opinion that these claims are not supported by scientific evidence and we refer again to Section 11.3.4 of the submitted EIAR which presents a discussion on sleep disturbance and human health impact with respect to noise from wind turbines.

3.7 Proposed Noise Limits and Predicted Levels

In a submission by A Doolan, the following statement is made:

“Bord Na Mona say in their application that they may use a Vestas 4.0 or 4.2MW wind turbine of tip height 185 metres. These are truly monstrous and while most of them are at least 1km from family homes they will still produce noise well in excess of 43dBA.”

Response: The worst-case omnidirectional predicted noise levels from the operation of the Derrinlough turbines at any noise sensitive location are all below 40 dB L_{A90} (with 39.8 dB at R177 being the highest). A lot of the time the turbine noise levels will be below this predicted level due to lower wind speeds and directionality effects. While the cumulative predicted turbines noise levels may be predicted to be greater than 43 dB L_{A90} at some sensitive

locations, mitigation has been presented to ensure that the Derrinlough turbines can operate such that, the total cumulative noise levels do not exceed the turbine noise limits. The assessment has been undertaken in line with best practice guidance and to ensure that the operation of the Derrinlough turbines does not result in any significant cumulative impacts.

In a submission by D McDonagh, concerns are raised regarding the turbine noise limits proposed at his dwelling, given that ABP have conditioned different noise limits to the operation of the Cloghan Wind Farm.

Response: Section 11.3.6.1 of the EIAR acknowledges the conditioned noise limits for the Cloghan Wind Farm. It is noted that Condition 11 of ABP Reference PL19.244053, states that a limit of 43 dB or 5 dB above background noise levels (whichever is the higher) relates to the 'Proposed Development' and not, the cumulative turbine noise levels. The turbine noise criteria proposed for the EIAR for the Derrinlough assessment has identified appropriate cumulative turbine noise limits for noise sensitive locations in line with the current criteria and best practice guidance. Further discussion on this topic is provided in Section 3.8 of this document in a response to a third-party submission by Gaeltech Energy Services (GES).

In the same submission by D McDonagh, the accuracy of the noise prediction calculations has been questioned.

Response: Section 11.3.8 of the EIAR presents full details of the methodology used for the calculation of turbine noise, including, the input data, calculation settings and any assumptions made in the assessment. The assessment is robust, in line with best practice guidance, fully transparent and any assumptions made are conservative i.e. worst case. Notwithstanding the above, it is acknowledged that aspects of the cumulative assessment of wind turbine noise are technical in nature and require some degree of technical knowledge on the subject. Table 11.19 in Section 11.5.3.1 of the EIAR presents some worked examples of the cumulative assessment and Section 11.3.8.3 describes in detail the attenuation effects when wind direction is considered in the calculations, these have been included to assist the lay reader in understanding the principles of the assessment undertaken.

3.8 Response to Submission by Gaeltech Energy Services

There are several technical items relating to noise raised in the submission by Gaeltech Energy Services (GES). Following review of the submission, the specific items relating to noise have been identified and are discussed below.

Statement from GES Submission:

"The noise impact assessment submitted by the Applicant demonstrates that the cumulative noise will exceed the 43dB noise limit for likely noise sensitive dwelling in the locality which has been established by planning precedent. Accordingly, there is no cumulative capacity to accommodate the proposed development in the local environment."

Section 11.3.6.1 of the EIAR stated the assumption made in the assessment in relation to the turbine noise limits for the Cloghan Wind Farm:

“For the assessment presented in this report we have assumed that the absolute noise limit of 43dB L_{A90} on turbine noise from the Cloghan wind farm will apply to all NSL’s unless a property is listed as a landowner with financial involvement in the project. In these instances, a limit of 45dB L_{A90} has been applied in line with best practice guidance.”

The assumption in the Derrinlough EIAR was made with reference to the document ‘Cloghan Wind Farm – Revised Turbine Dimensions and site Layout EIAR/EIS – Volume 1’ prepared by GES as part of the planning application submitted for the Cloghan Wind Farm in 2019, where a 45 dB L_{A90} lower threshold limit is proposed for the landowner dwellings. The two locations in question are identified in the Derrinlough EIAR as R032 and R058.

Although it is not explicitly stated in the planning condition, AWN does not dispute the interpretation by GES that “*the lower limit of 43dB (or 5dB above background noise levels be applied to all dwellings, regardless of whether they were involved or non-involved dwelling*”. For the purpose of presenting a revised assessment AWN accepts the statement made in the GES submission on behalf of the client that they “*will be required to curtail the operation of the proposed Cloghan Wind Farm in order to ensure the limit of 43dB is not exceeded*”.

The lower noise limits at R032 and R058 have been considered in a revised assessment for the Derrinlough Wind Farm and an updated table with attenuation requirement for the Derrinlough turbines, used to design the curtailment strategy, is presented in Section 4.1. The additional attenuation to the Derrinlough turbines as a result of the lower threshold of 43 dB L_{A90} at locations R032 and R058 is not significant, as the curtailment presented in the EIAR for Derrinlough Turbines was previously designed to be 10 dB below the predicted level from the Cloghan turbines at these locations.

The revised calculations and curtailment strategy will limit the contribution from Derrinlough to a maximum of 33 dB when the predicted level from the Cloghan turbines at R032 and R058 is at or above 43 dB.

To assist with understanding the issue, a simplified example is presented in Table 1 with reference to the predicted turbine levels at R032. Note that the calculations in the assessment take account of the contribution for all other windfarms

Description	dB L _{A90} Predicted Turbine Noise Levels at Location R032 at 7m/s in Various Wind Directions							
	N	NE	E	SE	S	SW	W	NW
Cloghan Turbines	41.9	43.0	43.0	43.0	43.0	41.4	39.2	40.1
Derrinlough Turbines	32.2	33.6	34.3	35.4	35.6	34.4	34.0	32.5
Cumulative	42.3	43.5	43.5	43.7	43.7	42.2	40.3	40.8
Cumulative Excess	--	0.5	0.5	0.7	0.7	--	--	--
Attenuation required at R032 through Curtailment of Derrinlough Turbines	--	0.6	1.3	2.3	2.6	--	--	--
Comments	--	Derrinlough turbines curtailed to 10 dB below the limit as no headroom is available.				--	--	--

Table 1 Example of Cumulative Assessment Calculations at R032

It can be seen in the example in Table 1 that the levels predicted from the Derrinlough turbines at R032 are much lower than the levels predicted from the Cloghan turbines.

The conditioned turbine noise limits for the Cloghan development are not in line with best practice guidance, however, it is acknowledged that similar noise limits have in the past been conditioned on wind farm developments. The turbine noise limits proposed in the EIAR chapter for the Derrinlough assessment are based on cumulative turbine noise levels, as per best practice, and are reiterated here:

- 40 dB L_{A90,10min} for quiet daytime environments of less than 30 dB L_{A90,10min};
- 45 dB L_{A90,10min} for daytime environments greater than 30 dB L_{A90,10min} or a maximum increase of 5 dB above background noise (whichever is higher), and;
- 43 dB L_{A90,10min} or a maximum increase of 5 dB above background noise (whichever is higher) for night time periods.

The above limits, in line with best practice guidance, are wholly appropriate for the assessment and AWN does not accept that the limits proposed are inappropriate.

It is noted that the condition for the Cloghan Wind Farm relates to the Cloghan development only as stated in Condition 11 of ABP. Therefore, based on the literal interpretation of the planning condition the operation of the Derrinlough development will have no effect on the Cloghan Wind Farms' ability to operate within the noise limits stipulated in the planning condition.

4.0 ITEM RAISED BY OFFALY CO. COUNCIL

The section presents direct responses to items raised by Offaly Council in the Chief Executive Report.

- Item 1: *"The applicant has not included details regarding the proximity of noise sensitive receptors to the nearest turbine. The applicant is required to provide a table listed the following:*
- *Dwelling ID reference,*
 - *Distance to nearest contributing turbines."*

Response: Please see Table 2 which provides the details regarding the proximity of each noise sensitive receptor to the closest proposed turbine, as requested.

Dwelling ID	IG Coordinates		Nearest Turbine	Distance (metres)
	Easting	Northing		
1	211,779	215,112	15	1219
2	206,837	217,277	8	1901
3	208,245	214,175	2	1168
4	203,432	214,993	10	1773
5	209,044	211,882	5	2228
6	211,785	212,680	15	1913
7	204,416	212,866	11	1445
8	204,468	212,772	11	1489
9	203,635	215,580	10	1838
10	203,326	215,015	10	1881
11	203,448	214,896	10	1734
12	203,350	215,355	10	1974
13	203,439	214,928	10	1750
14	203,540	214,366	10	1611
15	203,814	213,411	11	1616
16	210,406	218,659	21	1711
17	209,706	218,541	21	1490
18	207,015	217,319	1	1977
19	210,079	218,936	21	1900
20	209,549	218,303	21	1275
21	209,105	218,139	21	1292
22	208,869	218,003	21	1334
23	208,339	217,765	21	1635
24	208,113	217,746	21	1834
25	205,826	217,401	8	1821
26	205,789	217,579	8	2001
27	205,060	217,328	8	1964
28	205,217	217,368	8	1934
29	213,003	214,491	15	2150
30	213,051	214,556	15	2203
31	205,421	217,475	8	1967
32	207,901	216,303	1	1264
33	209,762	218,563	21	1509
34	208,290	217,734	21	1666
35	209,258	218,167	21	1242
36	209,521	218,347	21	1324
37	206,014	217,195	8	1609
38	203,489	213,654	11	1865
39	203,414	214,655	10	1734
40	205,090	217,386	8	2003
41	205,170	217,410	8	1991
42	204,575	215,385	10	1031
43	210,039	218,202	21	1169
44	208,882	218,068	21	1390
45	209,781	218,590	21	1535
46	204,592	215,428	10	1061
47	205,615	216,964	8	1422
48	204,852	215,915	8	1167
49	204,871	215,949	8	1157
50	204,916	215,917	8	1100

Dwelling ID	IG Coordinates		Nearest Turbine	Distance (metres)
	Easting	Northing		
51	206,555	216,189	8	840
52	210,079	218,780	21	1746
53	209,707	218,481	21	1429
54	209,635	218,477	21	1432
55	213,040	214,553	15	2192
56	212,921	214,458	15	2066
57	205,837	217,210	8	1629
58	207,857	216,826	20	1566
59	204,757	215,484	10	1024
60	207,317	216,664	1	1342
61	208,306	217,744	21	1656
62	208,311	217,690	21	1629
63	205,918	217,196	8	1611
64	204,729	215,544	10	1247
65	206,233	217,269	8	1704
66	205,877	217,196	8	1612
67	208,538	217,827	21	1494
68	211,537	213,059	15	1461
69	208,483	213,309	5	1561
70	208,395	214,514	2	1193
71	208,201	214,330	2	1060
72	208,262	211,957	5	1504
73	208,450	211,892	5	1698
74	208,603	211,941	5	1805
75	208,584	212,004	5	1759
76	208,768	211,918	5	1963
77	208,390	213,446	5	1526
78	208,712	213,557	13	1310
79	208,172	214,285	2	1052
80	212,640	213,699	15	1899
81	212,411	213,437	15	1804
82	212,679	214,004	15	1855
83	206,081	211,906	4	1165
84	205,521	212,349	4	868
85	206,122	211,446	5	1613
86	206,050	211,594	4	1475
87	212,691	213,476	15	2033
88	207,552	211,879	5	1061
89	205,616	211,963	4	1172
90	208,630	213,523	13	1392
91	207,509	211,880	5	1039
92	204,601	212,031	4	1747
93	204,776	211,973	4	1648
94	212,631	213,982	15	1812
95	208,654	212,009	5	1820
96	211,489	214,958	15	867
97	211,477	214,998	15	892
98	211,179	215,405	16	1081
99	208,513	211,884	5	1755
100	208,554	213,600	13	1412
101	209,047	213,835	13	878

Dwelling ID	IG Coordinates		Nearest Turbine	Distance (metres)
	Easting	Northing		
102	208,450	213,462	13	1568
103	204,868	211,723	4	1763
104	206,042	211,187	5	1875
105	206,008	211,926	4	1142
106	208,673	211,960	5	1858
107	209,094	213,822	13	856
108	205,648	211,956	4	1169
109	208,736	211,985	5	1904
110	203,552	213,558	11	1822
111	208,327	211,922	5	1577
112	208,699	213,532	13	1343
113	210,942	213,596	15	762
114	204,709	212,974	11	1190
115	207,355	216,904	1	1585
116	207,760	211,618	5	1393
117	204,286	212,816	11	1567
118	205,012	211,850	4	1573
119	205,832	211,704	4	1375
120	206,140	211,009	5	1984
121	205,786	211,934	4	1156
122	203,399	214,731	10	1756
123	203,836	215,298	10	1516
124	204,882	215,844	8	1128
125	211,599	213,073	15	1479
126	208,442	213,527	13	1534
127	208,364	212,981	5	1367
128	208,561	211,788	5	1847
129	211,763	212,518	15	2046
130	210,893	215,986	17	776
131	211,464	215,037	13	928
132	212,692	213,706	15	1946
133	212,386	213,054	15	2006
134	206,216	217,466	8	1897
135	212,462	213,504	15	1815
136	211,573	213,533	15	1088
137	205,497	216,201	8	783
138	205,721	217,228	8	1660
139	205,260	217,371	8	1920
140	205,181	217,361	8	1942
141	205,816	217,583	8	2003
142	205,064	216,751	8	1484
143	206,198	217,127	8	1558
144	207,784	216,914	20	1663
145	206,764	217,331	8	1918
146	210,012	218,933	21	1889
147	210,229	218,785	21	1780
148	209,923	218,713	21	1662
149	208,598	217,918	21	1509
150	212,871	214,404	15	2014
151	209,721	218,338	21	1286
152	204,890	215,870	8	1119

Dwelling ID	IG Coordinates		Nearest Turbine	Distance (metres)
	Easting	Northing		
153	204,520	215,280	10	972
154	204,354	215,048	10	948
155	205,439	216,829	8	1351
156	207,192	211,875	5	935
157	205,363	216,322	8	953
158	207,405	211,921	5	956
159	207,142	211,531	5	1268
160	206,587	216,244	8	904
161	207,420	211,888	5	992
162	204,779	215,799	8	1204
163	205,999	217,269	8	1683
164	206,525	216,331	8	925
165	206,618	217,352	8	1882
166	213,002	214,566	15	2156
167	206,428	216,367	8	905
168	204,495	212,884	11	1382
169	203,343	215,391	10	1995
170	204,777	217,222	8	2024
171	205,223	217,474	8	2030
172	205,247	217,468	8	2016
173	206,032	210,972	5	2067
174	212,403	213,097	15	1991
175	207,720	217,236	20	1850
176	211,168	215,050	15	766
177	210,942	215,216	16	776
178	206,023	210,963	5	2079
179	208,736	211,969	5	1911
180	204,682	215,573	8	1287
181	206,871	211,482	5	1318
182	205,037	211,862	4	1548
183	204,106	215,554	10	1467
184	210,578	218,619	21	1741
185	210,002	218,806	21	1761
186	204,385	211,924	4	1986
187	204,528	211,632	4	2062
188	203,210	213,922	10	2027
189	206,951	217,428	8	2088
190	207,102	217,412	1	2069
191	207,783	217,337	20	1845
192	207,750	217,445	20	1930
193	210,088	219,082	21	2045
194	210,158	219,072	21	2046
195	210,126	219,124	21	2093
196	210,179	219,131	21	2108
197	208,568	212,096	5	1705
198	207,955	214,467	2	750

Table 2 Distance to Nearest Turbine for each NSL

Item 2: *“The applicant states that the noise contribution from the Derrinlough turbines increases the overall cumulative turbine noise levels which result in potential exceedances of the noise limit criteria at noise sensitive locations. The applicant is requested to list which turbines would be required to operate in noise reduced mode.”*

Response: The predicted noise contribution of the Derrinlough turbines increases the overall cumulative noise levels at some NSL's. In almost all instances where a cumulative exceedance is predicted, the dominant source of turbine noise is due to the operation of turbines from other existing wind farms, which are predicted to be operating at or above the proposed noise limits adopted for this application. In the context of the assessment presented in the Derrinlough Wind Farm EIAR, assuming higher noise emissions on the Meenwaun and Cloghan turbines is worst-case, as the headroom room available for cumulative noise is essentially taken by the other wind farms.

- Section 11.3.2.2.3 of the EIAR presents the guidance adopted for the assessment of cumulative turbine noise impacts;
- Section 11.3.8.4 of the EIAR sets out the methodology followed for the assessment; and
- Section 11.5.6.1 of the EIAR presents a detailed discussion on the mitigation measures, with Tables 11.22 and 11.23 providing full details of the curtailment required for the Derrinlough Turbines, including the reduction on specific turbines and the wind conditions when these are required.

Item 3: *“Confirm that the applicant has considered the 2 turbine wind farm application (Ref: PL2/20/45).”*

Response: The 2-turbine development was not included in the EIAR assessment as there was no knowledge of the proposed development at the time. The turbine noise modelling and assessment has been updated to include this new proposed development and full details and results of the revised assessment, including the revised outline turbine curtailment strategy for the Derrinlough turbines is presented in Section 4.1 of this response.

Item 4: *“Section 11.3.6.2 (11-16) Section Error ! Reference Not Found – correction required.”*

Response: *Section Error ! Reference Not Found* on Page 11-16 of the submitted EIAR should read *Section 11.6.3.1*.

Item 5: *“Section 11.3.7.5, the applicant is requested to clarify why the background noise data from the Meenwaun Windfarm EIS was not used.”*

Response: The background noise survey undertaken for the Meenwaun assessment and presented in the associated EIS was undertaken with wind speed measurements made at a height of 10m, using a 10m mast.

Section 2.6 of IOA document, *A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise (2013)* (IOA GPG) states, the preferred method for

measuring wind speed for background noise surveys is direct measurements at hub height or using two anemometers at different heights, one being at a height not less than 60% of hub height and the other at least 15m below it. Both methods will result in a robust assessment which captures site-specific wind shear.

The use of a 10m mast for a background noise survey is the least preferred method outlined in the IOA GPG and “*should only be used for smaller scale development for which the installation of a tall met mast or deployment of a SODAR or LIDAR system at the planning stage might not be justified economically*”. The method adopted in the Meenwaun assessment is therefore the least preferred and does not take account of the specific hub height or site-specific wind shear in line with good practice. The method used for the background noise survey adopted in the Derrinlough assessment has been undertaken in line with the preferred approach and provides a more accurate assessment of the background noise levels in the environment. It is not possible to directly compare the results of the two assessments. As the method adopted in the Derrinlough assessment has been undertaken using the preferred method this data is considered more robust and was the only background noise data that has been used in the assessment.

Item 6: “40dB LA90 should apply at night time periods where background daytime noise is found to be less than 30dB. To avoid sleep disturbance.”

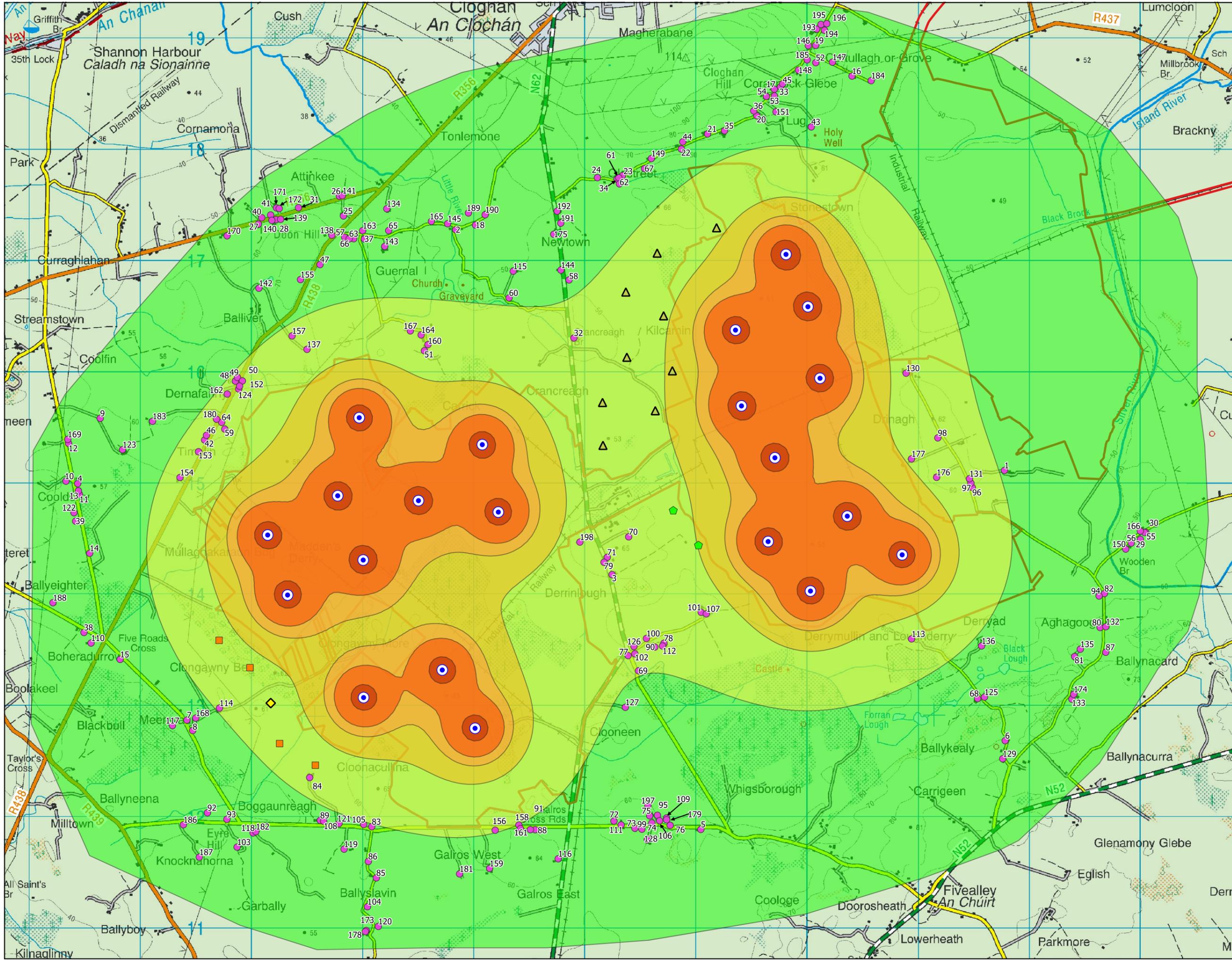
Response: The WEDG06 guidelines clearly state that a lower threshold of 43 dB should be applicable at night time periods. The WEDG06 Guidelines and the ETSU publication *The Assessment and Rating of Noise from Wind Farms (ETSU-R-97)*, both propose a lower limit of 43 dB for night periods. The WEDG06 states “A fixed limit of 43dB(A) will protect sleep inside properties during the night.”

It is noted that the maximum predicted levels at any NSL from the operation of the Derrinlough turbines is less than 40 dB. Noise limits should be cumulative, and as other wind farms in the area are permitted to 43 dB at night time, it would not be possible in our view to impose a cumulative night time limit of 40 dB as other developments in the area are permitted to operate at 43 dB or 5 dB above background noise.

Item 7: “Map Title: Sensitive Receptor Locations, Map No. Figure 11.X, dwelling ID is not legible.”

Response: The figures included in Appendix 11.5 (both Map No. Figure 11.X) of the submitted EIAR have been updated in order to ensure that all dwelling ID numbers are legible and included in this document, overleaf. For completeness, the proposed two-turbine development in the townland of Derrinlough has been included in the cumulative noise contour.

Item 8: “Confirm which if any dwellings are in ownership of individuals financially involved in the wind Farm.”



Map Legend

- EIAR Site Boundary
- Proposed Derrinlough
- ▲ Proposed Cloghan
- Existing Meenwaan
- ◆ Permitted Meenwaan
- ◆ Proposed 2 no. WTG development located in Derrinlough townland
- Dwelling Location

Omni 7m/s - Derrinlough (All Turbines)

- 0-35dB
- 35-40dB
- 40-43dB
- 43-45dB
- 45-50dB
- 50-65dB

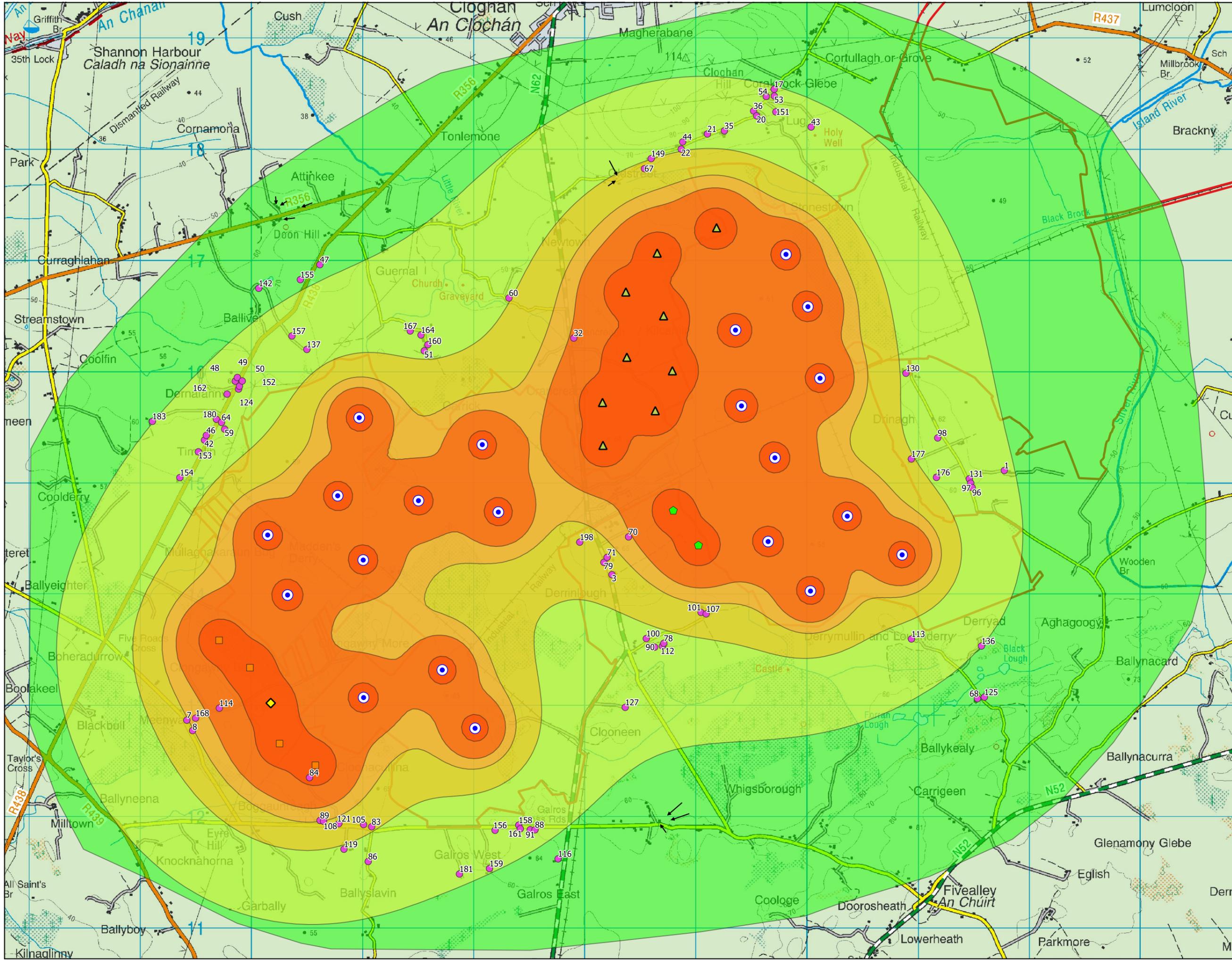
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Derrinlough Only - Noise Contour Map

Project Title: 171221 - BnM Clongawny Drinagh WF

Drawn By: DOS	Checked By: EM
Project No: 171221	Drawing No: Fig 11-X
Scale: 1:30000	Date: 22.09.20

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Map Legend

- EIAR Site Boundary
- Proposed Derrinlough
- △ Proposed Cloghan
- Existing Meenwaun
- ◇ Permitted Meenwaun
- ◆ Proposed 2 no. WTG development located in Derrinlough townland
- Dwelling Location

Omni 7m/s - Cumulative (All Turbines)

- 0-35dB
- 35-40dB
- 40-43dB
- 43-45dB
- 45-50dB
- 50-65dB

Drawing Title

Cumulative Noise Contour Map

Project Title

171221 - BnM Clongawny Drinagh WF

Drawn By	Checked By
DOS	EM
Project No.	Drawing No.
171221	Fig 11-x
Scale	Date
1:30000	22.09.20

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- Response: The proposed Derrinlough Wind Farm is located entirely on Bord na Móna lands. There are no dwellings around the windfarm that are in the ownership of individuals financially involved in the windfarm.
- Item 9: *“Outline mitigation measures that could be applied to further protect those dwellings closest to the 45 – 50dB contour lines (Map Title: Sensitive Receptor Locations, Map No. Figure 11.X)”*
- Response: Any dwelling located close to, or within the 45-50 dB contour (which is based on worst-case omnidirectional predictions) is dominated by predicted turbine noise from other developments and not Derrinlough. There are no further mitigation measures that could be incorporated into the proposed development that would reduce predicted noise levels within these bands. Essentially, the mitigation outlined ensures that there are no cumulative impacts from the Derrinlough turbine occurring within the 45 – 50 dB noise contours.
- Item 10: *“Section 11.5.3.1 (11 – 51) states:*
- “Where predicted levels from the Meenwaun or Cloghan, at a given NSL, are at or above the assessment criteria, then the contribution of from the Derrinlough turbines at the same locations will be limited to 10dB below the noise limit to ensure there are no cumulative exceedances of the noise limits as a result of the proposed development”*
- Please detail how this will be achieved.”*
- Response: Section 11.3.2.2.4 of the submitted EIAR outlines the relevant guidance in relation to the cumulative assessment of wind turbine noise. The following comments are provided to further address the query and to outline the principles on which the guidance is based, note that Section 11.2 of the EIAR presents discussion around the Decibel scale used to express Sound Pressure Level (SPL).
- With respect to environmental noise and the assessment of cumulative noise impacts, it is accepted that when the level difference between two noise sources is greater than or equal to 10 dB, the effect of the lower noise source is considered to be insignificant and will not result in an increase in the overall noise level, by way of example, 35 dB + 45 dB = 45 dB.
- Item 11: *“The applicant’s proposal to confirm predicted exceedances at the commissioning stage is considered to be inadequate. The applicant is requested to provide a list of turbines predicted to require curtailment, under what conditions and list the dwelling ID that is being protected by the curtailment measure. Where this information is not provided it is recommended that all turbines requiring curtailment comply with the noise limit condition are refused. Reason, the competent authority cannot wait for proof from the developer that curtailment is required after the windfarm has been constructed.”*
- Response: Section 11.5.6.4 of the EIAR confirms that compliance surveys will be undertaken in full accordance with the assessment guidance outlined in the IOA GPG and *Supplementary Guidance Note 5: Post*

Completion Measurements (July 2014). Compliance can only be determined through measurement post construction; it is reiterated that the turbine noise predictions are calculated using the ISO 9613-2 standard and relate to worst-case conditions favourable to noise propagation (typically downwind propagation from source to receiver and/or downward refraction under temperature inversions).

Section 11.5.6.1 of the EIAR presents a detailed discussion on the mitigation measures proposed for the Derrinlough turbines, with Tables 11.22 and 11.23 providing full details of the curtailment required, including the reduction on specific turbines and the wind conditions under which the various noise reduced modes are required.

The text from Section 11.5.6.1 of the EIAR is reiterated below to further address this query:

“The turbine noise assessment has identified that attenuation of the Derrinlough turbine noise emissions will be required under certain wind conditions to ensure that the cumulative turbine noise levels comply with best practice noise criteria at all NSL’s. The required attenuation for various wind speeds and directions has been calculated and is presented in Table 11.20 and Table 11.21. It should be noted that in all instances the levels of attenuation calculated for the Derrinlough turbines are based on the contribution of noise from other wind turbine developments at the specific locations listed in Table 11.20 and Table 11.21. At all stages of this assessment conservative assumptions have been made on the noise emission for the other windfarm developments to present a typical worst-cast assessment. Therefore, mitigation measures are specific to this assessment and the turbines noise emissions details outlined in Section 11.3.8.2.

Modern wind turbines can be programmed to run in reduced modes of operation (or low noise modes) in order to achieve the calculated attenuation required in the specific wind conditions (i.e. wind speed and direction). Operating the turbines in reduced noise modes is generally referred to as curtailment.

Should predicted exceedances be confirmed at the commissioning stage of the development, it is possible to mitigate for this through curtailment of some turbines in the relevant wind speed and directions. The curtailment strategy would ultimately be developed for the specific turbine technology installed on the site and the associated noise emissions at the various operational wind speeds. If necessary, a detailed curtailment strategy matrix will be developed at the detailed design stage in order to achieve the relevant noise criteria (cumulative) at all NSL’s.

If alternative turbine technologies are considered for the site an updated noise assessment will be prepared to confirm that the noise emissions will comply with the noise criteria as per best practice guidance outlined in Section 11.3.2.2 and/or the relevant operational criteria associated with the grant of planning for the Proposed Development. If necessary, suitable curtailment strategies will be designed and implemented for alternative technologies to ensure compliance with the relevant noise criteria curves, should detailed assessment conclude that this is necessary.”

The final turbine selection and details of any mitigation strategy (if required), will be designed to ensure that the Derrinlough Development can and will comply with any conditioned operational noise limits.

4.1 Revised Turbine Noise Assessment

This section presents an updated turbine noise assessment to take account of the proposed 2-turbine development, the details of which were not known when the original EIAR assessment was prepared. A revised curtailment strategy is presented which takes account of the 2 additional turbines and the revised lower threshold of 43 dB for landowner properties at the Cloghan development as discussed in Section 3.8 of this response.

For the avoidance of doubt, the proposed 2-turbine development is hereafter referred to as the '2-turbine development' and the 'Proposed Development' i.e. the Derrinlough Wind Farm (planning reference ABP-306706-20) is hereafter referred to as Derrinlough.

Full details of the methodology assumptions and input data are contained in the submitted EIAR. The assessment presented here presents new information only and supersedes the results presented in the submitted EIAR Chapter.

The following input data has been assumed for the 2-turbine development based on the information contained in the associated environmental report.

Turbine Ref.	Coordinates – Irish Grid (IG)	
	Easting	Northing
T01	208,796	214,750
T02	209,023	214,437

Table 3 Turbine Coordinates (2-Turbine Development)

Standardised 10m Height Wind Speed (m/s)	Octave Band (Hz) Sound Power Levels (dB re 10 ⁻¹² W)								dB(A)
	63	125	250	500	1k	2k	4k	8k	
3	72.9	78.7	82.5	85.5	88.2	88.1	79.8	65.3	93.1
4	77.3	83.1	86.9	89.9	92.6	92.5	84.2	69.7	97.4
5	82.3	88.1	91.9	94.9	97.6	97.5	89.2	74.7	102.4
6	85.7	91.5	95.3	98.3	101.0	100.9	92.6	78.1	105.9
≥7	86.8	92.6	96.4	99.4	102.1	102.0	93.7	79.2	107.0

Table 4 Turbine Noise Emissions for HH at 100.5m (2-Turbine Development).

An uncertainty factor of +1.1 dB is included, in line with the uncertainty factor presented in the Environmental Report for the proposed 2-turbine development.

A revised initial screening of the cumulative omni-directional noise levels has been undertaken by comparing the worst-case predicted turbine noise levels against the worst-case criteria curves based on the lowest background noise level envelope for day and night. This screening exercise identified a total of 24 no. NSL's with a potential cumulative exceedance of the worst-case noise criteria curve envelope. At all other NSL's the cumulative turbine noise levels are below the thresholds and there is no potential for the cumulative turbine noise to exceed the noise limits. The 24 no. NSL's are listed in Table 5 along with the maximum cumulative predicted turbines level and the maximum contribution from the Derrinlough turbines at each of these locations. A lot of the time the turbine noise levels will be below these predicted levels due to lower wind speeds and directionality effects.

NSL Ref.	Highest Predicted Omni directional Noise level dB LA90 at 7 m/s	
	Cumulative (All Wind Farms)	Derrinlough Turbines Only
R003	41.6	37.0
R007	42.9	33.4
R008	42.9	33.3
R032	45.5	36.1
R058	43.7	34.5
R070	44.6	37.5
R071	42.2	37.4
R079	41.9	37.4
R083	40.4	34.8
R084 ^{Note 1}	52.3	36.3
R089	43.1	34.1
R093	40.3	31.5
R101	42.1	37.9
R105	40.9	34.8
R107	42.0	38.1
R108	43.0	34.2
R114	46.6	35.2
R117	41.5	32.7
R118	40.5	31.8
R121	42.2	34.4
R144	42.5	34.1
R168	43.7	33.9
R182	40.7	31.9
R198	42.2	38.5

Table 5 List of NSL's with Potential for Cumulative noise Exceedance

Note 1: In relation to NSL R084, the EIS (Noise Chapter) for Meenwaun stated that if the windfarm was permitted that this property would no longer be used as a dwelling by any person and therefore it was not assessed as a receptor in that EIS and is not considered a NSL in this assessment.

Table 6 presents the predicted omni-directional cumulative noise levels for various operational wind speeds at the 24 no. locations and compares the predicted levels against the adopted noise criteria curves for each location. An updated noise contour for the omni-directional rated power wind speed (i.e. highest noise emission) for the cumulative scenario including the 2-turbine development is included after Page 15 of this document.

ID	Description	dB LA90 at Various Standardised Wind Speeds (m/s)				
		3	4	5	6	≥7
R003	Predicted Turbine Level	28.6	32.6	37.6	40.8	41.6
	Daytime Limits	40	40	45	45	45
	Potential Daytime Exceedance	--	--	--	--	--
	Night Limits	43	43	43	43	43
	Potential Night time Exceedance	--	--	--	--	--
R007	Predicted Turbine Level	33.8	36.5	41.7	42.8	42.9
	Daytime Limits	40	40	45	45	45
	Potential Daytime Exceedance	--	--	--	--	--
	Night Limits	43	43	43	43	43
	Potential Night time Exceedance	--	--	--	--	--

ID	Description	dB LA90 at Various Standardised Wind Speeds (m/s)				
		3	4	5	6	≥7
R008	Predicted Turbine Level	33.8	36.5	41.7	42.9	42.9
	Daytime Limits	40	40	45	45	45
	Potential Daytime Exceedance	--	--	--	--	--
	Night Limits	43	43	43	43	43
	Potential Night time Exceedance	--	--	--	--	--
R032	Predicted Turbine Level	31.9	36.1	41.1	44.5	45.5
	Daytime Limits	40	40	45	45	45
	Potential Daytime Exceedance	--	--	--	--	0.5
	Night Limits	43	43	43	43	43
	Potential Night time Exceedance	--	--	--	1.5	2.5
R058	Predicted Turbine Level	30.1	34.3	39.3	42.7	43.7
	Daytime Limits	40	40	45	45	45
	Potential Daytime Exceedance	--	--	--	--	--
	Night Limits	43	43	43	43	43
	Potential Night time Exceedance	--	--	--	--	0.7
R070	Predicted Turbine Level	31.2	35.4	40.4	43.7	44.6
	Daytime Limits	40	40	45	45	45
	Potential Daytime Exceedance	--	--	--	--	--
	Night Limits	43	43	43	43	43
	Potential Night time Exceedance	--	--	--	0.7	1.6
R071	Predicted Turbine Level	29.2	33.2	38.2	41.4	42.2
	Daytime Limits	40	40	45	45	45
	Potential Daytime Exceedance	--	--	--	--	--
	Night Limits	43	43	43	43	43
	Potential Night time Exceedance	--	--	--	--	--
R079	Predicted Turbine Level	28.9	32.9	37.9	41.1	41.9
	Daytime Limits	40	40	45	45	45
	Potential Daytime Exceedance	--	--	--	--	--
	Night Limits	43	43	43	43	43
	Potential Night time Exceedance	--	--	--	--	--
R083	Predicted Turbine Level	30.8	33.6	38.8	40.3	40.4
	Daytime Limits	40	40	45	45	45
	Potential Daytime Exceedance	--	--	--	--	--
	Night Limits	43	43	43	43	43
	Potential Night time Exceedance	--	--	--	--	--
R089	Predicted Turbine Level	34.1	36.7	41.9	43.1	43.1
	Daytime Limits	40	40	45	45	45
	Potential Daytime Exceedance	--	--	--	--	--
	Night Limits	43	43	43	43	43
	Potential Night time Exceedance	--	--	--	0.1	0.1
R093	Predicted Turbine Level	31.2	33.9	39.1	40.3	40.3
	Daytime Limits	40	40	45	45	45
	Potential Daytime Exceedance	--	--	--	--	--
	Night Limits	43	43	43	43	43
	Potential Night time Exceedance	--	--	--	--	--
R101	Predicted Turbine Level	29	33.1	38.1	41.3	42.1
	Daytime Limits	40	40	45	45	45
	Potential Daytime Exceedance	--	--	--	--	--
	Night Limits	43	43	43	43	43
	Potential Night time Exceedance	--	--	--	--	--

ID	Description	dB LA90 at Various Standardised Wind Speeds (m/s)				
		3	4	5	6	≥7
R105	Predicted Turbine Level	31.5	34.2	39.4	40.8	40.9
	Daytime Limits	40	40	45	45	45
	Potential Daytime Exceedance	--	--	--	--	--
	Night Limits	43	43	43	43	43
	Potential Night time Exceedance	--	--	--	--	--
R107	Predicted Turbine Level	29	33	38	41.2	42
	Daytime Limits	40	40	45	45	45
	Potential Daytime Exceedance	--	--	--	--	--
	Night Limits	43	43	43	43	43
	Potential Night time Exceedance	--	--	--	--	--
R108	Predicted Turbine Level	33.9	36.5	41.8	42.9	43
	Daytime Limits	40	40	45	45	45
	Potential Daytime Exceedance	--	--	--	--	--
	Night Limits	43	43	43	43	43
	Potential Night time Exceedance	--	--	--	--	--
R114	Predicted Turbine Level	37.7	40.3	45.6	46.6	46.6
	Daytime Limits	40	40	45	45	45
	Potential Daytime Exceedance	--	0.3	0.6	1.6	1.6
	Night Limits	43	43	43	43	43
	Potential Night time Exceedance	--	--	2.6	3.6	3.6
R117	Predicted Turbine Level	32.4	35	40.3	41.4	41.5
	Daytime Limits	40	40	45	45	45
	Potential Daytime Exceedance	--	--	--	--	--
	Night Limits	43	43	43	43	43
	Potential Night time Exceedance	--	--	--	--	--
R118	Predicted Turbine Level	31.3	34	39.2	40.4	40.5
	Daytime Limits	40	40	45	45	45
	Potential Daytime Exceedance	--	--	--	--	--
	Night Limits	43	43	43	43	43
	Potential Night time Exceedance	--	--	--	--	--
R121	Predicted Turbine Level	32.9	35.6	40.9	42.1	42.2
	Daytime Limits	40	40	45	45	45
	Potential Daytime Exceedance	--	--	--	--	--
	Night Limits	43	43	43	43	43
	Potential Night time Exceedance	--	--	--	--	--
R144	Predicted Turbine Level	29	33.2	38.2	41.5	42.5
	Daytime Limits	40	40	45	45	45
	Potential Daytime Exceedance	--	--	--	--	--
	Night Limits	43	43	43	43	43
	Potential Night time Exceedance	--	--	--	--	--
R168	Predicted Turbine Level	34.7	37.3	42.6	43.7	43.7
	Daytime Limits	40	40	45	45	45
	Potential Daytime Exceedance	--	--	--	--	--
	Night Limits	43	43	43	43	43
	Potential Night time Exceedance	--	--	--	0.7	0.7
R182	Predicted Turbine Level	31.6	34.2	39.4	40.6	40.7
	Daytime Limits	40	40	45	45	45
	Potential Daytime Exceedance	--	--	--	--	--
	Night Limits	43	43	43	43	43
	Potential Night time Exceedance	--	--	--	--	--

ID	Description	dB LA90 at Various Standardised Wind Speeds (m/s)				
		3	4	5	6	≥7
R198	Predicted Turbine Level	29.3	33.3	38.3	41.5	42.2
	Daytime Limits	40	40	45	45	45
	Potential Daytime Exceedance	--	--	--	--	--
	Night Limits	43	43	43	43	43
	Potential Night time Exceedance	--	--	--	--	--

Table 6 Review of Cumulative Predicted Turbine Noise Levels against Relevant Criteria at Screened NSL's

Section 11.5.3.1 of the EIAR stated “*The noise criteria curves for Location C are deemed to be appropriate for all locations where the predicted omni-direction cumulative noise emissions have indicated a potential exceedance*” it follows that Table 11.18 of the EIAR contained the incorrect daytime limits; the correct daytime limits are presented in Table 6 above.

On review of the results in Table 6, there are only six locations where the cumulative exceedances of the noise criteria are predicted.

A full suite of updated directional noise prediction models has been prepared for assessment in accordance with the methodology described in Section 11.5.3.1.1 of the EIAR.

The updated calculated attenuation requirements for the Derrinlough Turbines are outlined in Table 7 and Table 8 for the six locations at the various wind speeds and direction at which they are required.

NSL	Wind Speed	Attenuation (dB) Required to Derrinlough Turbines at Various Wind Speeds and Direction Sector - Daytime							
		N	NE	E	SE	S	SW	W	NW
R114	≥7m/s	--	0.2	0.1	--	--	--	--	--

Table 7 Daytime Attenuation Requirements for Derrinlough Turbines

NSL	Wind Speed	Attenuation (dB) Required to Derrinlough Turbines at Various Wind Speeds and Direction Sector – Night Time							
		N	NE	E	SE	S	SW	W	NW
R032	≥7m/s	--	0.6	1.3	2.4	2.6	--	--	--
R058		--	--	--	1.1	--	--	--	--
R070		3.1	2.9	2.6	--	--	--	--	--
R089		0.7	--	--	--	--	--	--	--
R114		1.6	2.2	2.1	0.4	--	--	--	0.1
R168		--	0.9	0.9	--	--	--	--	--
R032	6m/s	--	0.3	1.0	2.1	2.3	--	--	--
R058		--	--	--	--	--	--	--	--
R070		--	2.3	--	--	--	--	--	--
R089		0.3	--	--	--	--	--	--	--
R114		1.3	1.9	1.8	0.1	--	--	--	--
R168		--	0.6	0.6	--	--	--	--	--

Table 8 Night-time Attenuation Requirements for Derrinlough Turbines

Compared to the attenuation requirements contained in Tables 11.20 and 11.21 of the EIAR, it is noted that there is additional attenuation required in the revised assessment. The additional attenuation is required to reduce the Derrinlough contribution at R032 due to the lower threshold of 43 dB being applied to the

landowner dwellings and to address potential cumulative impacts at R70 arising from the operation of the proposed 2-turbine development.

Table 9 presents an updated curtailment strategy based on the revised assessment. This curtailment strategy will ensure that the attenuation requirement at all NSL's detailed in Tables 7 and 8 will be achieved.

Period	Wind Speed	Turbine Operating Mode in Various Wind Direction Sectors					
		N	NE	E	SE	S	NW
Day	≥7m/s	--	T11 = SO1	T11 = SO1	--	--	--
Night		T01 = SO11 T02 = SO13 T04 = SO1 T10 = SO1 T11 = SO2 T12 = SO13 T13 = SO13 T14 = SO1 T19 = SO1 T20 = SO2	T01 = SO2 T02 = SO2 T04 = SO2 T09 = SO1 T10 = SO1 T11 = SO2 T12 = SO11 T13 = SO11 T14 = SO11 T19 = SO11 T20 = SO1	T01 = SO1 T04 = SO2 T09 = SO1 T10 = SO1 T11 = SO2 T12 = SO11 T13 = SO11 T14 = SO11 T19 = SO2 T20 = SO2	T01 = SO2 T02 = SO11 T04 = SO1 T12 = SO2 T19 = SO2 T20 = SO11 T21 = SO1	T01 = SO13 T02 = SO2 T06 = SO1 T08 = SO1 T12 = SO1 T19 = SO2 T20 = SO2	T11 = SO1
Day	6m/s	--	--	--	--	--	--
Night		T04 = SO1 T10 = SO1 T11 = SO2	T02 = SO1 T04 = SO2 T09 = SO1 T10 = SO1 T11 = SO2 T12 = SO2 T13 = SO11 T14 = SO2 T19 = SO2 T20 = SO1	T04 = SO2 T10 = SO1 T11 = SO2 T19 = SO2 T20 = SO2	T01 = SO2 T02 = SO2 T04 = SO1 T12 = SO1 T19 = SO2 T20 = SO2 T21 = SO1	T01 = SO13 T02 = SO2 T06 = SO1 T08 = SO1 T12 = SO1 T19 = SO2 T20 = SO1	--

Table 9 Indicative Curtailment Strategy Matrix for Derrinlough to Achieve Criteria

5.0 REQUESTS FOR ADDITIONAL INFORMATION FROM ABP

ABP have requested two points of clarification in relation to the Noise and Vibration assessment which state:

Item 3 *“It is acknowledged in the EIAR that the noise monitoring locations are spread out over a relatively large area (section 11.3.7.1). Having regard to the significant geographical extent of the site and the clusters of dwellings in the locality, the applicant is requested to provide a more detailed rationale for the low number of monitoring locations (7 no.). It is unclear, for example, why no monitoring was conducted at noise sensitive locations to the west of the site (Timolin/Dernatanny/Balliver). The noise monitoring locations should provide confidence that all areas are fully considered to establish potential variations in the background noise levels in the study area”*

Response: Following an initial review of the preliminary turbine layout undertaken by AWN, nine noise monitoring locations were identified, including a number of alternatives for each location. The project Community Liaison Officer (CLO) contacted each of the identified homeowners and/or an alternative location as required and secured consent for 8 of the 9 locations. At the time of installation of the monitors one of the eight homeowners withdrew consent. A review was carried out at this time to determine if there were any additional suitable locations and it was determined that additional locations would not be required given the coverage provided by the seven remaining locations and the noise environment in the area.

The nine locations originally identified are shown in Figure 1 and as outlined in the preceding paragraph monitoring did not take place at locations ‘G’ and ‘I’ (note some of these references are different to the locations referred to in the EIAR).

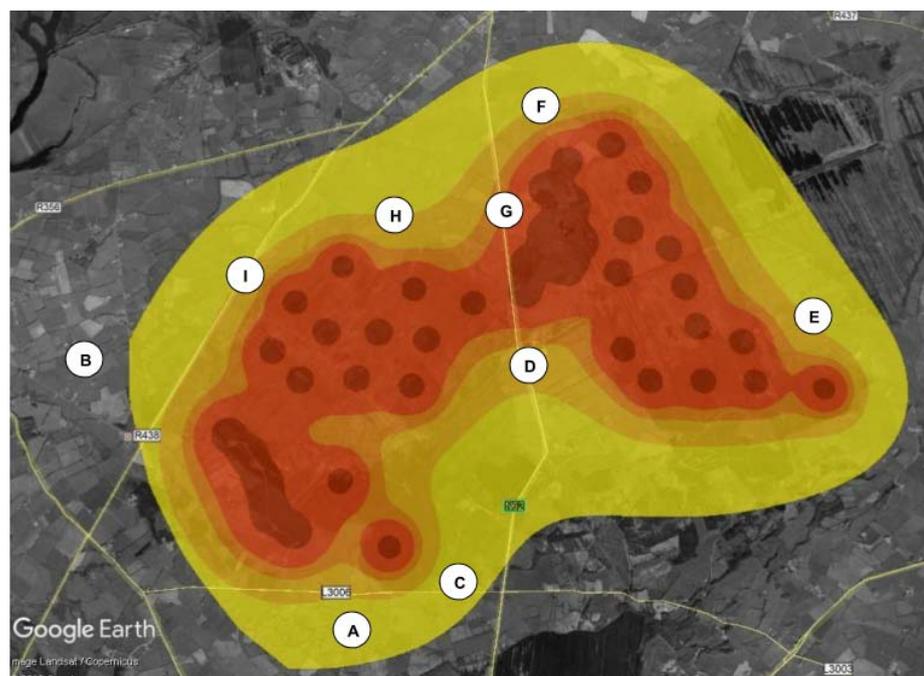


Figure 1 Initial Proposed Noise Monitoring Locations

It is reasonable to expect that Location G would have similar background noise levels to Location D, and Location B would serve as a proxy location for Location I. Given that Location I is situated closer to a regional road, it is likely that the background noise levels would be higher at this location.

It is our view, having completed, the analysis of the background noise data, inspections and observation made at the site and review of aerial photographs and mapping software, that the seven survey locations selected provided a representative depiction of typical background noise experiences at NSL's across the study area for the purpose of the planning assessment. Although the noise locations are spread out over a large geographical area, the noise sources that form the background noise are similar, and mostly determined by the distance from the surrounding road network.

As stated in Section 11.5.3.1 of the EIAR, an initial screening of the cumulative omni-directional noise levels was undertaken by comparing the worst-case predicted turbine noise levels against the worst-case criteria curves based on the lowest background noise level envelope for day and night. Following this, appropriate noise limits were assigned to each of the relevant NSL's based on professional judgement in line with best practice guidance of representative background noise levels measured as part of the survey. The noise criteria curves for Location C were deemed to be appropriate for all the remaining NSL's. Only two of the seven locations included in the background noise survey attracted lower noise criteria curves than Location C, namely Location E and G. As described in Section 11.3.7.1 of the EIAR, both these locations were isolated from any significant environmental noise source which is not deemed to be representative of the list of NSL's in Table 11.12. All other locations in the background noise survey attract a higher noise criteria curve. Therefore, adopting the background noise from Location C is robust and appropriate for this assessment

It is important to note that the proposed criteria are couched relative to the background noise levels, and any planning condition issued by the relevant authority should maintain this statement. Furthermore, the background noise levels are specific to the assessment hub height and any change in hub height of the proposed turbines will require the background noise data to be re-analysed to determine the appropriate background noise levels.

Background noise levels can only strictly apply to the specific location at which they were made. As it is not possible to monitor at all NSL's, it is important that when selecting noise monitoring locations and siting equipment, that the location is suitable to serve as a representation for other locations in the area. AWN confirms that the methodology for the background noise surveys, the analysis and the assigning of representative noise limits has been undertaken with respect to best practice guidance outlined in the IOA GPG Supplementary Guidance Notes 1² and 2³.

² Supplementary Guidance Note 1: Data Collection.

³ Supplementary Guidance Note 2: Data Processing & Derivation of ETSU-R-97 Background Curves.

If deemed necessary by the planning authority, additional background noise surveys could be undertaken to determine the background noise levels at specific locations.

Item 4 *“In relation to the submitted noise assessment (Chapter 11 of the EIAR), it is noted that reliance is placed on the 2006 Wind Energy Guidelines. The applicant is requested to clarify that the noise assessment is robust and is adequately protected. In responding the applicant is requested to identify any such up to date guidance.”*

Response: It is our view that the submitted noise impact assessment is robust and has been carried out in line with current standards and best practice guidelines, which includes ESTU and IOA methodologies as described above and including the requirements outlined in Section 5.6 of the Wind Energy Development Guidelines for Planning Authorities, 2006.

The original ETSU-R-97 concepts on which both the WEDG06 and the Draft Revised Wind Energy Development Guidelines (DRWEDG19) are based underwent a thorough standardisation and modernisation in 2013 with the Institute of Acoustics publication of the *Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise* including 6 Supplementary Guidance Notes, all of which bring together the combined experience of acoustic consultants in the UK and Ireland in the application of these methods. Numerous improvements in the accuracy and robustness are described, in particular the treatment of wind shear and the general adaptation to larger wind turbines. The assessment in the EIAR is therefore in full accordance with the latest best-practice methods.

5.0 CONCLUSION

This document has provided a detailed response to key items raised within the third-party submissions, items raised in relation to Noise within the Offaly County Council Chief Executives' Report and two requests for clarification from ABP.

A revised noise assessment has been undertaken to account for the proposed 2-turbine development, details of which were not known at the time of the original assessment and to account for the revised lower threshold of 43 dB for landowner properties at the Cloghan development.

A revised curtailment strategy has been presented that will ensure that the proposed Derrinlough development, in combination with all other existing, permitted, and proposed wind turbines in the area, will operate within the noise criteria at all NSL's. Furthermore, the contribution from the operation of the Derrinlough turbines will not result in any significant cumulative impacts.

At the six locations where mitigation is proposed for the Derrinlough Turbines, the cumulative noise levels predicted at these locations are dominated by noise from other wind Farm developments. The curtailment strategy presented is based on a desktop exercise with conservative noise prediction calculations and worst-case assumptions to provide a robust assessment in support of the planning application. In most instances the noise reduction required from the Derrinlough turbines is negligible to imperceptible.

The submitted noise impact assessment is robust and has been carried out in line with current standards and best practice guidelines (i.e. *Planning Guidelines for Wind Development 2006* and ETSU-R-97).



APPENDIX 2

**HYDROENVIRONMENTAL
SERVICES- GEOLOGICAL,
HYDROLOGICAL &
HYDROGEOLOGICAL
RESPONSES TO SUBMISSIONS**

Date: 22nd September 2020
Our Ref: P1463-1-0010

MKO Ireland
Planning & Environmental Consultants
Tuam Road,
Galway.
H91 VW84.

Attn: Mr Eoin McCarthy

Dear Eoin,

Re: Geological, Hydrological & Hydrogeological Responses to Submissions in relation to Derrinlough Wind Farm, Co. Offaly – (ABP Ref: 306706-20)

Hydro-Environmental Services (HES) were requested by MKO, acting on behalf of Bord Na Mona Powergen Ltd., to respond to geological and hydrological/hydrogeological issues that were raised in submissions in relation to the proposed Derrinlough Wind Farm, Co. Offaly.

This letter report provides detailed responses to submissions from Offaly County Council, Inland Fisheries Ireland, Irish Water, Geological Survey of Ireland, and the Development Applications Unit of the Department of Culture, Heritage and the Gaeltacht.

1 STATEMENT OF EXPERIENCE – WIND FARM AND PEATLAND DRAINAGE

Hydro-Environmental Services (HES) has extensive wind farm drainage and hydrogeological experience relevant to this project. Wind farm environmental impact assessment in respect of geology, hydrology and hydrogeology is a core business area for HES presently and also over the past 10 years. Wind farm drainage design/management requires experience both as a civil/drainage engineer, a hydrologist and as a hydrogeological specialist. HES have these combined experiences and expertise. HES have worked on over 100 wind farm projects in Ireland and Northern Ireland. Many of these required assessments of existing drainage features and streams and water quality data. HES work at all stages of wind farm developments including feasibility stage, layout design & preliminary drainage design/planning stage, and also at construction management stage.

HES's experience also covers the key area of water quality and drainage controls and mitigation during the construction phase of wind farm developments. HES work at EIAR/planning stage to assist with development of the optimal site layout which involves development of hydrological constraints maps and interaction with geotechnical and ecological specialists and with site designers. HES also provide a follow-on consultancy service (if planning is granted and the development proceeds to construction) of detailed drainage design and construction management for drainage during wind farm development/construction stage. This practical on-site experience is invaluable as it has led to development of improved preliminary and detailed drainage layouts and also many improvements/optimisations to standard peatland drainage mitigation measures.

HES specialises in wetland and peatland eco-hydrology. We also complete flood risk assessments for all types of developments across the county.

All these experiences are particularly relevant to this project, and they have been applied through the project development phase, the constraints mapping phase, and EIAR preparation work, including the cumulative impact assessment.

In addition to the above, Michael Gill of HES has worked on many projects with Bord na Móna over the last 25 years that have sensitive peatland hydrology issues, including Clara Bog, Raheenmore Bog, Corrib Gas Pipeline, Oweninny Wind Farm, and Cloncreen Wind Farm.

2 HES RESPONSES TO SUBMISSIONS

2.1 HES Responses to Offaly County Council

At page 45 of their submission Offaly County Council request the following:

- *The applicant is to confirm that public health has been considered in the event of making non potable water (of unknown microbial quality) available to staff for handwashing.*
- *The applicant is to confirm if monitoring (microbiological parameter) of the proposed on site water supply will be undertaken.*
- *The applicant is to outline mitigation measures that could be applied in the interest of public health of staff.*
- *It is noted that LAWPro were not consulted in this process. The applicant is recommended to consult with LAWPro in the context of Water Framework Directive objectives and in particular the Silver River which is a designated Priority Area for Action.*
- *The applicant is to confirm that spill kits and absorbent pads will be fitted in all on site machinery*
- *The applicant is to confirm that impermeable surface areas located in designated parking/storage areas will be provided for all fuel bowsers and refuelling vehicles/trailers.*
- *The applicant is to correctly reference Figure 9.5 in section 9.3.7 which reference locations of field hydrochemistry measurements taken within surface watercourses downstream of the proposed development.*

Responses

We confirm that public health has been considered in the event of making non potable water (of unknown microbial quality) available to staff for handwashing. Occupational hygiene training will be provided to staff and suitable site notices will be installed at hand wash locations. Alcohol gels and anti-bacterial hand wipes will also be made available for post hand-wash disinfection.

We confirm that microbiological monitoring of the groundwater source proposed for the on-site water supply (at the substation) will be undertaken.

Mitigation measures (in the interest of public health of staff) will include water testing and monitoring prior to commissioning of the water source, the inclusion of chlorination or UV treatment in the water treatment systems, and also occupational hygiene training will be provided and suitable site notices will be installed at hand wash locations, and alcohol gels and anti-bacterial hand wipes will be made available for post hand-wash disinfection.

Details in relation to the proposed development including the Hydrology and Hydrogeology chapter of the submitted EIAR were sent to LAWPro in line with the recommendation from Offaly County Council. We have received a verbal response from LAWPro that indicates that they have no consultation role in such projects, and that they would provide guidance directly to Offaly County Council. Notwithstanding this position, potential for impacts from the proposed Derrinlough Wind Farm development on all receiving waters (including the Silver River) are assessed in the submitted EIAR. There is significant best-practice mitigation outlined in the submitted EIAR (Sections 9.5.3 (Construction Phase), 9.5.4 (Operational Phase) and 9.5.5 (Decommissioning Phase)) to ensure surface water quality and groundwater quality is protected. The mitigation includes for prevention of impacts from silt, hydrocarbons,

cementitious and other pollutants. Also, a set of detailed drainage drawings for the proposed wind farm development are provided in Appendix 4.5 of the submitted EIAR. With the implementation of these mitigation measures the construction, operation and decommissioning of the proposed Derrinlough Wind Farm will not affect the current or future status of downstream surface waters, including the Silver River.

We confirm that spill kits and absorbent pads will be fitted in all on site machinery.

We confirm that impermeable surface areas will be located in designated parking/storage areas within the site compound for all fuel bowsers and refuelling vehicles/trailers.

Field chemistry monitoring locations are the same as surface water sampling locations and those locations are shown on Figure 9.5 as indicated in Section 9.3.7 of the submitted EIAR.

2.2 HES Responses to Inland Fisheries Ireland (IFI) Submission

In response to the IFI submission dated 23rd April 2020, we comment as follows:

- The development does not include for any direct in stream works on natural watercourses (streams or rivers). However, the applicant is familiar with the requirement of IFI regarding in-stream works or other works which may impact directly on a watercourse and is happy to comply with the specified open season period as referenced in the letter.
- We confirm that the planned wind farm layout and setting of the turbines and road network will not affect future works to restore Little Croghan and other associated tributaries to good status. The rewetting and rehabilitation proposed as part of the Draft Rehabilitation Plans will not have a significant impact on the receiving waters. As outlined in the submitted EIAR (Section 9.5.4.1) the proposed development footprint only comprises 1.45% (34.2 Ha) of the total site area of 2,360 Ha.
- All mitigation outlined in the EIAR will be implemented during the construction period and for the lifetime of the wind farm.
- Settlement Ponds: we note IFI comments regarding settlement ponds and silt traps. Details regarding proposed site drainage management and construction mitigation measures are outlined and assessed at Sections 9.4.2 and 9.5.3.1 of the EIAR, and detailed drainage drawings for the development are provided in Appendix 4.5.
- Roads and Drainage: No weak shale rocks will be used during access track/site road construction. (Note limestone is a sedimentary rock, and it is a very competent road construction material). Where required the applicant is happy to agree on any water related "road-crossing" works with IFI in advance.
- Biodiversity Management Plan:
 - The Rehabilitation Plans for Clongawny and Drinagh Bogs (both of which comprise the Derrinlough WF) will be finalised with the EPA, and in consultation with IFI.
 - All mitigation outlined in the submitted EIAR is included in the CEMP, and the CEMP also includes post-construction monitoring.
 - The list of mitigation outlined in the IFI submission, for the construction phase, are already included in the submitted EIAR, and the Applicant is happy to implement same.

2.3 HES Responses to Geological Survey of Ireland Submission

The submission from the GSI dated 19th March 2020 refers to topics for assessment/consideration, and those include:

- Geoheritage
 - Mushroom Rocks

- Kilcormac Esker
- Geohazards
- Groundwater
- Geotechnical Database Resources
- Other Comments

Response

During the scoping stage of the EIAR we previously received a similar letter from the GSI, dated 27th November 2019, referencing:

- Geoheritage
 - Mushroom Rocks
 - (Kilcormac Esker was not mentioned)
- Groundwater
- Geohazards
- Natural Resources (Minerals/Aggregates)

The following table provides a simple roadmap referencing locations within the submitted EIAR where the above topics are characterised and assessed:

Topic/Nature	Description	Characterised and Assessed in Chapter Section
<ul style="list-style-type: none"> • Geoheritage 	<ul style="list-style-type: none"> • Crancreagh Mushroom Rock • Derrinlough Mushroom Rock • Drinagh Mushroom Rock 	Section 8.3.5, and Section 8.5.2.6.
<ul style="list-style-type: none"> • Groundwater 	<ul style="list-style-type: none"> • Groundwater characterisation, vulnerability, groundwater resources, well databases, and Public Supply sources • Assessment of groundwater protection/sources 	Sections 9.3.8, 9.3.9, 9.3.12 and 9.3.15 Sections 9.5.3.9 and 9.5.4.3
<ul style="list-style-type: none"> • Geohazards 	<ul style="list-style-type: none"> • Peat stability (landslides) 	Section 8.3.2, and Section 8.5.2.6.
<ul style="list-style-type: none"> • Natural Resources (Minerals/Aggregates) 	<ul style="list-style-type: none"> • Geological resources 	Section 8.3.4.

Kilcormac Esker was not assessed explicitly in the submitted EIAR given that it is remote from the application site (at its closest point to the wind farm ~600m southeast of the southern boundary of the application site (on the Drinagh side)). As such it cannot be impacted by the development, either directly or indirectly, as there is no overlap in development, and no excavation or alteration of the esker is proposed. The proposed road alignments works at the N52/N62 junction are closer to the esker (~300m), but again no direct or indirect impacts will occur as there are no intended works within the mapped esker footprint.

HES are of the opinion that the topics referenced by the GSI (both at consultation stage and submission response stage) have been addressed comprehensively in the submitted EIAR.

2.4 HES Responses to Irish Water Submission

In the submitted Irish Water letter, dated 24th March 2020, the following points are raised:

- Location of the application site 4.2km upstream of the Shannon River Intake
- Location of the development site proximal to the Banagher Public Water Supply (PWS) Scheme

- Presence of infrastructure within the application area, and the requirement for diversion enquiry with IW. (Please note that this is addressed in Section 2.1.1.15 of the Further Information Response Document)

Responses

- Shannon River Intake:
 - The Shannon River Intake is 4.2km west of the proposed development, but along the hydrological pathway, there is ~11.3km of channel distance between the northern edge of the proposed wind farm and the intake location (i.e. the distance along the Little River, the Brosna River, and the Shannon River).
 - There is significant best-practice mitigation outlined in the submitted EIAR (Sections 9.5.3 (Construction Phase), 9.5.4 (Operational Phase) and 9.5.5 (Decommissioning Phase)) to ensure water quality in the Little River, and all other downstream water bodies, including the Shannon River, are not affected by the proposed wind farm development.
 - A set of detailed drainage drawings for the proposed wind farm development are provided in Appendix 4.5 of the submitted EIAR.
 - With the implementation of the mitigation measures outlined in the submitted EIAR, and given the significant separation distances involved, we are confident that there will be no deterioration in water quality in downstream receiving waters, and as such the requirements of the WFD in respect of the Shannon River Intake will not be affected.
- Banagher PWS Scheme
 - Details of the Banagher PWS scheme are presented in Section 9.3.15 of the submitted EIAR.
 - An assessment of potential health effects is also included at Section 9.5.4.4 of the submitted EIAR.
 - At Section 9.3.15 of the submitted EIAR, it is clearly stated that the source protection area for the Banagher PWS scheme does not overlap with the footprint of the proposed development.
 - In Section 9.5.4.4 of the submitted EIAR it is stated that "*The mapped source protection zone for this GWS does not fall within the proposed development site boundary. Notwithstanding this, the proposed site design and mitigation measures ensures that the potential for impacts on the groundwater environment are not significant*".
 - There is significant best-practice mitigation outlined in the submitted EIAR (Sections 9.5.3 (Construction Phase), 9.5.4 (Operational Phase) and 9.5.5 (Decommissioning Phase)) to ensure surface water quality and groundwater quality is protected. The mitigation includes for prevention of impacts from silt, hydrocarbons, cementitious and other pollutants. Also, a set of detailed drainage drawings for the proposed wind farm development are provided in Appendix 4.5 of the submitted EIAR.

HES are of the opinion that the topics referenced by Irish Water have been addressed comprehensively in the submitted EIAR.

2.5 HES Responses to Submission by the Development Applications Unit of the Department of Culture, Heritage and the Gaeltacht

In the submitted DoCHG (Department of Culture, Heritage and the Gaeltacht) letter, dated 11th June 2020, the following hydrology related points are raised:

- Assessment of cumulative impacts of the existing drainage network and the proposed network on water dependent receptors, such as fish species and aquatic invertebrates, is required.

Response

As outlined in the submitted EIAR (Section 9.5.4.1) the proposed development footprint only comprises 1.45% (34.2 Ha) of the total site area of 2,360 Ha.

The proposed wind farm drainage is localised to access roads, turbine locations, and the substation. All drainage from the wind farm development will drain via existing drainage infrastructure at the site to existing bog outfalls.

The EIAR states the following at Section 9.4.2:

"The proposed wind farm drainage will not significantly alter the existing drainage regime at the site. Moreover, the proposed drainage system will be fully integrated into the existing bog drainage systems. Existing field drains and main drains will be routed under/around access tracks using culverts as required. Runoff from access tracks, turbine bases, and developed areas (construction compounds, substations, met masts) will be collected and treated in local (proposed) silt traps and settlement ponds and then discharged to existing peat field drains. From there this water will flow towards the relevant bog site boundaries in existing field drains and main drains, and then be treated further in the existing main (bog) settlement ponds prior to discharge from the proposed development site. One of the proposed ecological aspects of the drainage design is to re-wet the site in small areas, where possible, to create wet areas as such wetland features which are good for overall site biodiversity. Ponding would occur in these areas to a very shallow depth, and only intermittently following heavy rainfall. No large open bodies of water are proposed, and where intermittent ponding occurs this will be broken up into small areas using peat berms."

There is significant best-practice mitigation outlined in the submitted EIAR (Sections 9.5.3 (Construction Phase), 9.5.4 (Operational Phase) and 9.5.5 (Decommissioning Phase)) to ensure surface water quality and groundwater quality is protected. The mitigation includes for impacts from silt, hydrocarbons, cementitious and other pollutants. Also, a set of detailed drainage drawings for the proposed wind farm development are provided in Appendix 4.5 of the submitted EIAR.

Potential for increased surface water runoff from the proposed development footprint is assessed at Section 9.5.4.1 of the submitted EIAR. In a worst-case scenario, we have demonstrated that runoff could increase by 0.06% in the wettest month, while in a post-mitigation scenario, which includes additional attenuation storage and water treatment in silt traps, a reduction in runoff of up to 11.4% could occur. This latter assessment is intended to simulate the conditions likely to occur following bog rehabilitation where wetter conditions on the bogs are envisaged. Increased retention of water on the bogs will be a major benefit to reducing downstream flood risk and improving downstream water quality.

It is our opinion that the proposed wind farm drainage will not significantly alter the existing drainage regime within the bogs that comprise the wind farm development (Drinagh and Clongawny bogs), and as such, the cumulative effects on drainage (either by quantity or quality) will be negligible. Indeed, with the implementation of Bog Rehabilitation Plans, there will likely be an improvement in downstream water quality.

3 CLOSURE

We trust the above response meets your requirements. Please contact the undersigned if you have any questions regarding the above.

Yours sincerely,

Michael Gill

Michael Gill
B.A., B.A.I., M.Sc., Dip Geol, MIEI, MCIWEM



APPENDIX 3

**ALAN LIPSCOMBE TRAFFIC AND
TRANSPORT- RESPONSE TO
OBSERVATIONS MADE BY
TRANSPORT INFRASTRUCTURE
IRELAND**

DERRINLOUGH WIND FARM DEVELOPMENT

DERRINLOUGH, COUNTY OFFALY

Response to Observations made by Transport Infrastructure Ireland (TII)

Alan Lipscombe Traffic & Transport Consultants Ltd
Claran, Headford, Co Galway

Email - Info@alipscombetraffic.ie
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Client: Bord na Mona
September 22nd , 2020
Project No: 7380

1 INTRODUCTION

A planning application was submitted to An Bord Pleanála for planning permission to construct the Derrinlough Wind Farm Development, with 21 turbines and all associated infrastructure, located in Derrinlough, County Offaly. The proposed development is currently being considered by An Bord Pleanála (Case Reference – PI 19.306706).

A letter with observations relating to the proposed development was submitted by Transport Infrastructure Ireland (TII) to An Bord Pleanála dated 15th April, 2020. This note summarises the observations together with design team responses to each.

2 SUMMARY RESPONSE TO OBSERVATIONS MADE BY TII

The key observations made by TII together with a response to each, are set out below. The letter submitted by TII dated 15th April, 2020, should be read in conjunction with this note.

TII Observation 1.1 - National Road Direct Access Considerations

This observation relates to the proposed temporary access junctions for the delivery of the abnormally sized loads located within the 100 km/h speed limit on the N62 with respect to the official policy 2.5 of DoECLG Spatial Planning and National Roads Guidelines (2012), which seeks to avoid the creation of access points on the national road network, or the intensification of existing access points, outside of 50 km/h urban zones.

As set out in Section 14.1.2.4 of the EIAR, the proposed junctions on the N62 will be temporary and will be used for the delivery of general construction materials to the site (stone, steel and concrete) as well as the delivery of large oversize components, such as turbine blades and tower sections. Section 14.1.2.4 also outlines that they may be reopened on a temporary basis during the lifetime of the development for the delivery of abnormal loads, including the replacement of turbine component parts, if required.

As set out in Section 14.1.10.2 of the EIAR it is forecast that the impacts on the N62 during the construction phase will be temporary and slight, with the abnormal sized loads delivered at night.

All abnormal load deliveries made to the site via these junctions will be accompanied by an escort from An Garda Síochána. These proposed junctions on the N62 will be closed at all other times by means of fencing and will not be used for the purpose of amenity trips or maintenance trips, which are provided for via the proposed junction on the R357 and the existing access to the Briquette Factory on the N62.

It is noted that TII do not object in principle to the temporary use of these junctions.

TII Observation 1.2 Proposals for N52 / N62 junction

TII note that there are two alternative solutions being proposed to accommodate abnormally sized loads at this junction, one involving a local bypass of the junction proposed as part of the subject development, and the other alterations to the existing junction as part of planning application reference number 19/404. The observation states;

“TII considers that this element of the development proposal, combined with the cumulative impact of other permitted development under planning ref 19/404, requires further detailed consideration in the interest of road safety, to avoid the creation of a traffic hazard and adherence to the provisions of official policy. Given the nature of the proposals, TII considers that resolution of this matter should be addressed prior to any decision on the subject strategic infrastructure development application.

It is acknowledged that there are two alternative proposals for accommodation of abnormally sized loads at this location, one as part of the subject development (a local bypass of the existing N62/N52 junction) and one as part of an additional development proposal under planning reference 19/404 (a local widening of the existing junction).

Notwithstanding the proposed works at the junction of the N52 / N62 (known as Kennedy's Cross) the applicant is open to engaging in a co-ordinated approach with the Local Authority and any other developers in relation to the finalised works should the proposed development be consented.

As set out in Section 14.1.2.4 of the EIAR, the use of the temporary local bypass at this location will be limited to the delivery of the abnormally sized vehicles only and these deliveries will be accompanied by a Garda escort in the interests of health and safety. Therefore, the proposed temporary bypass will not create a traffic hazard. In addition, Section 4.9.2 of the EIAR, together with Figure 4.26 and information provided in Appendix 4.1, sets out an overview of the proposed accommodation works at this location, which include the provision of gates that will be locked between scheduled turbine deliveries.

Following the completion of the construction phase of the proposed development the gates will remain in-situ. The temporary turbine delivery access road will be closed, covered with a layer of topsoil and reseeded. It would only be used again in the event that an oversized delivery was required for wind turbine maintenance purposes.

TII Observation 1.3 Road Safety Audit

It is noted by TII that a Road Safety Audit has not been undertaken to date in relation to the temporary proposals on the N52 and N62 for the duration of the construction phase of the proposed development. The developer commits to undertaking all stages of the Road Safety Audit process in accordance with TII Guidelines (set out in Publication reference GE-STY-01024, December 2017) prior to the construction of the proposed development, as has been standard practice on similar developments to date,

TII Observation 2.1 Proposed Turbine Haul Route M4 / M6 / N52 / N62

It is noted by TII that the haul route utilises the above roads in the responsibility of various Local Authorities and, in relation to the M4 and M6, private maintenance and PPP companies. TII recommend that the applicant consult with the relevant authorities and private companies with respect to works that affect roads and junction on the national road network in terms of operational requirements, including scheduling of deliveries and the implementation of temporary works, including reinstatement works, required at junctions on the national road network. TII require that all works must be undertaken in accordance with current standards and subjected to Road Safety Audits and that all relevant approvals, consents, agreements and licenses should also be in place prior to construction.

The applicant agrees to fully engage with the various local authorities and other relevant bodies in order to agree all aspects raised by TII under Point 2.1 of their submission, including the implementation of the temporary works required on the haul route (including the M4 / M6 / N52 and N62) and to ensure a safe environment for all road users during the implementation of the measures, during the delivery of the abnormally sized vehicles, and during reinstatement works.

It is agreed that all mitigation measures set out in Section 14.1.10.6 of the EIAR will be implemented and adhered to.

TII Observation 2.2 Existing National Road Structures

This point is in relation to the requirement for a structural assessment on the haul route for any loads where the weight falls outside the limits allowed by the Road Traffic (Construction Equipment & Use of Vehicles) Regulations 2003.

As stated in Section 14.1.1.1 of the EIAR, while there will be abnormally sized loads associated with the delivery of the turbine plant components, there will be no abnormal axle loads. This will be a requirement that the haulage company will comply with. It is therefore considered that the assessments requested under point 2.2 should not be applicable.

TII Observation 2.3 Proposed Structures on the National Road Network

TII require that the proposed underpass and associated barriers are designed in accordance with TII guidelines (DN-STR-03001 and DN-REQ-03034 respectively) and that the design gains Technical Acceptance status from TII.

In addition TII request that the applicant and planning authority address the issues in relation to a financial bond to ensure satisfactory completion of the works, and also request that a monitoring and inspection regime for the future management and maintenance of the underpass is agreed and implemented.

The applicant will obtain Technical Acceptance from TII for the detailed design of the proposed underpass, in accordance with the requirements of TII Publications DN-STR-03001, prior to the construction of the proposed wind farm development. Road safety barriers will be included in the detailed design of the of the proposed underpass in accordance with TII Publication DN-REQ-0304 and all works involved in the construction of the proposed underpass will be carried out in accordance with the requirements of TII Publications CC-SCD-02501 to CC-SCD-02503 (Series 2500 Special Structures – Access Underpass).

TII Observation 2.4 Grid connection proposals

The Applicant will consult with Offaly County Council well in advance of construction with regards the detailed design of the proposal including g the electricity cabling which will cross the N62 and, through the Council, provide TII with all relevant information.



APPENDIX 4

CYRRUS- AVIATION ASSESSMENT

Aviation Assessment

Derrinlough Wind Farm

Bord na Mona Powergen

25 August 2020

CL-5517-RPT-002 V1.1

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Executive Summary

Bord na Mona Powergen Ltd requires aviation technical expertise to respond to a Request for Further Information from An Bord Pleanála for the proposed Derrinlough Wind Farm. The Irish Aviation Authority had queried whether the proposed Wind Farm has potential to impact the flight inspection orbit for the Wolftrap Distance Measuring Equipment (DME). The DME is an aeronautical navigational aid providing airborne aircraft with distance measuring capability. As such the DME requires regular flight inspections to ensure it maintains its integrity.

The findings of this assessment indicate that:

- The Area Minimum Altitude (AMA), in the vicinity of the proposed wind farm, is 2,700 feet. The highest turbine within the wind farm does not impact the existing AMA.
- The Vertical and Horizontal requirements for conducting a flight calibration of a DME provide more than sufficient vertical separation from the highest turbine.

As a result, the proposed Derrinlough Wind Farm will not impact the flight calibration requirements for the Wolftrap DME.

Abbreviations

agl	above ground level
AMA	Area Minimum Altitude
amsl	above mean sea level
DME	Distance Measuring Equipment
FCSL	Flight Calibration Services Limited
ft	Feet
IAA	Irish Aviation Authority
ICAO	International Civil Aviation Organisation
m	meters
NAVAIDS	Navigational Aids
NM	Nautical Miles
VMC	Visual Meteorological Conditions

References

- [1] ICAO Doc8071, Manual on Testing of Radio Navigational Aids, Vol I – Testing of Ground-based Radio Navigational Systems, Fifth Edition, 2018.
- [2] VFR Route Chart provided by SkyVector®, www.skyvector.com/about.

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1. Introduction

1.1. General

1.1.1. Bord na Mona Powergen Ltd requires aviation technical expertise to respond to a Request for Further Information from An Bord Pleanála for the proposed Derrinlough Wind Farm. The Irish Aviation Authority (IAA) had queried whether the proposed Wind Farm has potential to impact the flight inspection orbit for the Wolftrap Distance Measuring Equipment (DME). The DME is an aeronautical navigational aid providing airborne aircraft with distance measuring capability. As such the DME requires regular flight inspections to ensure it maintains its integrity.

1.1.2. Cyrrus is experienced in conducting Technical Assessments on NAVAIDs, including DME facilities. Our staff are experienced at conducting requisite analysis and have previous experience in conducting flight inspections and calibrations of NAVAIDs and Radar systems.

1.2. Background

1.2.1. Following a review of the IAA submission to An Bord Pleanála, Bord na Móna Powergen Ltd consulted with the IAA to establish the extent of their query and to determine the level of assessment required. IAA advised that they should liaise directly with their service provider FCSL. Cyrrus was engaged by Bord na Móna Powergen Ltd to review the requirements and provide a summary report.

1.2.2. Flight Calibration Services Limited (FCSL), a company based in the United Kingdom, provides flight calibration services to Ireland and conducts these services for the Wolftrap DME on behalf of the IAA.

1.2.3. Cyrrus contacted FCSL and it was confirmed that calibration flights are conducted at safe altitudes, defined as Minimum Safe Altitudes (MSA) or in the en-route environment as Area Minimum Altitudes (AMA), during Visual Meteorological Conditions (VMC).

1.2.4. As an initial assessment to determine whether there is any impact to the flight calibration of the DME, Cyrrus conducted an evaluation of the site using the defined methodology for such flights.

2. Assessment

2.1. General

- 2.1.1. Cyrrus conducted internal research on the requirements for testing ground-based radio navigational aids.
- 2.1.2. The International Civil Aviation Organisation (ICAO) has published the recommended practices under Doc 8071, Manual on Testing of Radio Navigational Aids, Vol I – Testing of Ground-based Radio Navigation Systems. Chapter 3 deals specifically with DME.
- 2.1.3. Cyrrus have reviewed the proposed Derrinlough Wind Farm site in relation to the Wolftrap DME, the airspace surrounding the wind farm and the flight procedures related to the calibration requirements for a DME.

2.2. Site Details

- 2.2.1. Figure 1 provides an overview of the wind farm site in relation to the DME.

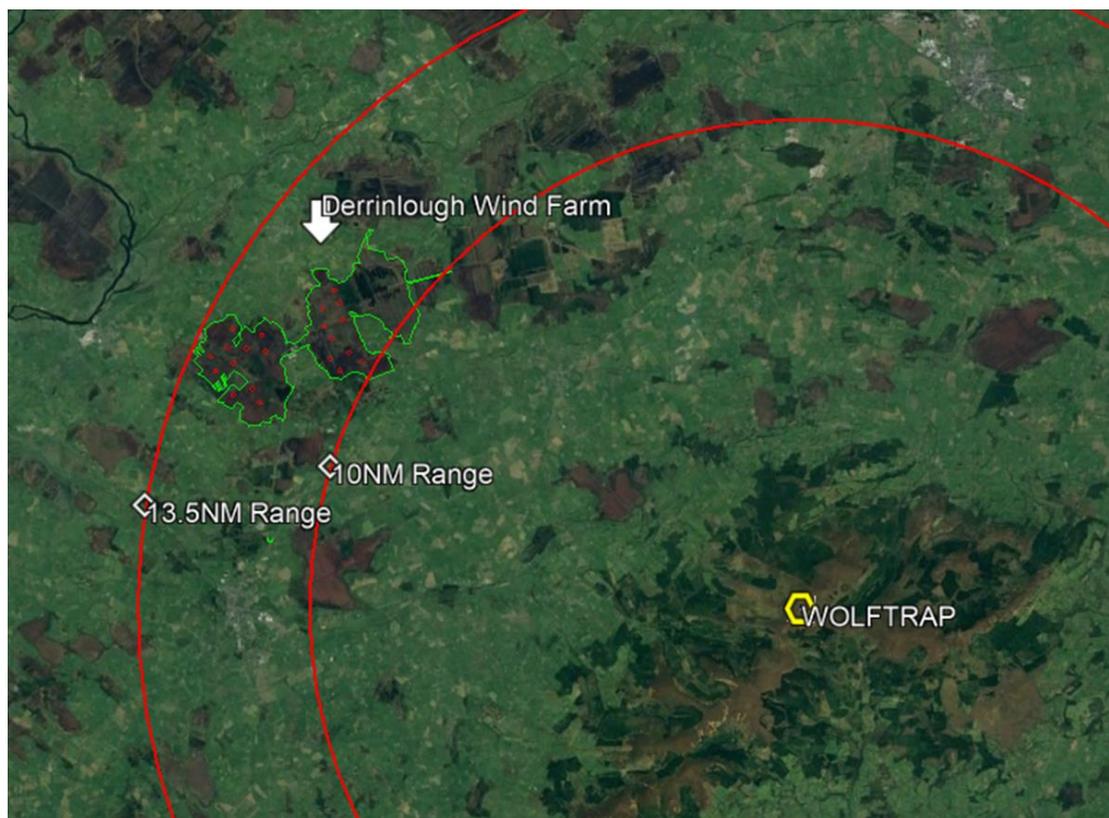


Image © 2020 CNES/Airbus, Maxar Technologies

Figure 1: The proposed Derrinlough Wind Farm is sited between 10 NM and 13.5 NM west of the Wolftrap DME.

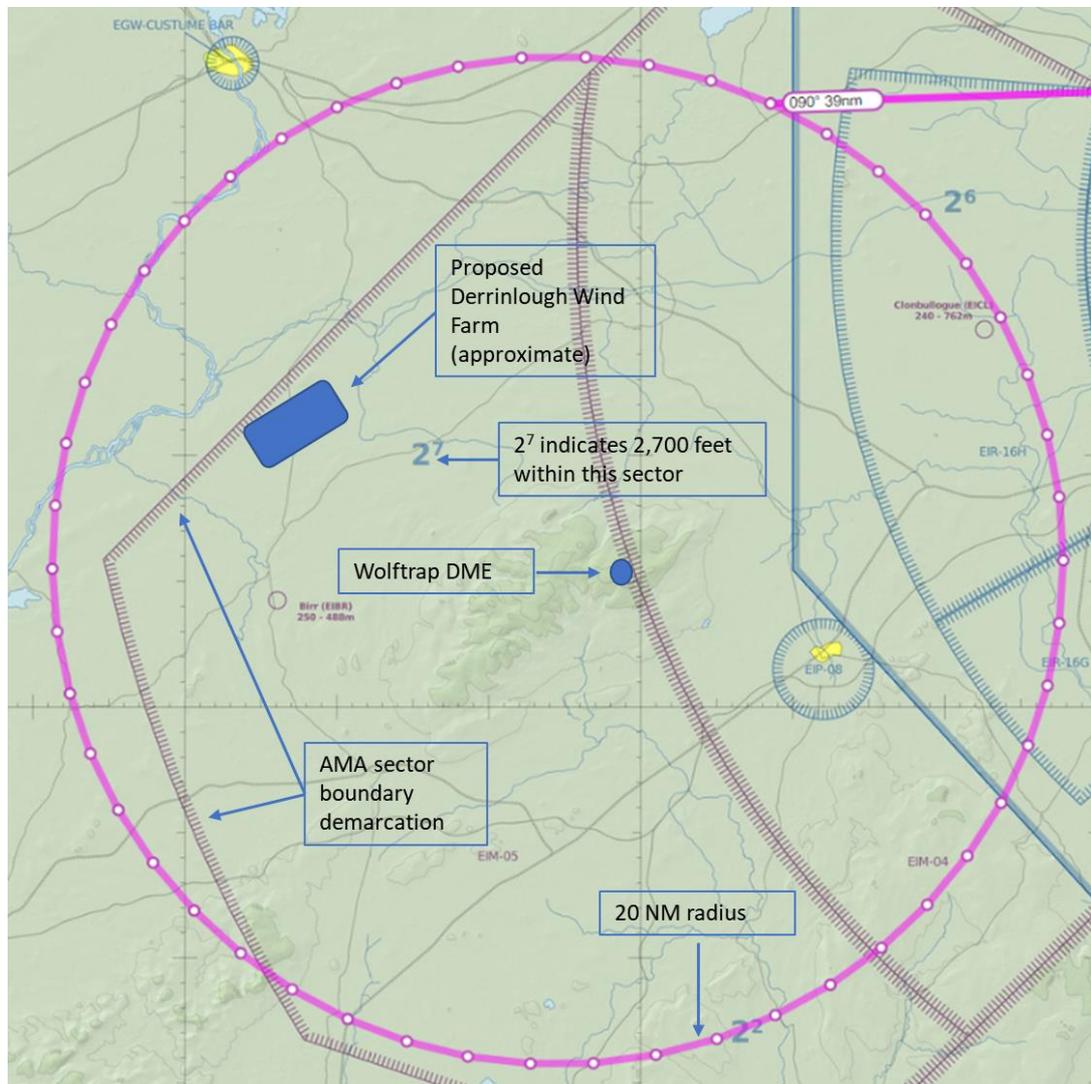
- 2.2.1. The turbines will have a tip height of 185 m above the top of the foundation. The top of foundation elevations for each turbine are outlined in Chapter 4, Table 4.1 of the submitted EIAR. The Table outlines that the highest top of foundation level will be circa 58 m above mean sea level (amsl). The assessment has therefore accounted for a worst-case scenario in

excess of 58 m per turbine. On this basis, the maximum potential height of the development will be 243 m (797.23 feet (ft)) amsl.

2.2.2. For the purpose of this assessment a worst-case scenario was established by setting all turbine sites to the maximum height rounded up to 800 ft. The additional rounded up figure of 800 ft (58.84 m) more than adequately covers the changes in terrain, the turbines and the foundation level.

2.3. Airspace

2.3.1. Figure 2 below provides a 20 NM radius (indicated in pink circle), centred on the DME, and indicates the AMA within the area. In the proposed site of the Derrinlough Wind Farm, the AMA is declared at 2,700 ft amsl.



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Figure 2: The airspace surrounding the Wolftrap DME site provides minimum safe altitudes for aircraft flying in the area known as Area Minimum Altitudes (AMA).

2.3.2. The AMA of 2,700 ft is determined by the highest obstacle in the area with an added buffer of 1,000 ft to ensure the safe operation of aircraft in that area. The turbines located with the

proposed Derrinlough Wind Farm do not influence the AMA as they will not be higher than the existing obstacle within the defined area. An AMA calculated against the highest turbine (assuming the turbine is the dominant obstacle) would result in an altitude of 1,800 ft.

- 2.3.3. A flight calibration flight conducted at an altitude of 2,700 ft will not be impacted by the proposed Derrinlough Wind Farm.

2.4. DME Flight Test Procedures

- 2.4.1. Doc 8071, Chapter 3, paragraphs 3.3.5 through to 3.3.8 details the horizontal and vertical coverage requirements of a DME Flight Test Procedure. An extract for each coverage element is provided below:

- 2.4.2. Flight Test Procedures – Horizontal Coverage

“3.3.6 The aircraft is flown in a circular track with a radius depending on the service volume of the associated facility around the ground station antenna at an altitude corresponding to an angle of elevation of approximately 0.5° to 3.6° above the antenna site, or 300 m (1 000 ft) above intervening terrain, whichever is higher. If there is no associated facility, the orbit may be made at any radius greater than 18.5 km (10 NM).”

- 2.4.3. Assuming a minimum calibration criterion for a flight conducted at 10 NM and at a minimum angle of elevation of 0.5° the resultant test pattern will be flown at 500 ft above the DME antennae.

- 2.4.4. In the event that this flight is either conducted at a further range from the DME or at a higher angle of elevation, then the resultant altitude above the DME antennae would be higher.

- 2.4.5. The Wolftrap DME is located on high ground. Figure 3 provides the elevation profile of the DME site relative to the proposed Derrinlough Wind Farm site. Assuming a calibration orbit flight at 10 NM radius and a minimum angle of elevation of 0.5°, the minimum height between the highest turbine and the lowest altitude to conduct the calibration flight is 1,278 ft.

- 2.4.6. The minimum altitude clearance requirement is 1,000 ft. As a result, the horizontal coverage flight test calibration for Wolftrap DME is not impacted.

- 2.4.7. In addition, the minimum flight calibration altitude at 0.5° is below the AMA (see Figure 2). Therefore, there is an additional buffer of 622 ft as the flight calibration should not descend below 2,700 ft. ICAO does permit a higher angle of elevation of up to 3.6° above the DME antennae height and therefore allowing the flight calibration to be conducted at 2,700 ft.

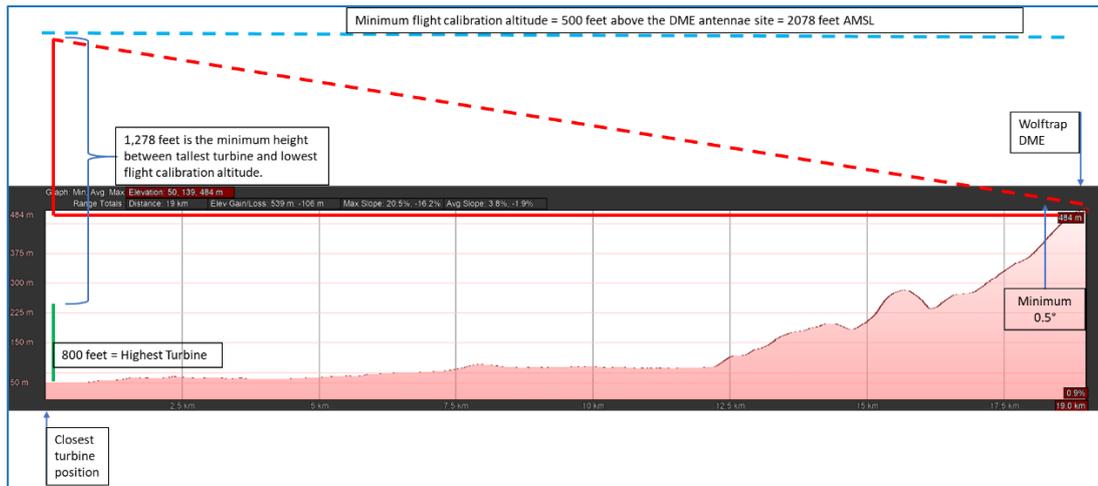


Figure 3: Elevation of the proposed Wind Farm to the DME

2.4.8. Flight Test Procedures – Vertical Coverage

“3.3.7 The following flight inspection may be made to evaluate the lobing pattern of a DME transponder. The flight test aircraft is used to perform a horizontal flight at approximately 1 500 m (5 000 ft) following a radial. The flight inspector records power density from the flight inspection system. Airspace procedures based on the use of DME are evaluated at the minimum flight altitude. The flight inspector verifies that the distance information is properly available in the aircraft at ATC reporting points, along air routes.”

2.4.9. As the minimum altitude for this test is stated at 5,000 ft the vertical coverage flight test calibration for Wolftrap DME is not impacted.

2.5. Conclusion

2.5.1. The initial consultation with FCSL confirmed that flight calibrations were conducted at safe altitudes (AMA) under VMC. The purpose of conducting flights under these conditions is to ensure that flights are conducted safely above the highest notified obstacles and terrain within the defined area in metrological conditions defined with good visibility.

2.5.2. The proposed site wind turbines heights have been established at a height of 800 feet agl.

2.5.3. The determination of an AMA requires flights to be conducted at a minimum safe altitude of 1,000 feet above the highest notified obstacle or terrain. The AMA in the region of the proposed Derrinlough Wind Farm is 2,700 ft. If the proposed wind turbines were the highest obstacles in that region, the AMA could be reduced to 1,800 ft. As a result, the published AMA provides an additional 900 ft buffer in that region.

2.5.4. An assessment of the minimum altitude required to conduct a DME Flight Test Procedure, as per ICAO Standards and Recommended Practices, determines that the required altitude, in the absence of a published AMA, would provide more than the required 1,000 ft above an obstacle.

2.5.5. As a result, the proposed Derrinlough Wind Farm will not impact the flight calibration requirements for the Wolftrap DME.



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APPENDIX 5

DRAFT REHABILITATION PLANS

BORD NA MÓNA
Naturally Driven

Draft Rehabilitation Plan

2017

Drinagh Bog

*This rehabilitation plan is developed under Condition 10 of IPC Licence Ref. 503 (April 2017). It outlines measures that will provide for stabilisation of the bog area upon cessation of peat production and decommissioning of the site. **Rehabilitation** generally comprises natural colonisation with or without targeted management. **After-use** involves the development of cutaway peatland into other land-uses. Rehabilitation can be incorporated into after-use development (e.g. Mountlucas Windfarm). Bord na Móna has focused after-use development of cutaway bogs into forestry, agriculture, grassland, amenity and biodiversity, (Lough Boora Discovery Park) and commercial industrial development (Drehid Resource Recovery, renewable energy – Mountlucas Windfarm). This rehabilitation plan **does not** outline future after-use development for Drinagh Bog. The general after-use strategy of Bord na Móna is outlined in the Bord na Móna Strategic Framework for Future-Use of Cutaway Bogs 2011. Any consideration of future after-uses for Drinagh Bog such as amenity, developments or mixed uses will be conducted following the relevant planning guidelines and consultation with relevant authorities and will be considered within the framework of this rehabilitation plan.*

Rehabilitation of industrial peatlands is a key objective of the Bord na Móna Biodiversity Action Plan 2016-2021. This action plan outlines the main objectives and actions around biodiversity on Bord na Móna lands.

Draft Rehabilitation Plan			
Bog Name:	<u>Drinagh</u>	Area (ha):	1389 ha
Works Name:	Boora	County:	Offaly
Author(s):	BnM Ecology Team	Survey/ Monitoring Date(s):	22-24/09/2009
Maps:	Habitats Map, Potential Future Habitats Map, Landuse Map		
Review status: Reviewed Spring 2017.			
<p>Background</p> <p>Bord na Móna operates under IPC Licence issued and administered by the EPA to extract peat within the Boora bog group (Ref. 500 SB). As part of Condition 10.2 of this license, a rehabilitation plan must be prepared for permanent rehabilitation of the boglands within the licensed area. Drinagh bog is part of the Boora bog group. This plan is a specific rehabilitation plan for Drinagh bog and outlines:</p> <ul style="list-style-type: none"> • criteria which define the successful rehabilitation, • consultation to date with interested parties, • main issues for rehabilitation, • proposed rehabilitation programme, • proposed timeframe to implement this programme, and, • associated aftercare, maintenance and monitoring. <p>The basis for the proposed approaches and implementation is the experience gained in 40 years of research on the after-use development and rehabilitation of the Bord na Móna cutaway bogs (see reference documents).</p>			
<p>Scope</p> <p>The scope of the rehabilitation plan seeks to address issues of concern as identified by Bord na Móna and the consultees. The key issues identified are:</p> <ul style="list-style-type: none"> • Categorisation of the habitats developing on Drinagh Bog (outlined in Appendix I) • Environmental stabilisation of the former peat production areas • Maintenance of drainage and silt control through the site • Remediation of water courses where necessary (<i>decommissioning</i>) • The timeframe for bog rehabilitation/restoration • The impact of any other proposed development on the site and rehabilitation plan 			
<p>List of consultees to date</p> <ul style="list-style-type: none"> • Open consultation with range of stakeholders at annual BAP review days 2010-2017. • Regular consultation with BWI re winter waterbird surveys at Drinagh and the breeding wader wetland trial carried out at Drinagh. • Walk in 03/2016 as part of the 2nd Bord na Mona Biodiversity Action Plan launch. • This rehabilitation plan remains a draft plan until formal consultation is carried out with relevant stakeholders. 			
<p>Site description</p> <p>Drinagh Bog is located to the east of Derrinlough Briquette Factory near Clocghan. It is largely divided into 4</p>			

main sections by the topography of the site and a railway on an embankment that crosses from the west to the east side of the site. The western section is separated from the eastern section by a ridge of high ground that partially divides the site (Mannin's Hill) and then by a block of conifer plantation that has been planted on the cutaway bog on this higher ground. This plantation is managed by Coillte (and is known as Drinagh West forest).

North-east section (zoned for biodiversity)

This area is dominated by the large biodiversity area north of the railway that contains a substantial portion of open water. The open water is divided into two main sections by a railway on an embankment. This area is developing into a wetland complex and there is a diverse mosaic of wetland habitats (several Poor fen vegetation communities) developing around the margins of the lakes, particularly along the eastern side. The lakes are shallow and there are frequent patches of emergent Common Reed and Bulrush developing in some sections as well as along the margins with Common Reed. The lakes also contain frequent indicators of the old peat production in this area with long linear islands or ridges of remnant peat vegetated with various communities. Some of the drier sections are developing Birch scrub (emergent, open and closed types). The remainder of the biodiversity area contains emerging Birch scrub and Poor fen vegetation of which Bog Cotton-dominated and Soft Rush dominated communities are the most prominent vegetation types. The wetland complex is enclosed along its northern boundary by a ridge that was developed along a natural stream (now significantly modified with sections piped along its length).

The area north of this ridge is classified as production related cutaway. This area is now quite vegetated with various stages of vegetation colonisation. The production-related area has primarily developed emergent and open Birch scrub with a Soft Rush dominated ground cover. The active production area is much more open and contains more frequent bare peat and much less scrub. There is a small area of cutover bog (inside the BnM boundary) in the north-east corner that is being cut by private individuals and is managed as private land.

South-east section

The south-east section is a core trial area to manage cutaway bog specifically for breeding waders (described in appended report Appendix II). It essentially comprises a mosaic of emerging and open Birch scrub and a Soft Rush-dominated pioneer community. Rehabilitation works commenced in 2010 to clear scrub and create more open water to enhance the site for wader chicks. There is also some bare peat in this area. There is a small area of Birch woodland developed along the west boundary of this area as well as a small area of remnant raised bog (PB1). This patch of high bog has a surprisingly good cover of *Sphagnum* moss in places.

North-west section

This section is mainly classified as a production-related cutaway with a small area of active production bog (devoid of vegetation) located at the northern end. The conifer plantation is located along the east side of this area. The main habitats in the production-related section are emerging birch scrub and a Soft-Rush dominated pioneer Poor Fen community. Other associated habitats include a Bog Cotton-dominated pioneer poor fen community and a minor amount of Common reed stands. Reedmace is also present but is relatively uncommon and confined to drains. There is a very minor area of shallow open water present. This area also contains a series of mineral ridges and mounds where glacial sub-soil is exposed in places. These mounds are quite dry and developing some other habitats such as emerging Birch scrub (eBir), disturbed vegetation dominated by Coltsfoot (DisCF) and some calcareous grassland (gCal), as well as bare sub-soil.

South-west section

Much of this section of the site south of the railway is primarily an active production area with bare peat that is devoid of vegetation. Smaller sections classified as production-related are recolonising with mainly emerging and open Birch scrub and Soft Rush-dominated Poor fen vegetation. There are smaller amounts of Bog Cotton-dominated Poor fen vegetation also present associated with the other vegetation communities. Small mineral mounds and ridges are also scattered through this area. These areas are also developing birch scrub and usually have some dry calcareous grassland and disturbed vegetation associated with them. Several mounds also have a small amount of dry heath dominated by Ling Heather (dHeath) developing on them. A small area of Dry Heath is also developing on somewhat higher ground near the eastern boundary of this section. There is also a remnant patch of raised bog (PB1) located along the west boundary (inside the BnM boundary) that is being actively cut from the outside by private individuals. This area is managed as private land. Of note is a drain along this high bog but at the level of the cutaway that is infilled with *Sphagnum* moss.

See Appendix I for more detail on site, habitats and local features

Peat production programme, land-use and proposed developments

- Milled peat production is anticipated to continue at Drinagh into the near future depending on future milled peat resource requirements.
- Drinagh has been zoned during the BnM Decision Framework Management process for biodiversity, amenity and eco-tourism and forestry.

Other considerations

- **Cessation of peat production.** Bord na Móna announced in 2015 that peat production for the generation of electricity was to cease by 2030 (http://www.bordnamona.ie/wp-content/uploads/2016/01/Sustainability_Statement_2015.pdf). Industrial peat production (with regard to all appropriate regulations) to supply other customers or sectors (e.g. horticulture) may continue after this date.
- **Peat extraction regulations.** New regulations for the extraction of peat are currently being drafted by government. Peat extraction on sites greater than 30 ha will be regulated through IPC licencing administered by the EPA. This draft rehabilitation plan has been prepared under the conditions of the original IPC licence.
- **Bord na Móna railway.** This bog railway is an active link to Derrinlough Brickette Factory and West Offaly Power (WOP). Decommissioning of this infrastructure is dependent on the general cessation of industrial peat production for supply of peat to WOP.
- **Coillte Forestry.** Several conifer plantations were established on this site in the 1980's by Coillte, with the site being leased by Coillte. Stands of mainly Lodgepole Pine and Sitka Spruce were planted on the site. Mixed broadleaves with Oak and Birch were also planted on one section of the site. No management practices such as thinning or weed control has been carried out on the site since planting took place.
- **Re-wetting potential.** This site has gravity based drainage. Bogs with pumped drainage are more likely to develop wetland habitats when industrial peat production ceases.
- Drinagh is currently the core site for a joint project with BirdWatch Ireland to develop management tools for breeding waders on cutaway bog areas.

Key biodiversity features of interest (2017)

- Drinagh is the core area in a project to develop wetland habitats specifically for breeding waders. The project, in partnership with BWI, is ongoing since 2010 with significant success in raising the numbers of breeding waders on the site since it began. Several pairs of Lapwing (Red-listed), Redshank (Red-listed) and Ringed Plover have bred on the site. Other red-listed ground-nesting species such as Skylark and Meadow Pipit breed on the site. Winter use of the site by birds has also been enhanced. Whooper Swans and Greenland White-fronted Geese occasionally use the site in winter as do Hen Harrier and Merlin.
- Drinagh has several features of interest, the main one being the large wetland area with open water that has been created in the north-east section of the site (in the area designated for biodiversity on the land-use map). This open water attracts some waterbirds and the surrounding wetland habitats are quite well-developed and naturalised in places. A diverse mosaic of wetland plant communities is present around the margins of the open water and some large areas of Reedbeds (Reedmace) and scrub/woodland is also developing. This area had previously been zoned for biodiversity.

Current ecological rating (A-E; following from NRA Guidelines)

The majority of the site can be rated as having a **high ecological value (C) (County level)**. Bare peat and other intensively managed areas are assessed as having a low local ecological value (although some bare peat areas attract breeding waders).

The active peat production areas are considered to have lower ecological value – **E**, although in time these areas will probably become of higher value given its context.

Criteria defining successful rehabilitation

- The main criteria are stabilisation of the former peat production area and mitigation of potential silt run-off.

Existing cutaway: significant areas of Drinagh are out of production and classed as cutaway. The re-vegetated areas of cutaway contain pioneer habitats such as dry heath, Birch scrub, poor fen and scrub as well as significant wetland areas with open water (temporary and permanent). Coillte have leased a section of the site and this area has been planted with conifers. These areas are stabilising rapidly through natural processes.

Production related cutaway: this covers sections of the site that have not been used for peat production for a period of time but may be brought back into production in the future. Some sections within Drinagh have been out of production for a number of years and have re-vegetated, if these areas are brought back into production they will then be treated for active peat production areas (see below).

Active peat production: large sections of Drinagh West are currently in milled peat production and are expected to remain in production for the foreseeable future. It is somewhat more difficult to predict future habitats and suggest possible management options, as the bog landscape has the capacity to significantly change as production removes more and more peat. The final landscape will be determined by production decisions (i.e. how much peat is removed) and by the underlying topography, drainage etc. Prolonged production of milled peat is likely to change the landscape of this site significantly. Natural colonisation is likely to form the basis for the stabilisation of the current production area when it comes out of production. Some sections of production-related cutaway, where underlying glacial sub-soil mounds and ridges are being exposed, were already re-vegetating with typical pioneer cutaway habitats. Localised drain blocking would aid the formation of wetland communities in some natural basins. The extent of wetlands habitat could be increased by targeted management, which would enhance the biodiversity of the whole site.

However, the progressive natural colonisation and emergent wetland communities indicate that the site will be a mosaic of wetland and scrub habitats.

Remnant sections of raised bog: the potential to restore *active* raised bog in the small areas of undeveloped raised bog located along the boundaries of Drinagh is poor, due to their relatively small size along with the issue of domestic turf cutting in many of these areas.

Coillte: A large area of the site has already been developed for forestry by Coillte. Management within these areas can be considered as ongoing maintenance with routine operations related to timber production and/or development of the conifer plantations as biodiversity areas. Issues of peat stabilisation and potential silt run-off will have to be addressed during forestry operations on the site by Coillte.

- At this point in time, 50% of the site is expected to develop as Birch woodland, conifer forestry and scrub, while 42% has potential to develop as mosaic of wetland habitats.
- Remediation of silt ponds and watercourses where required

Proposed Rehabilitation programme

Completed

- Wetland area created in 1990s over north east section.
- Bord na Móna-BirdWatch Ireland project commenced in 2010, covers approx 31ha.
- Coillte have planted a significant proportion of the site with conifers.
- The site is part of the Lough Boora Discovery Park.
- Approximately 60% of the site is now cutaway. Natural colonisation of the cutaway coupled with targeted rehabilitation management has been quite effective so far.

Short-term (0-2 years)

- The most sustainable management option for un-vegetated areas within the site is to allow continued natural re-colonisation of the site.
- Significant bare peat areas through the site and the progress of natural re-colonisation of the cutaway areas will be monitored.

Short-term (0-2 years) (when production ceases)

- All stock-piles should be removed from the site as part of the winding down of peat production operations. Any remaining or old stockpiles should be bulldozed and levelled as part of the rehabilitation/decommissioning process.
- Assessment of re-wetting scenarios and site drainage to be carried out to assess the potential to enhance wetland development in Drinagh bog.
- While natural colonisation is expected to proceed almost immediately once peat production ceases, there will be a determination of extent of bare peat and selection of best measures to accelerate re-vegetation (if necessary).
- Re-vegetation measures will be carried out as soon as possible post peat production. These will be monitored to determine effectiveness and success.
- Silt-ponds will be monitored during this period and there will be continued maintenance and cleaning (if required) to prevent silt run-off from the site during the rehabilitation phase.
- At this point a decision should be made as to the future management of the site for breeding waders.
- The potential to enhance the woodlands will be re-assessed at this stage.

Medium-term

- Targeted active management such as seeding of a nursery crop or use of fertiliser to help promote natural re-colonisation (see Drumman Rehabilitation Trials) will be carried out, if natural re-colonisation of significant bare peat areas within the active production areas has not progressed satisfactorily at this stage.
- The effect of any targeted active management will be monitored including rewetting, woodland management and revegetation measures.

Long-term

- This phase will follow on from cessation of peat production in adjacent bogs.
- Monitoring of the site to ensure stabilisation and complete re-vegetation.
- Decommissioning of silt-ponds will be assessed.
- Evaluate success of short-term rehabilitation measures outlined above and enhance where necessary (to be determined by selected short-term management above).
- Reporting to the EPA will continue until the IPC License is surrendered.
- Decommission the BnM railway on site.

Timeframe for rehabilitation

Short-term (2017-2019)

- Monitor re-vegetation of the cutaway area and assess requirements of targeted active management of the bare peat areas using fertiliser/nursery crop treatments.
- On-going monitoring of the overall site and BNM-BWI project area.

Long-term

- This phase will follow on from cessation of peat production in adjacent bogs.
- Continued monitoring and planning will take place to assess further rehabilitation requirements at Drinagh taking account of ongoing peat-production on the site and new areas of cutaway, including

potential for wetland development along with ongoing natural colonisation of the production areas (when production ceases).

- Reporting to the EPA will continue until the IPC License is surrendered.

After-care and maintenance

- There will be annual assessments of the site to determine the progress of the rehabilitation work and requirements for further enhancement measures.
- It is not expected that there will be any requirement for after-care and maintenance other than ecological monitoring.
- Where other uses are proposed for the site, these will be assessed by Bord na Móna in consultation with interested parties. Other after-uses can be proposed for licensed areas and must go through the appropriate assessment and planning procedures.

Potential future natural habitats on the site

This section attempts to predict the development of natural habitats on the site, assuming current land-use and known after-use plans for the cutaway (development etc). This prediction is based on research and methods used to predict the natural vegetation of Ireland (Cross 2005).

- The large biodiversity area has potential to develop into a wetland complex with a significant area of open water (FL2-3, acid-mesotrophic lake) with fringing Reedbeds and other typical zoned wetland communities including Wet Willow-Alder-Ash woodland (WN6) (fen carr type woodland), wet grassland (GS4) and poor fen (PF2) vegetation. There are already some indicators on site of potential for Rich Fen development (*Schoenus nigricans*) but this is likely to be confined to small pockets affected by ground water.
- The majority of this site at present is likely to develop dry Birch-dominated woodland (WN7) in the medium to long-term after production. This woodland is likely to be a mosaic containing small patches of more open habitat with scrub (WS1), wet grassland (GS4) and poor fen vegetation (PF2), and small wetland complexes with Reedbeds (FS1) and open water (FL2). Small patches on the mineral mounds are likely to develop into dry heath (HH1) and calcareous grassland depending on the depth of remaining peat over the subsoil (calcareous grassland (GS1) more likely to develop on mounds with exposed sub-soil). Some of these areas (GS1) also have the potential to develop Hazel scrub and Ash woodland in the long-term (WN2).
- A large part of the SW section has potential to be developed into a wetland complex of a similar scale to the NE section with appropriate management. There is also potential to develop some smaller bodies of open water in other parts of the site with appropriate management.

Budget and costing

- It is anticipated that the majority of the rehabilitation at this site will be through natural re-colonisation. Some preliminary budgeting can be carried out assuming that up to 42% of the site will be developed as wetlands with some active management required blocking outfalls to enhance re-wetting. The allocated rehabilitation provision will be based on this estimate.

Appendix I. Ecological Report

Ecological Survey Report			
<p><i>Note: This report outlines an ecological survey of the bog. This report should not be taken as a management plan for the site as other land-uses may still be considered. Information within this report may inform the development of other land-uses and identify areas with particular biodiversity value.</i></p>			
Bog Name:	Drinagh	Area (ha):	1389ha
Works Name:	Boora	County:	Offaly
Recorder(s):	MMC & DF	Survey Date(s):	22-24/09/2009
<p>Habitats present (in order of dominance)</p> <p>The most common habitats present on the Drinagh site include:</p> <ul style="list-style-type: none"> Bare peat (BP), pioneer Poor Fen communities (pJeff, pEang, pTrig) and <i>Betula pubescens</i>-dominated scrub (eBir, oBir). A wetland complex has developed in the north-east section with a large area of open water and associated marginal and emergent habitats such as Poor fen communities (pRos, PEang), Birch scrub (eBir, oBir) and Tall Reedbed (pPhrag, pThy, pSch). (Codes refer to BnM habitat classification system. See Appendix II). A large block of conifer forestry (WD4) has been planted in one section of the bog (Mannins Hill). There are fragmented and minor patches of dry grassland (gCal,) and dry disturbed/pioneer communities (DisCF, DisWill) around the site that are associated with the dry mineral mounds. Some dry heath (dHeath) is also developing in one small area. The area around Derrinlough Briquette Factory can be mainly classified as built land (BL3). Habitats associated with this area include conifer plantation (WD4), scrub (WS1), disturbed vegetation (ED3), Dense Bracken (HD1), some grassland (GS1/GS2) and silt ponds (FL8). A railway crosses the site and this can also be classed as built along with some works areas with associated infrastructure (BL3). (Codes refer to Heritage Council habitat classification system, Fossitt 2000. See Appendix II). Other fringe habitats around the margins of the bog include Scrub (Birch dominated and Gorse dominated), Birch woodland (WN7) and Cutover Bog (active and abandoned). 			
<p>Description of site</p> <p>Drinagh Bog is located to the east of Derrinlough Briquette Factory near Clochan. It is largely divided into 4 main sections by the topography of the site and a railway on an embankment that crosses from the west to the east side of the site. The western section is separated from the eastern section by a ridge of high ground that partially divides the site (Mannin's Hill) and then by a block of conifer plantation that has been planted on the cutaway bog on this higher ground. This plantation is managed by Coillte (and is known as Drinagh West forest).</p> <p>North-east section (Biodiversity Area)</p> <p>This area is dominated by the large biodiversity area north of the railway that contains a substantial portion of open water. The open water is divided into two main sections by a railway on an embankment. This area is developing into a wetland complex and there is a diverse mosaic of wetland habitats (several Poor fen vegetation communities) developing around the margins of the lakes, particularly along the eastern side. The lakes are shallow and there are frequent patches of emergent Common Reed and Bulrush developing in some sections as well as along the margins with Common Reed. The lakes also contain frequent indicators of the old peat production in this area with long linear islands or ridges of remnant peat vegetated with various communities. Some of the drier sections are developing Birch scrub (emergent, open and closed types). The remainder of the biodiversity area contains emerging Birch scrub and Poor fen vegetation of which Bog Cotton-dominated and Soft Rush dominated communities are the most prominent vegetation types. The wetland complex is enclosed along its northern boundary by a ridge that was developed along a natural stream (now significantly modified with sections piped along its length).</p>			

The area north of this ridge is classified as active production or production related cutaway on the Land Use Maps 2009. This area is primarily bare peat with various stages of vegetation colonisation. The production-related area has primarily developed emergent and open Birch scrub with a Soft Rush dominated ground cover. The active production area is much more open and contains more frequent bare peat and much less scrub. There is a small area of cutover bog (inside the BnM boundary) in the north-east corner that is being cut by private individuals and is managed as private land.

South-east section

The south-east section is classified as cutaway on the Land Use Maps 2009. The south east section is primarily a mosaic of emerging and open Birch scrub and a Soft Rush-dominated pioneer community. There is also some bare peat in this area. There is a small area of Birch woodland developed along the west boundary of this area as well as a small area of remnant raised bog (PB1). This patch of high bog has a surprisingly good cover of *Sphagnum* moss in places.

North-west section

This section is mainly classified as a production-related cutaway with a small area of active production bog (devoid of vegetation) located at the northern end. The conifer plantation is located along the east side of this area. The main habitats in the production-related section are emerging birch scrub and a Soft-Rush dominated pioneer Poor Fen community. Other associated habitats include a Bog Cotton-dominated pioneer poor fen community and a minor amount of Common reed stands. Reedmace is also present but is relatively uncommon and confined to drains. There is a very minor area of shallow open water present. This area also contains a series of mineral ridges and mounds where glacial sub-soil is exposed in places. These mounds are quite dry and developing some other habitats such as emerging Birch scrub (eBir), disturbed vegetation dominated by Coltsfoot (DisCF) and some calcareous grassland (gCal), as well as bare sub-soil.

South-west section

This section of the site south of the railway is primarily an active production area with bare peat that is devoid of vegetation. A smaller block classified as production-related is recolonising with mainly emerging and open Birch scrub and Soft Rush-dominated Poor fen vegetation. There are smaller amounts of Bog Cotton-dominated Poor fen vegetation also present associated with the other vegetation communities. Small mineral mounds and ridges are also scattered through this area. These areas are also developing birch scrub and usually have some dry calcareous grassland and disturbed vegetation associated with them. Several mounds also have a small amount of dry heath dominated by Ling Heather (dHeath) developing on them. A small area of Dry Heath is also developing on somewhat higher ground near the eastern boundary of this section. There is also a remnant patch of raised bog (PB1) located along the west boundary (inside the BnM boundary) that is being actively cut from the outside by private individuals. This area is managed as private land. Of note is a drain along this high bog but at the level of the cutaway that is infilled with *Sphagnum* moss.

Derrinlough works area

This area is associated with the Briquette Factory and is dominated by built habitats (BL3). There is also some mature conifer plantation (WD4) planted around the works area. The section to the east of the works area contains a mosaic of scrub, Bracken, Bramble and disturbed vegetation that has developed on ridges built along silt ponds. The Little River crosses this area and has more diverse emergent and semi-aquatic vegetation, although the channel and riparian zone has been modified in the past.

Designated areas on site (cSAC, NHA, pNHA, SPA other)

The site is adjacent to Lough Coura pNHA (NPWS site code 000909) along part of the south-west boundary and there is very minor overlap (~0.2 ha) between the designated area and the BnM property containing typical fringing scrub habitats that are found around the site). Lough Coura is an old infilled lake containing wet grassland and some rich fen habitat. Some of the old lake and surrounding area has been planted with conifer plantation. Several rare species of conservation importance have been recorded at this site and it is also noted for its archaeological prominence.

Adjacent habitats and land-use

Habitats and land-use around the site include cutover bog with active peat-cutting (PB4) at several locations, the use of improved grassland (GA1) for grazing livestock and growing fodder, remnant patches of raised bog (PB1),

and old cutover bog (PB4) around the margins of the site that have developed a range of habitats including scrub (WS1) and some Birch woodland (WN7).

Watercourses (major water features on/off site)

The drainage system of the west side is linked to a series of silt ponds near the back of the Derrinlough Factory. These silt ponds have some semi-natural features and some aquatic vegetation.

- The Silver River flows along the eastern side of the site. Several streams and drains including the Black Brook in the east side flow into this river, which flows north and is part of the River Brosna catchment. The Black Brook was a natural stream that has had its channel modified in the past and used to drain from the SE corner of the wetland complex. This channel is still present. A second drainage channel drains the northern section of this area. An outflow from the open water complex into a large drain connected to this network is present in the north-east section.
- The Little River flows close to the west side of the site and along the back of the Derrinlough factory. This river drains the Lough Coura complex and flows north linking to the River Brosna. A former stream flowed off the bog into this river near the site of the silt ponds close to the factory. Parts of this channel are still visible.

The OSI second edition 6 inch map indicates several small lakes and pools of open water that were formerly present in the south-east corner of the SW section (Lough Laweclawn).

Fauna biodiversity

Several birds were noted around the site. Snipe were widespread around the site roosting in the wet grassland and scrub (22 sightings around site). Meadow Pipit also widespread around site using cutaway areas and areas with established vegetation cover (9 occurrences). Wren (7 occurrences) and Robin (5 occurrences) noted using patches of scrub around the site. A group of about 30 Redpoll were feeding on Birch scrub in the north-east section of the site. Other species include Blackbird (2), Magpie (1), Rook (1) (over-flying site), Swallow (5) (over-flying site), Wood pigeon (2), Pheasant (1), Pied Wagtail (1).

Two groups of Mallard were noted on the open water on different days (10 and 7). 1 pair of Mute Swan using open water and a separate family of 1 adult and 3 juveniles also present). A small flock of unidentified waders (possibly Lapwing) were also recorded around a small water body in the west side of the site.

- Signs of Rabbits are widespread and common around the site on many of the mineral islands and one the drier ridges. Signs of Hares widespread around site, especially on younger cutaway with establishing vegetation and some bare peat (3 adults recorded).
- Frequent signs of Deer activity (tracks), mainly single animals, particularly in southern part of the site.
- Pine Marten droppings noted in north-west section and tracks noted in south-east section.
- Signs of Badger activity in the north-east section (woodland adjacent to open water).
- Fox droppings recorded at several locations.
- Pine Marten droppings noted at one location.
- A group of 17 pie-bald ponies including fowls and mature males and females were noted on the site.
- Frogs recorded on the small patch of raised bog and in some Birch woodland around margins of site.
- Sticklebacks (fish) noted in one drain and in some open water (north-west section)
- One Peacock Butterfly noted, associated with Derrinlough works area. Some Dragonfly and Damselfly activity.
- Painted Lady recorded in north-east section.

Fungal biodiversity

Fungal species found on this site included *Russula exalbicans* (Bleached brittle gill), *Lactarius uvidus*, *Lycoperdon perlatum* (Common puffball), *Leccinum scabrum* (Birch bolete), *Boletus badius* (Bay Bolete) *Hygrocybe miniata* (Vermilion waxcap), *Clitocybe ericetorum* (Funnel cap), *Laccaria purpureobadia* and *Clitocybe flaccida* (Tawney funnel cap).

Activities on the site

A small part of the site contains forestry and is managed by Coillte as a commercial plantation.

HABITAT DESCRIPTIONS

(See Habitat Description Document for detailed description of each vegetation community not described in this section.)

Habitats developed on industrial cutaway

Pioneer Poor Fen communities (pJeff)

This pioneer community is generally the most common vegetation community found on the site and is usually associated with emergent *Betula pubescens*-dominated scrub, which is the next stage in the succession of these communities. The vegetation is dominated by *Juncus effusus*. *Phragmites australis* and *Typha latifolia* are sometimes present along the drains within this habitat and occasionally spread out to form small patches of single-species sward or a mixed community with the *Juncus effusus*. *Lemna* sp. was also noted in a drain at several locations. Other species found in this vegetation type include *Juncus articulatus*, *Centaurea nigra*, *Triglochin palustre*, *Hydrocotyle vulgaris*, *Hypochaeris radicata*, *Tussilago farfara*, *Taraxacum* sp., *Potentilla anserina*, *Dactylis glomerata*, *Agrostis stolonifera*, *Pulicaria dysenterica*, *Eupatorium cannabinum*, *Cirsium palustre*, *C. arvense*, *Osmunda regalis*, *Carex panicea*, *Rumex acetosa*, *Sonchus arvensis*, *Mentha aquatica*, *Hieracium pilosella*, *Cerastium fontanum*, *Daucus carota*, *Carex demissa*, *Molinia caerulea*. This habitat is also regularly associated with other Poor fen communities such as pEang and pTrig, but these usually make up a small proportion of the vegetation cover. Some of this grassland can be quite variable and drier sections are more typical of Disturbed vegetation (DisCF) and can be dominated by *Equisetum* sp.

This habitat is found associated with the maturing woodland near the open water complex in the north-east section. This area is notable for the large hummocks of *Calliergonella cuspidata* that are developing in the grassland and the abundant cover of *Agrostis stolonifera*, which dominates in places.

Pioneer Poor Fen communities (pEang)

This community is widespread throughout the site, although it does not cover as great a proportion of the site as pJeff. It can be found in a variety of situations, mainly in mosaic with pJeff, pTrig and eBir in production-related areas that are rapidly re-vegetating. It can also be found in a variety of conditions including with standing water at the edge of an open water body.

This community is typically found vegetating bare peat and is dominated by *Eriophorum angustifolium*. Other species may include *Mentha aquatica*, *Juncus effusus*, *Juncus articulatus*, *Hypochaeris radicata*, *Rubus fruticosus*, *Lycopus europaeus*, *Triglochin palustre*, *Juncus bulbosus*, *Carex demissa* and *Veronica beccabunga*.

This community is also found around the edge of the open water in mosaic with pRos, pPhrag and pTyph. The vegetation is dominated by *Eriophorum angustifolium* and also contains *Mentha aquatica*, *Molinia caerulea*, *Triglochin palustre*, *Lythrum salicaria*, *Hydrocotyle vulgaris*, *Chamaerion angustifolium*, *Epilobium hirsutum*, *Juncus effusus*, *Typha latifolia*, *Juncus bulbosus*, *Galium palustre*, *Carex nigra*, *Ranunculus flammula*, *Taraxacum* sp., *Pulicaria dysenterica*, *Eupatorium cannabinum*, *Salix aurita*, *Holcus lanatus* and *Cirsium arvense*. This community can have extensive patches of *Calliergonella cuspidata* moss associated with it, sometimes forming large hummocks in the older more established areas. *Utricularia* sp. is sometimes present in the standing water within this community and other semi-aquatic species typical of aquatic margins such as

Hippuris vulgaris, *Equisetum fluviatile* and *Typha latifolia* are present.

Pioneer Poor Fen communities (pRos)

This community is mainly found around the margins of the large area of open water in the north-east section, with small patches appearing in other parts of the site, usually associated with wetland areas with open water. It forms a complex mosaic in places with the open water and with other pioneer Poor fen habitats such as pEang and sections are beginning to resemble mature marginal vegetation of lakes (but their diversity is probably still somewhat lower). There is some typical zonation on plant communities in places around the open water from wet to dry habitats.

This habitat is dominated by *Carex rostrata* in places but can be relatively diverse. Other species present include *Eriophorum angustifolium*, *Carex echinata*, *Hippuris vulgaris*, *Hydrocotyle vulgaris*, *Mentha aquatica*, *Utricularia* sp., *Typha latifolia*, *Juncus effusus*, *Juncus articulatus*, *Ranunculus flammula* and *Carex demissa*. Some large hummocks of *Calliergonella cuspidata* are developing in this community where it is well-established.

Pioneer Poor Fen communities (pPhrag, pTyph, pSch)

These communities are presently encountered in the open water complex in the north-east section. *Phragmites australis*, *Typha latifolia* and *Schoenoplectus lacustris* can all form dense mono-specific stands around the margins of the open water or in shallow areas where the stands are emergent from the open water. Stands of *Schoenoplectus lacustris* are generally not found in association with the marginal vegetation but rather as small stands of emergent vegetation within the open water. The majority of these stands are relatively small in size at present apart from a large area of Tall Reed swamp dominated by *Typha latifolia* (pTyph) that is located at the south-east corner of the open water complex. This community is somewhat more diverse and open, with patches of open water within it and occasional *Salix* spp. trees developing in it.

Open Water complexes (OW)

A large area of open water is found within the Biodiversity Area in the north-east section of the site. This open water has a complex topography and is found in mosaic with other wetland habitats such as pEang, pRos, pPhrag, pTyph and eBir. Typical emergent species found in the open water near the margins include *Equisetum fluviatile* and *Triglochin palustre*. Patches of *Potamogeton* sp. are frequently found floating in the open water. The open water also contains frequent 'islands' and elongated ridges of remnant peat that are covered with various communities of which pJeff is most frequent.

***Betula pubescens* scrub (eBir, oBir)**

These habitats are the most frequently encountered pioneer habitats at this site. *Betula pubescens* saplings and young trees are generally emerging from Poor fen vegetation dominated by *Juncus effusus*. However, *Betula pubescens* dominated scrub can develop from a range of different communities including dry grassland and disturbed vegetation, which is found on many of the mineral mounds and ridges scattered through the site.. *Salix cinerea* and *Salix aurita* are also frequently present and sometimes become dominant. *Ulex europaeus* is also present on some drier areas on mineral ridges and on shallower peat near the margins of the site.

The underlying or ground vegetation generally reflects the surrounding conditions and pJeff is the most common community that is associated with the *Betula pubescens*-dominated scrub. The ground cover may also be dominated by *Chamaerion angustifolium* or *Agrostis stolonifera* in places. *Salix repens* is also present in places but is never very prominent. The *Betula pubescens*-dominated scrub sometimes develops from a *Calluna vulgaris*-dominated ground cover (dHeath).

Other species associated with the scrub habitat include *Dryopteris dilatata*, *D. carthusiana*, *D. felix-mas*, *Equisetum sylvaticum* and *Campylopus introflexus*.

Open *Betula pubescens*-dominated scrub is generally classified where the scrub is somewhat denser and taller, but has still not filled all the gaps and is not developing a woodland canopy.

Closed *Betula pubescens* scrub (cBir)

Closed *Betula pubescens*-dominated scrub is generally classified where the scrub is denser and taller, and has patches that are developing a woodland canopy. This community is generally difficult to access as it is so dense. The species composition is quite similar to the other forms of *Betula pubescens*-dominated scrub described above. It can have some open patches that contain species typically found in pJeff or gCal in drier areas including *Chamaerion angustifolium*, *Tussilago farfara*, and *Rubus fruticosus*.

Birch-Willow woodland (BirWD)

This habitat is found in the north-east section on the small raised area that extends into the open water wetland complex from the railway. This area is a mosaic of developing woodland, patches of younger scrub and open areas containing pJeff. The woodland areas contain frequent *Salix cinerea* in places and this dominates some of the canopy. Some of the woodland is quite dry and the ground cover is dominated by *Rubus fruticosus*. Other species present in the understorey and canopy include *Betula pubescens*, *Ulex europaeus* and *Sorbus aucuparia*. The ground cover also contains *Eurhynchium praelongum* and *Rhytidiadelphus squarrosus* along with many of the species recorded above in the other scrub habitats and in pJeff.

***Calluna vulgaris*-dominated community (dHeath)**

This community is found in several different locations around the site but it is generally not very extensive in cover. It is associated with drier areas around the margins of the bog. The vegetation is dominated by *Calluna vulgaris* and is not very diverse. Some of the vegetation can be quite open with extensive bare peat cover. Other species associated the older, better developed sections include *Molinia caerulea*, *Anthoxanthum odoratum*, *Betula pubescens*, *Rubus fruticosus*, *Chamaerion angustifolium*, *Campylopus introflexus*, *Hypnum cupressiforme*, *Potentilla erecta* and *Erica tetralix*.

This community is associated with emergent *Betula pubescens* and *Ulex europaeus* scrub, and also with Birch woodland on the site. A larger area of this habitat is developing on the east side of the south-west section on a somewhat raised area. This area also contains some occasional young *Pinus contorta* trees as well as *Ulex europaeus* and *Betula pubescens*.

***Ulex europaeus*-dominated community (eGor)**

This scrub community is found in some locations around the site and is mainly associated with some of the drier ridges around the site, particularly the main ridge that divides the north-east section and confines the open the water complex. Overall it forms a relatively minor part of the vegetation in the site. Small amounts of this habitat can be found around the margins of the site associated with drier areas.

This ridge is associated with a drain/stream that flows of the bog in this area. The community is dominated by dense *Ulex europaeus* scrub in places and it can also be associated with dense stands of *Pteridium aquilinum* that also form on these ridges in response to the drier conditions. Other species found in this community includes occasional *Betula pubescens*, *Pinus contorta* and *Salix* spp. trees and saplings.

This community can also be found in associated with small amounts of gCal and disCF, which also develop in these drier areas.

Dry grassland communities (gCal)

This community is most frequently encountered on the drier mineral mounds that are scattered around the site. It is usually associated with dry bare sub soil. This habitat can be found with disturbed vegetation (DisCF) and with emergent *Betula pubescens*-dominated scrub. Some of these mounds that been used to collect Pine debris from the surrounding production area. The grassland is dominated by *Anthoxanthum odoratum*, *Agrostis stolonifera* and *Centaurea nigra*, and it also contains *Carex flacca*, *Filipendula ulmaria*, *Hypochaeris radicata*, *Bellis perennis*, *Dactylis glomerata*, *Cirsium arvense*, *Holcus lanatus*, *Calluna vulgaris*, *Equisetum* sp., *Hypericum pulchrum*, *Cerastium fontanum*, *Leucanthemum vulgare*, *Achillea millefolium*, *Chamaerion angustifolium*, *Rubus fruticosus*, *Potentilla erecta*, *Potentilla anglica*, *Cirsium arvense* and *Cirsium vulgare*.

Carlina acaulis was noted on several mounds.

Wet and dry grassland communities (gMol, gCo-An)

A small amount of diverse grassland of this type is present at the northern end of the north-east section, close to the access point onto the bog. This grassland has developed in an area that has not been disturbed for some time and usually appears near the periphery of the bog. The grassland is dominated by *Molinia caerulea* and also contains frequent *Anthoxanthum odoratum*, *Centaurea nigra*, *Potentilla anserina*, *Agrostis stolonifera*, *Plantago lanceolata* and *Dactylis glomerata*. Other species present include *Rubus fruticosus*, *Lotus corniculatus*, *Calystegia sepium*, *Equisetum* sp., *Arrhenatherum elatius*, *Mentha aquatica*, *Sonchus arvensis*, *Lythrum salicaria*, *Holcus lanatus*, *Carex flacca*, *C. demissa*, *C. nigra*, *Linum catharticum*, *Triglochin palustre*, *Potentilla erecta*, *Calluna vulgaris*, *Rhinanthus minor*, *Hypochaeris radicata*, *Pedicularis sylvatica*, *Hypericum pulchrum*, *Succisa pratensis*, *Lathyrus pratensis*, *Juncus articulatus*, *Trifolium* sp., *Stachys sylvatica*, *Stellaria* sp., *Juncus effusus*, *J. inflexus*, *Dactylorhiza* sp., *Cirsium arvense*, *C. vulgare*, and *Centaureum erythraea*. A small amount of *Betula pubescens*, *Ulex europaeus* and *Salix aurita* is spreading into this grassland type and this community transitions to an emergent *Betula pubescens*-dominated community. There is a subtle change from this community to a more typical mosaic dominated by eBir and pJeff on deeper peat and more low-lying areas.

Some of this grassland is drier and is dominated by *Dactylis glomerata* and *Anthoxanthum odoratum* and is somewhat more tussocky. However, the extent of this vegetation type is quite minor in relation to the site area.

Similar gMol grassland dominated by *Molinia caerulea* (to the community described above) is found in small patches around the margins of the site on drier peat.

Rich fen community

A very small pocket of grassland found along the margins of the north-east section contained some *Schoenus nigricans*, an indicator of developing rich fen. This species was found in a disturbed area in association with *Molinia caerulea*, *Rhinanthus minor*, *Juncus inflexus*, *Carex demissa*, *Equisetum* sp, *Juncus articulatus*, *Centaurea nigra*, *Hypericum pulchrum*, *Sonchus arvensis*, *Mentha aquatica*, *Eriophorum angustifolium*, *Cirsium palustre*, *Carex flacca*, *Galium palustre*, *Calliergonella cuspidata* and *Ajuga reptans*. Some of this vegetation has developed on a spoil heap.

Conifer Plantation (WD4)

This plantation is located in the central part of the site on somewhat higher ground compared the rest of the cutaway. The plantation is managed by Coillte. It is predominantly planted with Sitka Spruce (*Picea sitchensis*) although there is a small amount of Lodgepole Pine (*Pinus contorta*) also planted in several blocks. This plantation is mainly at post-thicket stage with the relatively young trees having closed to form a dense canopy with very little vegetation cover underneath. There are some failed patches with stunted trees that would be considered pre-thicket plantation. These stunted areas are mainly vegetated by *Calluna vulgaris*, which is probably having a negative impact on the nutrient status of the soil and the condition of the trees. Overall, the plantation is in poor condition, although there are some pockets where the Spruce is growing at a fast rate and is in need of thinning.

Dry Disturbed/Pioneer communities (DisCF, DisWill)

Dry disturbed vegetation (DisCF) is found frequently on the small mineral mounds of sub-soil made up of glacial deposits that are found around the production area. It is frequently associated with emergent scrub (eBir) and dry grassland (gCal), which also are found on these mounds. This vegetation is dominated by *Tussilago farfara* and also contains *Rubus fruticosus*, *Molinia caerulea*, *Potentilla anserina*, *Daucus carota*, *Taraxacum* sp., *Agrostis* sp., *Carex flacca*, *Bellis perennis*, *Equisetum* sp., *Dactylorhiza* sp., *Cirsium arvense*, *Cirsium palustre*, *Salix aurita*, *Leucanthemum vulgare*, *Hypochaeris radicata* and *Centaureum erythraea*.

Other Habitats (around the fringe of the bog)

Birch woodland (WN7)

This habitat is located along the western boundary of the south-east section. The woodland is in the initial stages of development and is immature, although it does contain some mature trees. The canopy is dominated by *Betula pubescens* with a minor amount of *Salix cinerea* present. The canopy is about 8 m high and some of the largest trees reach a dbh of 40 cm. The woodland contains shrubby *Betula* of different ages. *Ulex europaeus* is also present in the understorey. The ground cover is relatively dry and dominated by leaf litter, patches of *Rubus fruticosus* and some moss cover. Other species present in the ground layer include *Hypericum humifusum*, *Dryopteris dilatata*, *Ilex aquifolium*, *Juncus effusus*, *Agrostis* sp., *Calluna vulgaris* and *Molinia caerulea*. Moss species present in the ground layer include *Thuidium tamariscinum*, *Polytrichum commune*, *Eurhynchium striatum* and *Hypnum* sp. There are some open patches within the woodland that would be described as scrub and are vegetated with *Ulex europaeus* and *Pteridium aquilinum*. The woodland also contains small stagnant pools of water associated with old drains.

There are signs of Deer-browsing in the woodland.

Raised Bog (PB1)

Small patches of remnant high bog are found at several locations around the site. The largest area is in the south-east section (about ~ 5 ha) and is positioned along the western boundary. This bog is in quite good condition and there is a surprisingly high cover of *Sphagnum* moss including *S. capillifolium*, *S. papillosum*, *S. subnitens*, *S. magellanicum* and some hummocks of *S. imbricatum*. The majority of the bog could be classified as sub-marginal with small patches in the northern section considered as sub-central quality. The cover of *Sphagnum* decreases towards the southern boundary.

The bog is surrounded by a tall face-bank with dense *Calluna vulgaris* that is almost 3 m high along the east side. A drain in a trench marks the northern boundary while there is some drainage along the southern boundary that is associated with peat cutting on adjacent private land. The vegetation is typically dominated by *Calluna vulgaris* and *Eriophorum vaginatum*. Other species present include *Eriophorum angustifolium*, *Narthecium ossifragum*, *Trichophorum cespitosum*, *Drosera rotundifolia*, *Carex panicea* and *Rhynchospora alba*. There is also extensive cover of *Cladonia portentosa*. Other mosses present include *Leucobryum glaucum* and *Hypnum jutlandicum*. There are some typical hummock-hollow complexes but for the most part the surface of the bog is relatively flat with few features. No pools were present and there is no standing water. A very small damp hollow was the only location on the intact bog where *S. cuspidatum* was recorded. Several *Betula pubescens* and *Pinus contorta* are present on the high bog. There was some high *Sphagnum* cover, mainly in hummocks, and there was also some minor lawn development. Some of the larger hummocks do display signs of degradation and drying out in places. An old drain crosses through the centre of the bog (N-S direction) and is infilling with *S. cuspidatum*.

Improved grassland (GA1)

This habitat is found in the south-east section along the western margin. A section of land within the BnM boundary has been improved in the past by private individuals and managed as agricultural grassland. The margins of this area are disturbed and there is some development of patches of *Rubus fruticosus*, *Pteridium aquilinum*, *Urtica dioica* and *Chamaerion angustifolium*. A deep drain separates this area from adjacent habitats on the periphery of the bog.

Cutover Bog (PB4)

This habitat is found around the margins of the site at several locations. Patches of cutover bog within the BnM site boundary, but managed by private individuals, are begun cut privately for peat and are typical of Turbary with several different individual plots being found in the same unit. Various stages of development are present, from active peat cutting where there is very little vegetation development (dominated by bare peat) and freshly cut turf is being dried, to abandoned sections that are developing *Calluna vulgaris*-dominated vegetation (dHeath), *Juncus effusus*-dominated vegetation (pJeff), dense *Pteridium aquilinum* (dPter) or *Betula pubescens*-dominated scrub (eBir). Some units of cutover bog have a mosaic of these communities that are related to the time since

the different plots were last cut for peat.

Draft

Appendix II. Codes used for habitat classification.

Bord na Moña habitat classification scheme

	General	Habitat ¹	BnM habitat code	Equivalent Heritage Council codes ²
Pioneer habitats of industrial cutaway	Peatland	Bare peat (0-50% cover)	BP	ED2
		Embryonic bog community (containing <i>Sphagnum</i> and Bog Cotton)	PBa	PB
		Embryonic bog community (Calluno-Sphagnion)	PBb	PB
	Flush and Fen	Pioneer <i>Campylopus</i> -dominated community	pCamp	PF2
		Pioneer <i>Juncus effusus</i> -dominated community (Soft Rush)	pJeff	PF2
		Pioneer <i>Eriophorum angustifolium</i> -dominated community (Bog Cotton)	pEang	PF2
		Pioneer <i>Juncus bulbosus</i> -dominated community (Bulbous Rush)	pJbulb	PF2
		Pioneer <i>Triglochin palustris</i> -dominated community (Marsh Arrowgrass)	pTrig	PF2
		Pioneer Caricion davallianae-Community with <i>Cladium</i> (rich fen)	pCladium	PF1
		Emergent communities	Pioneer <i>Carex rostrata</i> -dominated community (Bottle Sedge)	pRos
	Pioneer <i>Phragmites australis</i> -dominated community (Common Reed)		pPhrag	FS1
	Pioneer <i>Typha latifolia</i> -dominated community (Reedmace)		pTyp	FS1
	Pioneer <i>Schoenoplectus lacustris</i> -dominated community (Bulrush)		pSch	FS1
	Open water	Charaphyte-dominated community	pChar	FL2
		Permanent pools and lakes	OW	FL2
		Temporary open water	tOW	
	Woodland and scrub	Emergent <i>Betula/Salix</i> -dominated community (A) (Birch/Willow)	eBir	WS1
		Open <i>Betula/Salix</i> -dominated community (B) (Birch/Willow)	oBir	WS1
		Closed <i>Betula/Salix</i> scrub community (C) (Birch/Willow)	cBir	WS1
		<i>Ulex europaeus</i> -dominated community (Gorse)	eGor	WS1
		<i>Betula/Salix</i> -dominated woodland (Birch/Willow)	BirWD	WN7
	Heathland	Pioneer dry <i>Calluna vulgaris</i> -dominated community (Heather)	dHeath	HH1
		Dense <i>Pteridium aquilinum</i> (Bracken)	dPter	HD1
	Grassland	Pioneer dry calcareous and neutral grassland (Centaureo-Cynosuretum)	gCal	GS1
		<i>Dactylis-Anthoxanthum</i> -dominated community (Cocksfoot-Sweet Vernalgrass)	gCo-An	GS2
		<i>Anthoxanthum-Holcus-Equisetum</i> community (Sweet Vernalgrass-Yorkshire Fog-Horsetail)	gAn-H-Eq	GS
		<i>Molinia caerulea</i> -dominated community (dry) (Purple Moorgrass)	gMol	GS4
		Marsh (Meadowsweet and other tall herbs) (<i>Filipendulion ulmariae</i>)	Mar	GM1
	Disturbed	<i>Tussilago farfara</i> -dominated community (vegetation > 50%) (Colt's Foot)	DisCF	ED3
		<i>Epilobium</i> -dominated community (vegetation > 50%) (Willowherb spp.)	DisWil	ED3
General	Riparian areas (streams or drain with associated edge habitats (e.g. FW2/4 + WS1, GS2 etc)	Rip	FW2 +	
	Silt Ponds (artificial ponds with associated bank habitats (e.g. FL8 + WS1, GS2, ED2, ED3)	Silt	FL8 +	
	Access (tracks or railways with associated edge habitats (e.g. BL3 + gCal, gMol, eGor etc)	Acc	BL3 +	
	Works areas (predominately built land but can include landscaped and brownfield habitats (e.g. GA2, WS3, WD4, ED2, ED3)	Works	BL3 +	

¹ These are generally pioneer habitats of bare peat and the communities can contain a significant proportion of bare peat. Some habitats are more developed than others. They frequently occur in mosaic with each other.

² Not all these communities are equivalent to habitat classes used by The Heritage Council habitat classification scheme (Fossitt 2000) as some are quite rudimentary and undeveloped.

Heritage Council habitat classification scheme (Fossitt 2000)

	General	Habitat	Heritage Council code
Semi-natural and modified habitats	Peatlands	Raised Bog	PB1
		Lowland Blanket bog	PB3
		Cutover Bog	PB4
		Rich fen and flush	PF1
		Poor fen and flush	PF2
		Transition mire and quaking bog	PF3
	Woodland and scrub	Oak-Birch-Holly woodland	WN1
		Oak-Ash-Hazel woodland	WN2
		Wet Pendunculate Oak-Ash woodland	WN4
		Riparian Woodland	WN5
		Wet Willow-Alder-Ash woodland	WN6
		Bog woodland	WN7
		Mixed broad-leaved woodland	WD1
		Mixed broad-leaved/conifer woodland	WD2
		Conifer plantation	WD4
		Scrub (Gorse)	WS1
		Emergent Betula-dominated community	WS1
		Closed Betula scrub community	WS1
		Recently-planted woodland	WS2
		Ornamental scrub	WS3
		Short-rotation coppice	WS4
	Recently-felled woodland	WS5	
	Linear woodland	Hedgerow	WL1
		Treeline	WL2
	Grasslands and Marsh	Improved grassland	GA1
		Amenity grassland	GA2
		Dry calcareous and neutral grsld	GS1
		Dry meadows and grassy verges	GS2
		Dry-humid acid grassland	GS3
		Wet grassland	GS4
	Freshwater Marsh	GM1	
	Heath and Bracken	Dry Heath	HH1
		Dry calcareous Heath	HH2
		Wet Heath	HH3
		Dense Bracken	HD1
	Disturbed ground	Exposed sand, gravel or till	ED1
		Spoil and bare ground	ED2
		Recolonising bare ground	ED3
		Active quarry	ED4
	Freshwater	Acid Oligotrophic lakes	FL2
		Mesotrophic lakes	FW4
		Artificial ponds (slit ponds)	FL8
Depositing rivers		FW2	
Canals		FW3	
Drains	FW4		
Cultivated and Built land	Stonewalls and other stonework	BL1	
	Earth Banks	BL2	
	Buildings and artificial surfaces	BL3	
	Arable crops	BC1	
	Horticulture	BC2	
Tilled land	BC3		

BORD NA MÓNA
Naturally Driven

Draft Rehabilitation Plan

2017

Clongawny Bog

This rehabilitation plan is developed under Condition 10 of IPC Licence Ref. 503 (April 2017). It outlines measures that will provide for stabilisation of the bog area upon cessation of peat production and decommissioning of the site. Rehabilitation generally comprises natural colonisation with or without targeted management. *After-use involves the development of cutaway peatland into other land-uses. Rehabilitation can be incorporated into after-use development (e.g. Mountlucas Windfarm). Bord na Móna has focused after-use development of cutaway bogs into forestry, agriculture, grassland, amenity and biodiversity, (Lough Boora Discovery Park) and commercial industrial development (Drehid Resource Recovery, renewable energy – Mountlucas Windfarm). This rehabilitation plan does not outline future after-use development for Clongawny Bog. The general after-use strategy of Bord na Móna is outlined in the Bord na Móna Strategic Framework for Future-Use of Cutaway Bogs 2011. Any consideration of future after-uses for Clongawny Bog such as amenity, developments or mixed uses will be conducted following the relevant planning guidelines and consultation with relevant authorities and will be considered within the framework of this rehabilitation plan.*

Rehabilitation of industrial peatlands is a key objective of the Bord na Móna Biodiversity Action Plan 2016-2021. This action plan outlines the main objectives and actions around biodiversity on Bord na Móna lands.

Draft Rehabilitation Plan			
Bog Name:	<u>Clongawny</u>	Area (ha):	1028 ha
Works Name:	Boora	County:	Offaly
Author(s):	BnM Ecology Team	Survey/ Monitoring Date(s):	29/30 September & 1 September 2009 4/06/2010, 11/11/2013, 20,21/05/2014,
Maps:	Habitats Map, Potential Future Habitats Map, Landuse Map		
Review status: Reviewed Spring 2017.			
<p>Background</p> <p>Bord na Móna operates under IPC Licence issued and administered by the EPA to extract peat within the Boora bog group (Ref. 500 SB). As part of Condition 10.2 of this license, a rehabilitation plan must be prepared for permanent rehabilitation of the boglands within the licensed area. Clongawny bog is part of the Boora bog group. This plan is a specific rehabilitation plan for Clongawny bog and outlines:</p> <ul style="list-style-type: none"> • criteria which define the successful rehabilitation, • consultation to date with interested parties, • main issues for rehabilitation, • proposed rehabilitation programme, • proposed timeframe to implement this programme, and, • associated aftercare, maintenance and monitoring. <p>The basis for the proposed approaches and implementation is the experience gained in 40 years of research on the after-use development and rehabilitation of the Bord na Móna cutaway bogs (see reference documents).</p>			
<p>Scope</p> <p>The scope of the rehabilitation plan seeks to address issues of concern as identified by Bord na Móna and the consultees. The key issues identified are:</p> <ul style="list-style-type: none"> • Categorisation of the habitats developing on Clongawny Bog (outlined in Appendix I) • Environmental stabilisation of the former peat production areas • Maintenance of drainage and silt control through the site • Remediation of water courses where necessary (<i>decommissioning</i>) • The timeframe for bog rehabilitation/restoration • The impact of any other proposed development on the site and rehabilitation plan 			
<p>List of consultees to date</p> <ul style="list-style-type: none"> • Open consultation with range of stakeholders at annual BAP review days 2010-2017; discussions with Forest Service in relation to NWS area. • This rehabilitation plan remains a draft plan until formal consultation is carried out with relevant stakeholders. 			
<p>Site description</p> <p>Clongawny Bog is located adjacent to the Cloghan to Birr Road and the majority of the bog is still in active production or is classified as production related cutover. The bog is primarily divided into several sections by the blocks of forestry located towards to centre of the site and by a railway that crosses the site in a NW-SE orientation. The forestry on the site is managed by Coillte with both commercial production of timber and biodiversity as the main management objectives. The site has a varied topography with some higher areas, mineral mounds of glacial material and deeper basins.</p>			

Northern Section

This is the largest section and takes in all of the site north of the railway from the eastern to the western side, including a small area of active production on the east side (east of the railway, Derrinlough). The majority of this area (north-west of the lake and north of the railway) has been classified as active-production and production related cutaway. The largest habitat in the N section is bare peat (BP).

A large block of forestry is situated to the south of this section and is composed primarily of Sitka Spruce and some Lodgepole Pine. One native woodland (dominated by Ash) on a mineral mound is also located in this section (west side), while another mineral island on the east side contains some maturing scrub with dense Hazel and Blackthorn. The central section is an area of production-related cutaway that is re-vegetating and contains Poor fen pioneer communities.

South-west section

This section is found in the SW part of the site and is found south of the railway. It contains a small native woodland on a mineral island named Maddens Derries. A small area of newly planted Oak woodland (a Bord na Mona Native Woodland Scheme) is located to the north side of this area. This section of new woodland is clearly visible by the high fence around its perimeter. Maddens Derries is the central part of a long ridge on which is developing open birch scrub (oBir) and dry heath (dHeath). The area to the south of this ridge is primarily active peat production with very little vegetation cover and minor amounts of Poor fen communities.

South-eastern section

This large area (south of the railway and east of the mineral ridge that extends into the site from the southern side) contains a large area of active peat production with bare peat with very little vegetation cover (west side). The eastern side contains a relatively large lake (classified as an Acid (Oligotrophic) lake) that has developed on a natural basin between forestry planted on higher ground and the main road. This area is classified as a Biodiversity Area (on the land-use map) and is surrounded by dry heath and some emergent Birch scrub, which are colonising the bare peat. To the south east (south of the railway) an area of dry heath (dHeath) was developing on an old section of cutaway.

This section also contains a small area of diverse wetland located to the north-west (between the mineral ridge of Clongawny More Townland and the conifer plantation). This area is classified as production-related cutover and is used for access between the various sections of the site, although most of the area has been re-vegetated for some time with communities well-established. This area also contains several indicators of Rich fen development including *Cladium mariscus* in the open water, a small area being vegetated by *Schoenus nigricans*, the presence of Brown Mosses and the presence of an iron flush.

South-west 'Island'

This small isolated area to the south-west of the main site is located adjacent to the Cloghan-Five Crossroads road. It contains a mosaic of cutover bog (PB4), scrub (WS1) and a minor amount of raised bog (PB1). It has never been in industrial peat production and has been leased to Coillte (although no forestry has been planted on it).

See Appendix I for more detail on site, habitats and local features

Peat production programme, land-use and proposed developments

- It is anticipated that milled peat production will continue in Clongawny for the foreseeable future depending on milled peat resource requirements.
- Clongawny has been zoned during the BnM Decision Framework Management process for biodiversity, amenity, forestry and eco-tourism.

Other considerations

- **Cessation of peat production.** Bord na Móna announced in 2015 that peat production for the generation of electricity was to cease by 2030 (http://www.bordnamona.ie/wp-content/uploads/2016/01/Sustainability_Statement_2015.pdf). Industrial peat production (with regard to all appropriate regulations) to supply other customers or sectors (e.g. horticulture) may continue after this date.
- **Peat extraction regulations.** New regulations for the extraction of peat are currently being drafted by

government. Peat extraction on sites greater than 30 ha will be regulated through IPC licencing administered by the EPA. This draft rehabilitation plan has been prepared under the conditions of the original IPC licence.

- **Bord na Móna railway.** An active rail line is still operational between Clongawny and other sites in the Boora Group. Decommissioning of this infrastructure is dependent on the general cessation of industrial peat production for supply of peat to various customers including WOP and Derrinlough Brickette Factory.
- **Coillte Forestry.** Several conifer plantations were established on this site in the 1980's by Coillte, with the site being leased by Coillte. Stands of mainly Lodgepole Pine and Sitka Spruce were planted on the site. Mixed broadleaves with Oak and Birch were also planted on part of the plantation. No management practices such as thinning or weed control has been carried out on the site since planting took place.
- **Private sod-peat production;** there is some private sod-peat production around the margins of the high bog.
- A phone mast is located on the site.
- **Native Woodland Scheme:** A native woodland scheme plantation has been established on a section of cutaway.

Key biodiversity features of interest (2017)

- Clongawny Lake: One of the main features of interest is the creation of an area of open water located at the west of the site. This lake was created over ten years ago and attracts waders and wildfowl. The site also has note-worthy acidic water chemistry, which has influenced the re-colonisation of *Sphagnum* moss species in drains connected to the lake. Bird counts from the site (Copland, A. *BWI Winter Counts 2008/2009*) indicate that the lake is not used by water bird species to the same extent as other recently created lakes and/or wetland habitats in the Boora region and this low usage has also been linked to the more acidic water chemistry in the lake (Lally H., IPC 2008 paper). The lake was used by a colony of Black-headed Gulls (100 +) (Red-listed species) during 2014.
- The site was being used by several pairs of breeding Lapwing (4) (Red-listed species) and Ringed Plover during summer 2014. These breeding waders were mainly found in the central part of the site associated with wetlands.
- Rich Fen area: One wetland area in particular, towards the centre of the site, contains several indicators of Rich Fen (PF1) habitat and is of particular biodiversity interest. This area has significant potential to develop habitats with important nature conservation interest and potential to qualify as EU habitats Directive Annex I habitats (PF1) in the future. (Codes refer to Heritage Council habitat classification system, Fossitt 2000. See Appendix I).
- Marsh Fritillary Butterfly. This species was recorded in the potential rich fen area in June 2010. It is listed on Annex II of the EU Habitats Directive and is a species of significant conservation importance, particularly as there are no recent records for this species in the local area or from BnM properties in the Boora group. Dingy Skipper butterfly is widely distributed through the site on gravelly mounds. This butterfly species has a restricted distribution in Ireland.
- Native Woodlands: The site also contains four relatively small areas of native woodlands (180yrs +) with mature Oak and Ash, which predate industrial peat harvesting on the site. These small woodlands are located on mineral islands located in the bog. The site also contains some conifer plantation, some of which has failed and is beginning to develop native scrub.
- The site is used occasionally by Merlin, Peregrine and Whooper Swan in the winter (Biosphere Environmental Services 2015).

Current ecological rating (A-E; following from NRA Guidelines)

A large part of the site can be rated as having a **low local ecological value (E)** as it is in milled peat production. Areas of cutaway have a higher ecological value (**D**). The breeding assemblage of waders and Black-headed Gulls is significant. The area of undeveloped raised bog also has a high local ecological value (**D**), although its

restoration prospects are poor.

The presence of Marsh Fritillary Butterfly, this species is listed on Annex II of the EU Habitats Directive and is a species of significant conservation importance **(A)**. The native (Oak and Ash) woodlands have a high ecological rating as a habitat of national importance **(C)**.

Criteria defining successful rehabilitation

- The main criteria are stabilisation of the former peat production area and mitigation of potential silt run-off.

Existing cutaway: significant areas of Clongawny are out of production and classed as cutaway. The re-vegetated areas of cutaway contain pioneer habitats such as dry heath, Birch scrub, poor fen, rich fen and scrub. Coillte have leased sections of the site and these areas have been planted with conifers, a native woodland scheme has also been established on the site by Bord na Móna. Five areas of mature Oak and Ash woodland are located on mineral soil within the site, these woodlands predate any Bord na Móna operations on the site.

Production related cutaway: this covers sections of the site that have not been used for peat production for a period of time but may be brought back into production in the future. Some sections within Clongawny have been out of production for a number of years and have re-vegetated, if these areas are brought back into production they will then be treated as for the active peat production areas (see below).

Active peat production: large sections of Clongawny are currently in milled peat production and are expected to remain in production for the foreseeable future. It is somewhat more difficult to predict future habitats and suggest possible management options for this relatively young section, as the bog landscape has the capacity to significantly change as production removes more and more peat. The final landscape will be determined by production decisions (i.e. how much peat is removed) and by the underlying topography, drainage etc. Prolonged production of milled peat is likely to change the landscape of this site significantly.

Natural colonisation is likely to form the basis for the stabilisation of the current production area when it comes out of production. Some small sections of production-related cutaway, where underlying glacial sub-soil mounds and ridges are being exposed, were already re-vegetating with typical pioneer cutaway habitats. Localised drain blocking would aid the formation of wetland communities in some natural basins. The extent of wetlands habitat could be increased by targeted management, which would enhance the biodiversity of the whole site.

Remnant sections of raised bog: the potential to restore *active* raised bog in the small areas of undeveloped raised bog located along the boundaries of Clongawny is limited, due to their relatively small size.

Woodlands: sections of mature Oak and Ash woodland are located on Clongawny, these woodlands predate any peat extraction operations by Bord na Móna. Targeted management operations would prove beneficial to these woodlands. A native woodland was planted in Clongawny in 2007 through the native woodland scheme. This woodland will need ongoing management in order to ensure that it reaches maturity.

Coillte: A large area of the site has already been developed for forestry by Coillte. Management within these areas can be considered as ongoing maintenance with routine operations related to timber production and/or development of the conifer plantations as biodiversity areas. Issues of peat stabilisation and potential silt run-off will have to be addressed during forestry operations on the site by Coillte.

- At this point in time, 42% of the site is expected to develop as Birch woodland and scrub, 42% is likely to develop as wetland (including the lake) and 6% is likely to remain as raised bog (PB1), 10% as forestry.
- Remediation of silt ponds and watercourses where required.

Proposed Rehabilitation programme

Completed

- A lake was created along the eastern boundary of the site twelve years (2000) ago by blocking an outfall and allowing a basin that had formed through peat extraction to fill with water.
- A native woodland scheme has been planted in Clongawny in 2007 comprising Oak (1.2 ha).

- Coillte have planted a significant proportion of the site with conifers (in the 1980s).
- Approximately 25% of the cutaway on the site has already naturally re-vegetated with typical cutaway habitats.
- The site was re-surveyed in 2014 and this indicated that the area of bare peat had significantly reduced within the cutaway and that habitat development was progressing. Natural colonisation of the cutaway at this site has so far been quite effective.

Short-term (0-2 years)

- Significant bare peat areas through the site and the progress of natural re-colonisation of the cutaway areas will be monitored.
- Targeted rehabilitation of the bare peat areas can be considered within the cutaway area.
- There will be ongoing monitoring of the site and appropriate rehabilitation planning related to any changes in land-use at Clongawny.
- Continued planning should take place to assess the potential to enhance and the scale of wetland development at Clongawny. This will include a survey of drainage on the site to assess suitability for drain-blocking of the major outfalls and internal drainage and the potential for re-wetting.

Short-term (0-2 years) (when production ceases)

- The most sustainable management option for the active production areas within the site is to allow natural re-colonisation of the site, once the decision is made to cease production at the site.
- All stock-piles should be removed from the site as part of the winding down of peat production operations. Any remaining or old stockpiles should be bulldozed and levelled as part of the rehabilitation/decommissioning process.
- Assessment of re-wetting scenarios and site drainage to be carried out to assess the potential to enhance wetland development in Clongawny bog.
- While natural colonisation is expected to proceed almost immediately once peat production ceases, there will be a determination of extent of bare peat and selection of best measures to accelerate re-vegetation (if necessary).
- Re-vegetation measures will be carried out as soon as possible post peat production. These will be monitored to determine effectiveness and success.
- Silt-ponds will be monitored during this period and there will be continued maintenance and cleaning (if required) to prevent silt run-off from the site during the rehabilitation phase.
- The potential to enhance the woodlands will be re-assessed at this stage.

Medium-term

- Targeted active management such as seeding of a nursery crop or use of fertiliser to help promote natural re-colonisation (see Drumman Rehabilitation Trials) will be carried out, if natural re-colonisation of significant bare peat areas within the active production areas has not progressed satisfactorily at this stage. The effect of any targeted active management will be monitored.
- The effect of any targeted active management will be monitored and further work determined.

Long-term

- This phase will follow on from cessation of peat production in adjacent bogs.
- Monitoring of the site to ensure stabilisation and complete re-vegetation.
- Decommissioning of silt-ponds will be assessed.
- Evaluate success of short-term rehabilitation measures outlined above and enhance where necessary (to be determined by selected short-term management above).
- Decommission the BnM railway on site.
- Reporting to the EPA will continue until the IPC License is surrendered.

<p>Timeframe for rehabilitation</p>
<p>Short-term (2017-2019)</p>
<ul style="list-style-type: none"> • Monitor re-vegetation of the cutaway area and assess requirements of targeted active management of the bare peat areas using fertiliser/nursery crop treatments; and potential for rewetting. • On-going monitoring of the overall site.
<p>Long-term</p>
<ul style="list-style-type: none"> • This phase will follow on from cessation of peat production in adjacent bogs • Continued monitoring and planning will take place to assess further rehabilitation requirements at Clongawny taking account of ongoing peat-production on the site and new areas of cutaway, including potential for wetland development and ongoing natural colonisation of the production areas (when production ceases). • Reporting to the EPA will continue until the IPC License is surrendered.
<p>After-care and maintenance</p>
<ul style="list-style-type: none"> • There will be annual assessments of the site to determine the progress of the rehabilitation work and requirements for further enhancement measures. • It is not expected that there will be any requirement for after-care and maintenance other than ecological monitoring. • Where other uses are proposed for the site, these will be assessed by Bord na Móna in consultation with interested parties. Other after-uses can be proposed for licensed areas and must go through the appropriate assessment and planning procedures.
<p>Potential future natural habitats on the site</p>
<p>This section attempts to predict the development of natural habitats on the site, assuming current land-use and known after-use plans for the cutaway (development etc). This prediction is based on research and methods used to predict the natural vegetation of Ireland (Cross 2005).</p>
<ul style="list-style-type: none"> • The majority of this site at present is likely to develop dry Birch-dominated woodland (WN7) in the medium to long-term after production. This woodland is likely to be a mosaic containing small patches of more open habitat with scrub (WS1), wet grassland (GS4) and poor fen vegetation (PF2). • The wooded mineral islands on the site are likely to retain their semi-natural woodland, which has the potential to expand somewhat naturally in the future if the canopy is allowed to mature (such as at Madden's Derries). These woodlands are surrounded by a narrow band of Birch scrub and woodland, some of which has the potential to develop Oak-Ash-Hazel woodland in the future. The small mound containing Hazel scrub also has the potential to develop Ash-dominated woodland (WN2) in the future. • Other mineral mounds are likely to develop into dry heath (HH1) and calcareous grassland (GS1) depending on the depth of remaining peat over the subsoil (calcareous grassland (GS1) more likely to develop on mounds with exposed sub-soil). These areas also have the potential to develop Hazel scrub and Ash woodland in the long-term (WN2). • The lake has the potential to develop into a natural acid-oligotrophic lake (FL2) typical of lowland bog areas. The lake is likely to be surrounded by some emergent vegetation (Poor fen communities) with the drier sections developing dry heath (HH1) and Birch woodland (WN7). • The small wetland area in the centre of the site has the potential to develop into Rich Fen (PF1). The presence of iron flushes close by indicates that springs are present, although this habitat is not likely to be extensive. The majority of this area is likely to develop a mosaic of Wet Willow-Alder-Ash woodland (WN6) (fen carr type woodland) in the long term with open patches containing Poor fen (PF2), Rich fen (PF1), wet grassland (GS4), open water and Reedbeds (FS1). Other small potential wetland areas

around the site have the potential to develop in the same way in the long-term.

Budget and costing

- It is anticipated that the majority of the rehabilitation at this site will be through natural re-colonisation. Some preliminary budgeting can be carried out assuming that approximately 42% of the site will be developed as wetlands with some active management required blocking outfalls to enhance re-wetting. The allocated rehabilitation provision will be based on this estimate.

Draft

Appendix I. Ecological Report

Ecological Survey Report			
<p><i>Note: This report outlines an ecological survey of the bog. This report should not be taken as a management plan for the site as other land-uses may still be considered. Information within this report may inform the development of other land-uses and identify areas with particular biodiversity value.</i></p>			
Bog Name:	Clongawny More	Area (ha):	1028ha
Works Name:	Boora	County:	Offaly
Recorder(s):	MMC & DF	Survey Date(s):	29/30 September & 1 September 2009 4/06/2010
<p>Habitats present (in order of dominance)</p> <ul style="list-style-type: none"> Habitats present on the industrial cutaway include: (Codes refer BnM classification of pioneer habitats of production bog. See Appendix II). Bare peat (BP), pioneer Poor Fen communities (pJeff, pEang, pTrig, pJbulb) and <i>Betula pubescens</i>-dominated scrub (eBir, cBir). There is one large lake along with other fragmented and minor patches of Open water (OW), Reedbeds (pTyp, pPhrag), Dry Heath (dHeath) & dry disturbed/pioneer communities (DisCF, DisWill) around the site. A small wetland area in the centre of the site has developed some Rich fen indicators (pCladium). (Codes refer to BnM classification of pioneer vegetation of industrial cutaway areas, see appendix II.). There is some built land (BL3) with paths accessing works areas and a mobile phone in the SE section. Rail-lines crossing the site can also be classified as BL3. Silt Ponds are located to the NE and SW of the bog. Along side the silt ponds are linear mounds of excavated material that run parallel to the ponds. This spoil is a mixture of glacial material, limestone and marl. Several large area of conifer forestry (WD4) (approximately 92ha in total) have been planted at various locations around the site, on peat and on some of the mineral mounds. Oak-Ash-Hazel Woodland (WN2) is present on several small mineral mounds and another mound contains some mature dense Hazel and Blackthorn scrub (WS1). There are small areas of grassland (gCal) associated with this mound, and also with the access routes such as the railways and around the mobile phone mast area. Other fringe habitats around the margins of the bog include Scrub (Birch-dominated with some Scots Pine), Birch woodland (WN7) and Cutover Bog (active and abandoned). There are also several drainage ditches around the margins of the site (FW4). 			
<p>Description of site</p> <p>Clongawny Bog is located adjacent to the Cloghan to Birr Road and the majority of the bog is still in active production or is classified as production related cutover. The bog is primarily divided into several sections by the blocks of forestry located towards to centre of the site and by a railway that crosses the site in a NW-SE orientation. The forestry on the site is managed by Coillte with both commercial production of timber and biodiversity as the main management objectives. The site has a varied topography with some higher areas, mineral mounds of glacial material and deeper basins.</p> <p>Northern Section</p> <p>This is the largest section and takes in all of the site north of the railway from the eastern to the western side, including a small area of active production on the east side (east of the railway, Derrinlough). The majority of this area (north-west of the lake and north of the railway) has been classified as active-production and production related cutaway. The largest habitat in the N section is bare peat (BP).</p> <p>A large block of forestry is situated to the south of this section and is composed primarily of Sitka Spruce and some Lodgepole Pine. This section of forestry is of moderate quality and appears to grade from moderate quality on its eastern side to poorer quality on the western side. Some of this forestry has failed and is naturally re-generating scrub. One native woodland (dominated by Ash) on a mineral mound is also located in this section</p>			

(west side), while another mineral island on the east side contains some maturing scrub with dense Hazel and Blackthorn.

The central section is an area of production-related cutaway that is re-vegetating and contains Poor fen pioneer communities (pJeff, pEang), emergent Birch scrub (eBir), and a minor amount of dry heath (dHeath). A small patch of raised bog (high bog) (PB1) is located on the northern boundary, while some other boundary habitats include scrub (WS1), conifer plantation (WD4), and dry grassland (GS1, GS2) along with a works area near Derrinlough that is used for storage and refuelling to the east of the site.

South-west section

This section is found in the SW part of the site and is found south of the railway. It contains a small native woodland on a mineral island named Maddens Derries. A small area of newly planted Oak woodland (a Bord na Mona Native Woodland Scheme) is located to the north side of this area. This section of new woodland is clearly visible by the high fence around its perimeter. Maddens Derries is the central part of a long ridge on which is developing open birch scrub (oBir) and dry heath (dHeath). The area to the south of this ridge is primarily active peat production with very little vegetation cover and minor amounts of Poor fen communities (pJeff, pEang). A silt pond is located to the west side. There are some remnants of uncut high bog along the eastern and western boundary of this section that can be classified as raised bog (PB1) and are being cut for peat by private individuals along the outer boundary. The eastern boundary also has several plots of land that extend into the mineral ridge of Clongawny More. Some of these plots contain Birch woodland (WN7), scrub (WS1) and cutover bog (PB4).

South-eastern section

This large area (south of the railway and east of the mineral ridge that extends into the site from the southern side) contains a large area of active peat production with bare peat with very little vegetation cover (west side). There is a group of silt ponds (Rip) and some associated Birch scrub (eBir) located at the western side of this section. This area also contains some young pioneer Poor Fen vegetation (mainly pEang and pJeff) spreading from the drains.

The eastern side contains a relatively large lake (classified as an Acid (Oligotrophic) lake) that has developed on a natural basin between forestry planted on higher ground and the main road. This area is classified as a Biodiversity Area (on the land-use map) and is surrounded by dry heath and some emergent Birch scrub, which are colonising the bare peat. This section is notable for the presence of naturally colonising Oak in some of the scrub and also *Sphagnum* moss appearing in some of the drains connected to the lake. The western boundary is defined by several large blocks of conifer forestry. A phone mast is located in one section of plantation, which has been planted on a relatively large mineral island and surrounding shallow peat. This forestry is dominated by Sitka Spruce but it also contains two distinct patches of native old woodland that have developed on mineral mounds and have been left intact. To the south east (south of the railway) an area of dry heath (dHeath) was developing on an old section of cutaway.

This section also contains a small area of diverse wetland located to the north-west (between the mineral ridge of Clongawny More Townland and the conifer plantation). This area is classified as production-related cutover and is used for access between the various sections of the site, although most of the area has been re-vegetated for some time with communities well-established. The railway also runs through this section. The wetland area is mainly at the western side and there are several small areas of open water around which there have developed diverse poor fen communities (pEang, pJeff, pBulb), minor amounts of Reedbeds (pTyph, pPhrag) and emergent Birch scrub (eBir). This area also contains several indicators of Rich fen development including *Cladium mariscus* in the open water, a small area being vegetated by *Schoenus nigricans*, the presence of Brown Mosses and the presence of an iron flush.

South-west 'Island'

This small isolated area to the south-west of the main site is located adjacent to the Cloghan-Five Crossroads road. It contains a mosaic of cutover bog (PB4), scrub (WS1) and a minor amount of raised bog (PB1). It has never been in industrial peat production and has been leased to Coillte (although no forestry has been planted on it).

Forestry and potential forestry on site

Three main commercial forestry blocks are located on the site. These areas are managed by Coillte and are dominated by *Picea sitchensis*. These plantations have dual purposes with some sections intended for timber production and some sections intended for biodiversity. Some sections have achieved a yield class of 22 which is considered to be of medium quality (depending on planting year) from a timber production point of view but many other sections are of much poorer quality and some sections are failing completely. Low nutrient levels,

high water table, competition from other plants, namely *Calluna vulgaris* and exposure, appear to be taking their toll on these plantations.

A small flush with extensive *Sphagnum* sp. cover was noted close to the edge of the large conifer plantation in the south-east section (northern side, see map). This flush contained extensive cover of *S. capillifolium*, *S. magellanicum*, *S. papillosum* and *Aulacomnium palustre*. Forestry planted in this area had failed. Other species such as *Eriophorum vaginatum*, *Narthecium ossifragum* and *Rhynchospora alba* were present.

An area to the north of the most westerly woodland (Madden's Derries) has been planted with Oak as part of the Native Woodland Scheme. This area was planted in 2008 and is clearly visible with the high deer fencing bounding it. This area consists of *Quercus robur*, *Betula pubescens*, *Calluna vulgaris*, *Eriophorum* sp. and *Juncus effusus*. The fungus *Armillaria tabescens* was also noted within this area.

This habitat is found in four separate locations on the site and a boundary wall is still visible in some of the woodlands, indicating they were managed in the past, possibly grazed. These woodlands are dominated by Oak trees that are estimated to be 180+ years old and are quite large (dbh 1.5 m). Many of the trees appear to have been coppiced the past and as a result are multi-stemmed. Some of these woodlands are bordered with or contained within conifer plantations.

Over-grazing (presumably by deer) is a problem with the result that there is poor diversity in the woods with a poor shrub layer and the woodland is quite open. However, some sections did have numerous *Fraxinus excelsior* (Ash seedlings) so grazing intensity may vary across the site and the poor woodland development may in part be due to the heavy canopy. Species found within the canopy and understorey included *Quercus robur*, *Corylus avellana*, *Sorbus aucuparia*, *Ilex aquifolium*, *Betula pubescens*, *Prunus spinosa*, *Euonymus europaea*, *Hedera helix*, *Sambucus nigra*, *Alnus glutinosa*, *Malus sylvestris*, *Crataegus monogyna* and *Fagus sylvatica*. Several mature *Taxus baccata* were noted in one of the woodlands. Some sections of the canopy were much younger and dominated by *Betula pubescens*, *Salix cinerea* and/or *Corylus avellana*. The ground cover was generally dominated by *Hedera helix* in the heavily shaded areas, with *Rubus fruticosus* appearing in the more lightly shaded sections. Other species present included *Dryopteris dilatata*, *Dryopteris felix-mas*, *Arum maculatum*, *Rubus fruticosus*, *Urtica dioica*, *Pteridium aquilinum*, *Lonicera periclymenum*, *Viola* sp. *Oxalis acetosella* and *Sanicula europaea*. The ground cover of these woodlands was low in diversity but survey during early summer would probably increase the number of species recorded. The ground cover also had extensive moss cover in places as well as one exposed limestone rocks. This was dominated by *Thamnobryum alopecurum*, with *Mnium hornum*, *Hypnum* sp., *Eurhynchium striatum* and *Thuidium tamariscinum* all present.

One of the woodlands has a canopy dominated by *Fraxinus excelsior* and contained *Sambucus nigra* and *Corylus avellana* with a dense *Rubus fruticosus* and *Pteridium aquilinum* understorey.

The woodland at Maddens Derries is poor in structure, with large gaps in the canopy and dense scrub and thickets of *Rubus fruticosus* and *Pteridium aquilinum* surrounding the mature trees.

One of the small mineral mounds has developed a small area of *Corylus avellana*-dominated scrub. This scrub is quite dense and impenetrable. It is surrounded by a band of dense *Prunus spinosa* and then by a zone of dense *Pteridium aquilinum* and *Rubus fruticosus*. This is a typical example of a succession habitat that will eventually develop Ash woodland (WN2). Several *Fraxinus excelsior* and *Betula pubescens* trees are emerging from the *Corylus avellana* canopy.

There is a minor amount of this habitat on the site and it can be found around the edges of the wooded mineral islands. The canopy is generally dominated by *Betula pubescens*. Other species present include *Sorbus aucuparia*. The ground cover and shrub layers are poorly developed and are dominated by *Rubus fruticosus* thickets. Other species present include *Molinia caerulea*, *Juncus effusus*, *Carex* sp., *Dryopteris dilatata*, *Hedera helix* and *Sambucus nigra*.

Designated areas on site (cSAC, NHA, pNHA, SPA other)

None

Adjacent habitats and land-use

Habitats and land-use around the site include cutover bog with active peat-cutting (PB4), the use of improved grassland (GA1) for grazing livestock and growing fodder, some minor semi-natural habitats such as scrub and remnant patches of raised bog (PB1), some Birch woodland (WN7), commercial forestry (WD4) and the Derrinlough briquette factory to the east of the site.

Watercourses (major water features on/off site)

Several Silt pond areas are present on the site along with some drains along the site boundaries. A deep drain is present in the mid section of the site while a mostly dry drain was noted to the north of the site.

The eastern side of the site is within the Little River catchment. This river flows north along the eastern side of the site and links to the River Shannon. The western side of the site is drained by several small streams that are linked to the Rapemills River, which also flows to the River Shannon, to the west of the site, and by another small stream to the north of the site that flows directly into the River Shannon.

Fauna biodiversity**Birds**

- Several bird species were noted around the site. Wren, Robin and Blackbird use the scrub areas around site, Meadow Pipit (10 - 15) using a variety of habitats on site, Blue Tit was recorded in some of the woodlands, and Snipe (>15) in some of the wetter pioneer Poor fen and wetland areas and in the drains around the site. Wood Pigeon, Magpie, Raven and House Martin occasionally observed over the site. A flock of 22 Curlew were observed on bare peat in the N section while a flock of 40 Lapwing were observed over the S section of the site. A Peregrine Falcon was hunting close to the road on the on the E edge of the bog. Jays were also heard in at least two of the woodlands.
- A group of Mallard (9) were noted in the lake as were one Grey Heron, a single Snipe and two flocks of Lapwing (seven and twelve).

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- 16 Black-headed Gulls using lake (breeding colony?)
- 2 Great-crested Grebe
- 1 Ringed Plover (near lake)
- Blackcap (in adjacent Birch woodland)

Mammals

- Signs of Rabbits are widespread and common around the site.
- Signs of Hares also noted.
- Deer tracks were observed throughout the site while evidence of Deer rutting was also observed in some of the woodlands in the form of damaged trees and ground disturbance.
- Pine Marten tracks were observed in numerous locations around the bog.
- Signs of Badger activity in the bog included tracks, scrapes and droppings. Badger activity appeared to be focused on some sections of the woodlands.
- Fox droppings recorded at several locations.
- Evidence of Squirrels (red or grey) was noted in two of the native woodlands.

Other species

- Frogs recorded at several locations on the site.
- Sticklebacks were observed in the lake.
- Painted Lady Butterfly and Tortoiseshell Butterfly were noted in the north of the site while other invertebrate species observed included Grasshopper, Two-spotted Ladybird and numerous Dragonflies.

4/06/2010

- 4-spotted chaser Dragonfly
- Green-veined White

- Marsh Fritillary Butterfly (8) using dry grassland around the potential rich fen area.

Fungal biodiversity

Leccinum scabrum (Brown Birch Bolete), *Hygrocybe cantharellus* (Goblet Waxcap), *Lactarius vietus* (Grey Milkcap), *Lactarius uvidus*, *Lycoperdon lividum* (Common Puffball), *Armillaria tabescens* (Ringless Honey Fungus) and *Agaricus silvicola* (Wood Mushroom).

HABITAT DESCRIPTIONS

(See Habitat Descriptions Document for detailed description of each vegetation community not described in this section.)

Pioneer Poor Fen communities (pPhrag)

There is a small amount of this habitat present on the site and it is found associated with the developing wetland in the south-west section (south-west of Madden's Derries). Dense stands of *Phragmites australis* are developing in association with *Eriophorum angustifolium*-dominated vegetation (pEang) and a minor amount of *Typha latifolia* in drains with some *Carex rostrata*-dominated vegetation (pRos).

Open Water (OW)

A large area of open water is found within the Biodiversity Area in the east section of the site. This open water area is an acid oligotrophic lake and it is noticeable that there are no emergent Reedbed communities (pTyph and pPhrag) in this lake compared to other recently created lakes. Algae were noted in the lake itself with very little emergent plant species.

The marginal vegetation around the lake is a pioneer community developing on bare peat that included *Campylopus introflexus*, *Juncus bulbosus*, *Drosera rotundifolia*, *Molinia caerulea*, *Quercus robur*, *Eriophorum vaginatum*, *Polytrichum sp.*, *Sorbus aucuparia*, *Utricularia sp.*, *Alnus glutinosa*, *Carex echinata*, *Carex echinata*, *Betula pubescens*, *Succisa pratensis*, *Salix cinerea*, *Juncus effusus*, *Carex rostrata* and *Eriophorum angustifolium*. This community was a mosaic of *Campylopus*-dominated vegetation (pCamp) and *Eriophorum angustifolium*-dominated vegetation (pEang). There were some stands of *Eriophorum angustifolium* (pEang) within the water as well as a minor amount of *Carex rostrata* (pRos). Drains connected to the lake contained some *S. cuspidatum* and this species also appeared around the edge of the lake but was poorly developed.

The vegetation of the drier sections around the southern end of the lake was composed of emergent Birch (eBir) and areas of *Calluna vulgaris* dHeath). Birch was more prominent to the west of the lake, while the northern end comprised Sitka Spruce, Heather and bare peat.

The OW habitat immediately to the north of the Native Woodland scheme appears to be subject to seasonal wetting and appeared shallow and mainly consisted of *Juncus bulbosus*-dominated vegetation (pJbulb).

Potential Rich Fen Wetland complex (OW, pClad, pEang, pJeff, eBir, oBir)

This relatively small area is located in the central part of the site adjacent to the south-side of a conifer plantation and the end of the Clongawny More mineral ridge. This area is classified as production-related cutaway but has been out of production for some time and the vegetation communities are well-established. Two access routes cross through the area. This area contains several wetland areas where there is open water and/or a quaking vegetation mat. There is a subtle transition westwards related to the underlying topography from drier communities (eBir and pJeff) to the wetter communities.

The main communities were an *Eriophorum angustifolium*-dominated community and a *C. rostrata*-dominated community with a small amount of emergent *Betula*-dominated scrub. Other species present include *Carex echinata*, *Carex demissa*, *Triglochin palustris*, *Mentha aquatica*, *Molinia caerulea*, *Juncus articulatus*, *Juncus effusus*, *Ranunculus flammula*, *Juncus bulbosus*, *Hydrocotyle vulgaris*, *Salix aurita*, *Osmunda regalis*, *Narthecium ossifragum* and *Myrica gale* (west side). The quaking areas contain *Potamogeton sp.*, *Menyanthes trifoliata* and *Carex rostrata*. Mosses include extensive cover of *Calliergonella cuspidata* and *Fissidens sp.* *Drepanocladus sp.* was also present. The moss layer was extremely well developed on some sections and

some hummocks of *Sphagnum* sp. moss were also associated with these wetlands.

The open water contains some stands of *Typha latifolia* (pTyph) as well as several small clumps of *Schoenoplectus lacustris*. *Chara* is prominent in shallow water. One clump of *Cladium mariscus* (a rich fen indicator) was noted in one of the open water areas.

Drier grassland around the fringes of these wetland areas is dominated by *Molinia caerulea* (gMol). An iron flush was noted adjacent to one of the wetland areas and *Schoenus nigricans* appeared in a small drier area adjacent to the open water at the west side of this section (adjacent to the Ash woodland).

04/06/2010

This site was also visited during June 2010 and a detailed species list was made. The water level was somewhat lower but there still was extensive standing water (20 cm high) over most of the wetland. Several areas were quaking and there was still some small pools. The vegetation was dominated by *Carex rostrata* with a ground layer of dense *Chara* sp. There were patches dominated by *C. nigra* through the wet area. Loose tussocks of *Carex diandra* were scattered through the wetland, becoming locally frequent. Some of the ground layer was dominated by a dense mat of *Calliergonella cuspidata*. *Betula pubescens*, *Salix cinerea* and *Salix aurita* appeared along the old drains and in drier areas towards the margins, although the majority of the wetland was quite open. The wetland area was surrounded by mainly open scrub.

There were some large hummocks of Bryophytes including *Hylocomium splendens* associated with the scrub. Species more typical of dry communities were found on these hummocks, such as *Molinia caerulea*. Other species recorded in this area included, *Hydrocotyle vulgaris*, *Eriophorum angustifolium*, *Ranunculus flammula*, *Osmunda regalis*, *Mentha aquatica*, *Equisetum fluviatile*, *Cardamine pratensis*, *Juncus articulatus*, *J. effusus*, *Typha latifolia*, *Menyanthes trifoliata*, *Cladium mariscus*, *Potamogeton* sp., *Hippuris vulgaris*, *C. diandra*, *C. panicea*, *C. dioica*, *C. elata*, *C. demissa*, *Pinus contorta*, *Salix repens*, *Potentilla erecta*, *Listera cordata*, *Calluna vulgaris*, *Drosera rotundifolia*, *Kindbergia praelonga*, *Dryopteris carthusiana*, *Succisa pratensis*, *Centaurea nigra*, *Pedicularis sylvatica*, and *Dactylorhiza maculata*. In addition to the one large clump of *Cladium mariscus*, an additional small clump was noted at another location.

The above description indicates that this is a relatively species-rich area and is likely to develop into rich fen in the future (PF1). At present the bryophyte flora may be somewhat less diverse but the site is quite stable at present with 100% vegetation cover in the wetland areas. This area could also be classified as transition mire as it also contains several indicators of this habitat including the quaking sections and the wetland vegetation with frequent *C. diandra*. The domination by *Carex rostrata* probably indicates that the rich fen influence is not extensive at present and that the site is still in a pioneer phase. This is also confirmed by the sparse presence of brown mosses, which were only found in one location.

Marsh Fritillary was recorded within and around the margins of this area, mainly using drier open pioneer grassland dominated by *Molinia caerulea* and *Carex flacca* that was developing on a mound of glacial till along the northern boundary.

***Betula pubescens* scrub (eBir, oBir)**

This habitat is a common one, particularly in the north west of the site. *Betula pubescens* saplings and young trees are generally emerging from Poor fen vegetation dominated by *Juncus effusus*. However, *Betula pubescens* dominated scrub can develop from a range of different communities including dry grassland and disturbed vegetation, the Birch scrub appears to readily emerge from the drains. An area to the east of Madden's Derry is dominated by Open Birch as it runs along a ridge in an east west direction. The majority of eBir and oBir habitats on this site were dry and contained *Salix aurita*, *Tussilago farfara*, *Agrostis stolonifera*, *Gallium saxatile*, *Hieracium pilosella*, *Chamaerion angustifolium*, *Calluna vulgaris*, *Salix cinerea*, *Viola* sp., *Campylopus introflexus*, *Juncus effusus*, *Rubus fruticosus*, *Carex flacca*, *Eriophorum angustifolium*, *Osmunda regalis*, *Blechnum spicant* and *Polytrichum formosum*.

This habitat is also prominent along a ridge that is connected to Madden's Derries. This area contains a mosaic of open and emergent *Betula pubescens* scrub that is developing from dry heath dominated by *Calluna vulgaris*. Other species present include *Salix cinerea* and occasional *Sorbus aucuparia* and *Ulex europaeus*. The ground cover contains frequent *Juncus effusus*, *Pteridium aquilinum*, *Chamaerion angustifolium* and *Rubus fruticosus*. Other species present include *Galium saxifrage*, *Molinia caerulea*, *Cirsium* sp., *Hypericum pulchrum*, *Polytrichum* sp. moss, *Polytrichum formosum*, *Eriophorum angustifolium*, *Dryopteris affinis*, *D. dilatata*, *D. felix-mas*, *Salix repens*, *Anthoxanthum odoratum*, *Carex binervis*, *Potentilla erecta*, *Leontodon autumnalis* and *Daucus carota*

Calluna vulgaris-dominated community (dHeath)

Areas of dHeath can be found dotted throughout the site mainly on higher areas of cutover bog (former high fields). *Calluna vulgaris* is the dominant species in this habitat with other minor components comprising of *Juncus effusus*, *Cirsium palustre*, *C. arvense*, *Agrostis stolonifera*, *Succisa pratensis*, *Phragmites australis*, *Chamaerion angustifolium*, *Polytrichum sp.*, *Betula pubescens*, *Salix aurita*, *Ulex europaeus*, *Rubus fruticosus*, *Potentilla anglica*, *Salix repens*, *Hypochaeris sp.* and *Hypericum sp.*

This habitat is also found in the south-east section of the bog. It is primarily dominated by *Calluna vulgaris* and also contains substantial bare peat and *Campylopus introflexus* cover. Scrub with *Betula pubescens*, *Salix sp.* and *Pinus sp.* is colonising this habitat. Some acidic indicators were noted along the drains through this section such as *Narthecium ossifragum* and *Rhynchospora alba*. *Sphagnum spp.* mosses are appearing in the drains and some sections of drains are infilling where there is water retention (at the bottom of a small basin) with *S. cuspidatum* and *S. magellanicum* prominent. Some *S. capillifolium*. and *S. papillosum* is also appearing along the edges of the drains.

Dry grassland communities (gCal)

A small area of dry grassland habitat is found on the site but is widely distributed. This grassland is found a few locations such as close to the silt ponds, on the verges of some areas of conifer plantation and along the railway. Species composition of this habitat included *Centaurea nigra*, *Tussilago farfara*, *Equisetum sp.*, *Agrostis stolonifera*, *Daucus carota*, *Centaureum sp.*, *Rubus fruticosus*, *Hypochaeris radicata*, *Hydrocotyle vulgaris*, *Betula pubescens*, *Anthoxanthum odoratum*, *Potentilla anglica*, *Lotus corniculatus*, *Carex flacca*, *Dactylorhiza sp.*, *Hypericum pulchrum*, *Plantago lanceolata*, *Cirsium arvense*, *Carex demissa*, *Mentha sp.*, *Trifolium repens*, *Molinia caerulea* and *Rumex obtusifolius*.

This type of grassland was also found around one of the mineral islands that contained dense *Corylus avellana* scrub. Additional species present at this location included *Galium verum* and *Arrhenatherum elatius*.

Wet grassland communities (gMol)

A minor amount of dry grassland habitat is found on the site but is widely distributed. This community was also found around the small mineral mound in the centre of the site containing *Corylus avellana*-scrub and is association with railways and the drier sections of the wetland complexes. The vegetation was dominated by *Molinia caerulea* and also contained *Succisa pratensis*, *Carex demissa*, *Rubus fruticosus*, *Potentilla anglica*, *Agrostis stolonifera*, *Hypochaeris radicata*, *Cirsium spp.*, *Poa sp.*, *Anthoxanthum odoratum*, *Linum catharticum*, *Potentilla erecta*, *Plantago lanceolata*, *Calluna vulgaris* and *Viola sp.*

Dry Disturbed/Pioneer communities (DisCF, DisWill)

Dry disturbed vegetation (DisCF) is found frequently on the small mineral mounds of sub-soil made up of glacial deposits that are found around the production area. It is frequently associated with emergent scrub (eBir) and dry grassland (gCal), which also are found on these mounds. This vegetation is dominated by *Tussilago farfara* and also contains *Rubus fruticosus*, *Molinia caerulea*, *Potentilla anserina*, *Daucus carota*, *Taraxacum sp.*, *Agrostis sp.*, *Carex flacca*, *Bellis perennis*, *Briza media*, *Equisetum sp.*, *Dactylorhiza sp.*, *Cirsium arvense*, *Cirsium palustre*, *Salix aurita*, *Leucanthemum vulgare*, *Hypochaeris radicata* and *Centaureum erythraea*.

Production areas (BP)

The majority of this bog is in active production. There are extensive fields of bare peat around the site that have been recently milled and are divided by drains devoid of vegetation.

Some vegetation is spreading into other fields where there has been less recent activity although vegetation re-colonisation is at various stages. The vegetation is most typically pJeff and it is spreading from the drains into the fields. The drains in these sections are generally completely vegetated and also contain some emergent *Betula pubescens*-dominated scrub (eBir).

There is some encroachment of vegetation from the sides of the drains including pJeff pEang, pTrig, and eBir.

Conifer Plantation (WD4)

Three main commercial forestry blocks are located on the site. These areas are managed by Coillte and are

dominated by *Picea sitchensis*. These plantations have dual purposes with some sections intended for timber production and some sections intended for biodiversity. Some sections have achieved a yield class of 22 which is considered to be of medium quality (depending on planting year) from a timber production point of view but many other sections are of much poorer quality and some sections are failing completely. Low nutrient levels, high water levels, competition from other plants, namely *Calluna vulgaris* and exposure, appear to be taking their toll on these plantations.

A small flush with extensive *Sphagnum* sp. cover was noted close to the edge of the large conifer plantation in the south-east section (northern side, see map). This flush contained extensive cover of *S. capillifolium*, *S. magellanicum*, *S. papillosum* and *Aulacomnium palustre*. Forestry planted in this area had failed. Other species such as *Eriophorum vaginatum*, *Narthecium ossifragum* and *Rhynchospora alba* were present.

Riparian zone (Rip)

Two silt ponds are located on the site along with some drains along the boundary. Plant species in these areas includes *Agrostis stolonifera*, *Potamogeton* sp. and *Glyceria fluitans*. The silt ponds appeared to have been recently cleaned out and a drain to the north of the site was in the process of being cleaned during the site visit.

Recently-planted woodland (WS2)

An area to the north of the most westerly woodland (Madden's Derries) has been planted with Oak as part of the Native Woodland Scheme. This area was planted in 2008 and is clearly visible with the high deer fencing bounding it. This area consists of *Quercus robur*, *Betula pubescens*, *Calluna vulgaris*, *Eriophorum* sp. and *Juncus effusus*. The fungus *Armillaria tabescens* was also noted within this area.

Oak-Ash-Hazel Woodland (WN2)

This habitat is found in four separate locations on the site and a boundary wall is still visible in some of the woodlands, indicating they were managed in the past, possibly grazed. These woodlands are dominated by Oak trees that are estimated to be 180+ years old and are quite large (dbh 1.5 m). Many of the trees appear to have been coppiced the past and as a result are multi-stemmed. Some of these woodlands are bordered with or contained within conifer plantations.

Over-grazing (presumably by deer) is a problem with the result that there is poor diversity in the woods with a poor shrub layer and the woodland is quite open. However, some sections did have numerous *Fraxinus excelsior* (Ash seedlings) so grazing intensity may vary across the site and the poor woodland development may in part be due to the heavy canopy. Species found within the canopy and understorey included *Quercus robur*, *Corylus avellana*, *Sorbus aucuparia*, *Ilex aquifolium*, *Betula pubescens*, *Prunus spinosa*, *Euonymus europaea*, *Hedera helix*, *Sambucus nigra*, *Alnus glutinosa*, *Malus sylvestris*, *Crataegus monogyna* and *Fagus sylvatica*. Several mature *Taxus baccata* were noted in one of the woodlands. Some sections of the canopy were much younger and dominated by *Betula pubescens*, *Salix cinerea* and/or *Corylus avellana*. The ground cover was generally dominated by *Hedera helix* in the heavily shaded areas, with *Rubus fruticosus* appearing in the more lightly shaded sections. Other species present included *Dryopteris dilatata*, *Dryopteris felix-mas*, *Arum maculatum*, *Rubus fruticosus*, *Urtica dioica*, *Pteridium aquilinum*, *Lonicera periclymenum*, *Viola* sp. *Oxalis acetosella* and *Sanicula europaea*. The ground cover of these woodlands was low in diversity but survey during early summer would probably increase the number of species recorded. The ground cover also had extensive moss cover in places as well as one exposed limestone rocks. This was dominated by *Thamnobryum alopecurum*, with *Mnium hornum*, *Hypnum* sp., *Eurhynchium striatum* and *Thuidium tamariscinum* all present.

One of the woodlands has a canopy dominated by *Fraxinus excelsior* and contained *Sambucus nigra* and *Corylus avellana* with a dense *Rubus fruticosus* and *Pteridium aquilinum* understorey.

The woodland at Maddens Derries is poor in structure, with large gaps in the canopy and dense scrub and thickets of *Rubus fruticosus* and *Pteridium aquilinum* surrounding the mature trees.

Hazel scrub (WS1)

One of the small mineral mounds has developed a small area of *Corylus avellana*-dominated scrub. This scrub is quite dense and impenetrable. It is surrounded by a band of dense *Prunus spinosa* and then by a zone of dense *Pteridium aquilinum* and *Rubus fruticosus*. This is a typical example of a succession habitat that will eventually develop Ash woodland (WN2). Several *Fraxinus excelsior* and *Betula pubescens* trees are emerging

<p>from the <i>Corylus avellana</i> canopy.</p>
<p>Birch woodland (WN7)</p> <p>There is a minor amount of this habitat on the site and it can be found around the edges of the wooded mineral islands. The canopy is generally dominated by <i>Betula pubescens</i>. Other species present include <i>Sorbus aucuparia</i>. The ground cover and shrub layers are poorly developed and are dominated by <i>Rubus fruticosus</i> thickets. Other species present include <i>Molinia caerulea</i>, <i>Juncus effusus</i>, <i>Carex</i> sp., <i>Dryopteris dilatata</i>, <i>Hedera helix</i> and <i>Sambucus nigra</i>.</p>
<p>Other Habitats (around the fringe of the bog)</p>
<p>Raised Bog (PB1)</p> <p>Several small remnant patches of this habitat are found around the fringes of the site. The majority of this remnant high bog was drained in the past for industrial peat production, but peat was never harvested. These drains are now filling in. Steep face-banks separate this habitat from the industrial harvested areas of the BnM areas while domestic turf cutting has been taking place on the outer boundaries, some of which would appear to have encroached onto the BnM property. Species present include <i>Calluna vulgaris</i>, <i>Erica tetralix</i>, <i>Eriophorum vaginatum</i>, <i>E. angustifolium</i>, <i>Trichophorum cespitosum</i>, <i>Narthecium ossifragum</i>, <i>Rhynchospora alba</i>, <i>Cladonia portentosa</i>, <i>Carex panicea</i>, <i>Molinia caerulea</i>, <i>Andromeda polifolia</i>, <i>Sphagnum capillifolium</i>, <i>S. papillosum</i> and <i>S. magellanicum</i>. <i>Sphagnum cuspidatum</i> was noted in the drains. <i>Myrica gale</i> was noted on the high bog at several locations.</p> <p><i>Betula pubescens</i> and <i>Ulex europaeus</i> are spreading onto these fragments in places and there are patches of scrub (WS1) and Birch woodland (WN7) that have developed on the high bog in places.</p> <p>The majority of the raised bog would be classified as marginal or face-bank ecotopes and is dominated by <i>Calluna vulgaris</i>. A small amount being in better condition could be considered to be sub-marginal with greater <i>Eriophorum vaginatum</i> and <i>Narthecium ossifragum</i> cover. This habitat as a whole was dry and degraded with evidence that it may once have been burned. No intact pools were present and there were only a few small wet hollows containing <i>S. cuspidatum</i>. There are poor restoration prospects for any of these fragments of raised bog but they are good for biodiversity on a local level.</p>
<p>Scrub (WS1)</p> <p>This habitat appears along the fringes of the production area, mainly along the boundaries. Several different communities are present.</p> <p>Species present include <i>Salix cinerea</i>, <i>Salix aurita</i>, <i>Alnus glutinosa</i>, <i>Rubus fruticosus</i>, <i>Pteridium aquilinum</i>, <i>Crataegus monogyna</i> and <i>Betula pubescens</i>. This habitat forms a mosaic with Dense Bracken (HD1) along parts of the northern boundary.</p>
<p>Cutover Bog (PB4)</p> <p>This habitat is found around the margins of the site at several locations. Patches of cutover bog within the BnM site boundary, but managed by private individuals, are being cut privately for peat and are typical of Turbary with several different individual plots being found in the same unit. Various stages of development are present, from active peat cutting where there is very little vegetation development (dominated by bare peat) and freshly cut turf is being dried, to abandoned sections that are developing <i>Calluna vulgaris</i>-dominated vegetation (dHeath), <i>Juncus effusus</i>-dominated vegetation (pJeff), dense <i>Pteridium aquilinum</i> (dPter) or <i>Betula pubescens</i>-dominated scrub (eBir).</p> <p>Some units of cutover bog have a mosaic of these communities that are related to the time since the different plots were last cut for peat. And the cutover bog forms a mosaic with other habitats in places such as scrub (WS1) and Birch woodland (WN7), particularly on the west side of the Clongawny More mineral ridge (southwest section).</p>

Draft

Appendix II. Codes used for habitat classification.

Bord na Moña habitat classification scheme

	General	Habitat ¹	BnM habitat code	Equivalent Heritage Council codes ²
Pioneer habitats of industrial cutaway	Peatland	Bare peat (0-50% cover)	BP	ED2
		Embryonic bog community (containing <i>Sphagnum</i> and Bog Cotton)	PBa	PB
		Embryonic bog community (<i>Calluno-Sphagnion</i>)	PBb	PB
	Flush and Fen	Pioneer <i>Campylopus</i> -dominated community	pCamp	PF2
		Pioneer <i>Juncus effusus</i> -dominated community (Soft Rush)	pJeff	PF2
		Pioneer <i>Eriophorum angustifolium</i> -dominated community (Bog Cotton)	pEang	PF2
		Pioneer <i>Juncus bulbosus</i> -dominated community (Bulbous Rush)	pJbulb	PF2
		Pioneer <i>Triglochin palustris</i> -dominated community (Marsh Arrowgrass)	pTrig	PF2
		Pioneer Caricion davallianae-Community with <i>Cladium</i> (rich fen)	pCladium	PF1
	Emergent communities	Pioneer <i>Carex rostrata</i> -dominated community (Bottle Sedge)	pRos	FS1
		Pioneer <i>Phragmites australis</i> -dominated community (Common Reed)	pPhrag	FS1
		Pioneer <i>Typha latifolia</i> -dominated community (Reedmace)	pTyp	FS1
		Pioneer <i>Schoenoplectus lacustris</i> -dominated community (Bulrush)	pSch	FS1
	Open water	Charaphyte-dominated community	pChar	FL2
		Permanent pools and lakes	OW	FL2
		Temporary open water	tOW	
	Woodland and scrub	Emergent <i>Betula/Salix</i> -dominated community (A) (Birch/Willow)	eBir	WS1
		Open <i>Betula/Salix</i> -dominated community (B) (Birch/Willow)	oBir	WS1
		Closed <i>Betula/Salix</i> scrub community (C) (Birch/Willow)	cBir	WS1
		<i>Ulex europaeus</i> -dominated community (Gorse)	eGor	WS1
		<i>Betula/Salix</i> -dominated woodland (Birch/Willow)	BirWD	WN7
	Heathland	Pioneer dry <i>Calluna vulgaris</i> -dominated community (Heather)	dHeath	HH1
		Dense <i>Pteridium aquilinum</i> (Bracken)	dPter	HD1
	Grassland	Pioneer dry calcareous and neutral grassland (Centaureo-Cynosuretum)	gCal	GS1
		<i>Dactylis-Anthoxanthum</i> -dominated community (Cocksfoot-Sweet Vernalgrass)	gCo-An	GS2
		<i>Anthoxanthum-Holcus-Equisetum</i> community (Sweet Vernalgrass-Yorkshire Fog-Horsetail)	gAn-H-Eq	GS
		<i>Molinia caerulea</i> -dominated community (dry) (Purple Moorgrass)	gMol	GS4
		Marsh (Meadowsweet and other tall herbs) (<i>Filipendulion ulmariae</i>)	Mar	GM1
	Disturbed	<i>Tussilago farfara</i> -dominated community (vegetation > 50%) (Colt's Foot)	DisCF	ED3
		<i>Epilobium</i> -dominated community (vegetation > 50%) (Willowherb spp.)	DisWil	ED3
General	Riparian areas (streams or drain with associated edge habitats (e.g. FW2/4 + WS1, GS2 etc)	Rip	FW2 +	
	Silt Ponds (artificial ponds with associated bank habitats (e.g. FL8 + WS1, GS2, ED2, ED3)	Silt	FL8 +	
	Access (tracks or railways with associated edge habitats (e.g. BL3 + gCal, gMol, eGor etc)	Acc	BL3 +	
	Works areas (predominately built land but can include landscaped and brownfield habitats (e.g. GA2, WS3, WD4, ED2, ED3)	Works	BL3 +	

¹ These are generally pioneer habitats of bare peat and the communities can contain a significant proportion of bare peat. Some habitats are more developed than others. They frequently occur in mosaic with each other.

² Not all these communities are equivalent to habitat classes used by The Heritage Council habitat classification scheme (Fossitt 2000) as some are quite rudimentary and undeveloped.

Heritage Council habitat classification scheme (Fossitt 2000)

	General	Habitat	Heritage Council code
Semi-natural and modified habitats	Peatlands	Raised Bog	PB1
		Lowland Blanket bog	PB3
		Cutover Bog	PB4
		Rich fen and flush	PF1
		Poor fen and flush	PF2
		Transition mire and quaking bog	PF3
	Woodland and scrub	Oak-Birch-Holly woodland	WN1
		Oak-Ash-Hazel woodland	WN2
		Wet Pendunculate Oak-Ash woodland	WN4
		Riparian Woodland	WN5
		Wet Willow-Alder-Ash woodland	WN6
		Bog woodland	WN7
		Mixed broad-leaved woodland	WD1
		Mixed broad-leaved/conifer woodland	WD2
		Conifer plantation	WD4
		Scrub (Gorse)	WS1
		Emergent Betula-dominated community	WS1
		Closed Betula scrub community	WS1
		Recently-planted woodland	WS2
		Ornamental scrub	WS3
	Short-rotation coppice	WS4	
	Recently-felled woodland	WS5	
	Linear woodland	Hedgerow	WL1
		Treeline	WL2
	Grasslands and Marsh	Improved grassland	GA1
		Amenity grassland	GA2
		Dry calcareous and neutral grsld	GS1
		Dry meadows and grassy verges	GS2
		Dry-humid acid grassland	GS3
		Wet grassland	GS4
	Freshwater Marsh	GM1	
	Heath and Bracken	Dry Heath	HH1
		Dry calcareous Heath	HH2
		Wet Heath	HH3
		Dense Bracken	HD1
	Disturbed ground	Exposed sand,gravel or till	ED1
Spoil and bare ground		ED2	
Recolonising bare ground		ED3	
Active quarry		ED4	
Freshwater	Acid Oligotrophic lakes	FL2	
	Mesotrophic lakes	FW4	
	Artificial ponds (slit ponds)	FL8	
	Depositing rivers	FW2	
	Canals	FW3	
	Drains	FW4	
Cultivated and Built land	Stonewalls and other stonework	BL1	
	Earth Banks	BL2	
	Buildings and artificial surfaces	BL3	
	Arable crops	BC1	
	Horticulture	BC2	
	Tilled land	BC3	



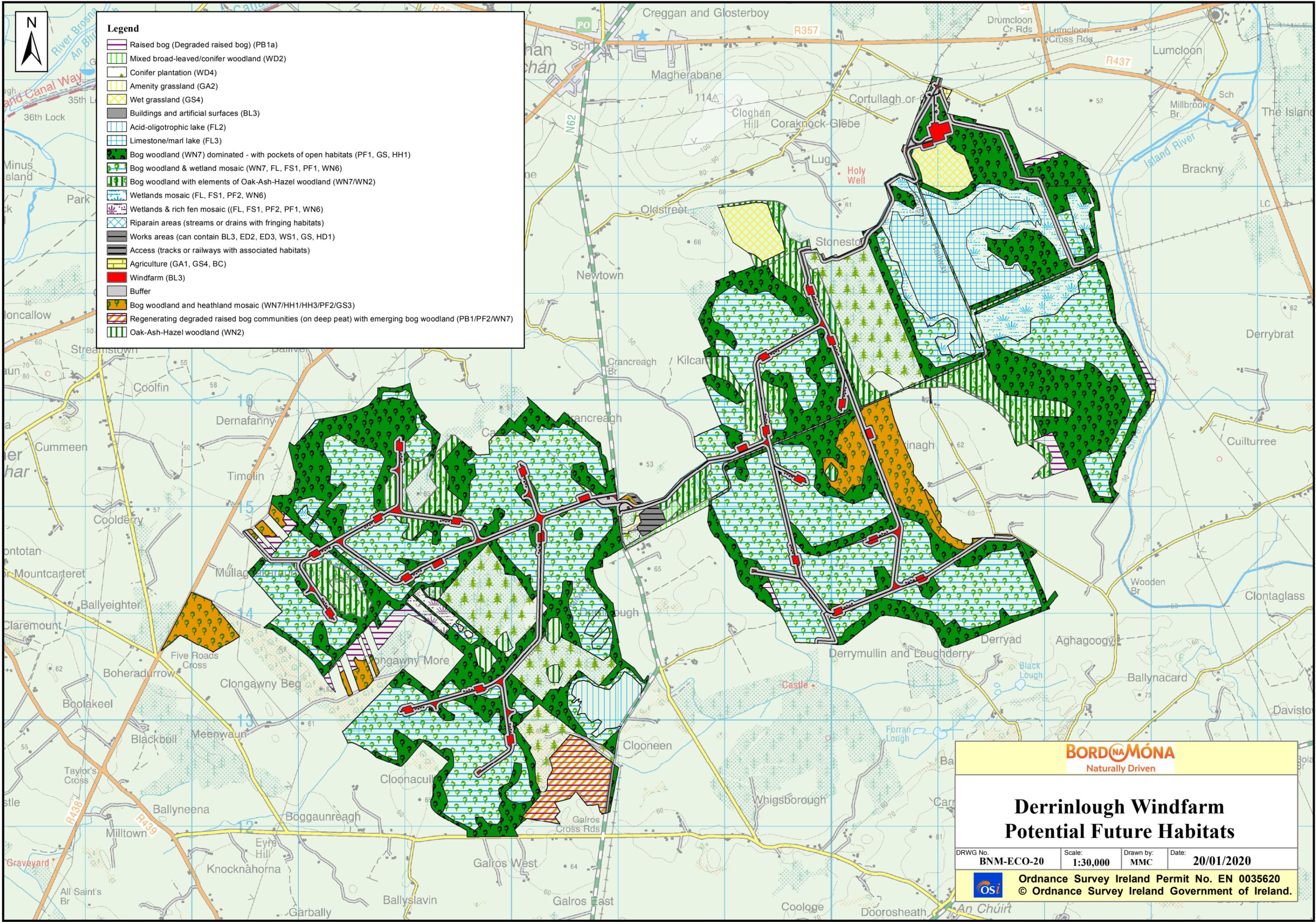
APPENDIX 6

**HABITATS MAP, POTENTIAL
FUTURE HABITATS MAP AND
LANDUSE MAP**



Legend

-  Raised bog (Degraded raised bog) (PB1a)
-  Mixed broad-leaved/conifer woodland (WD2)
-  Conifer plantation (WD4)
-  Amenity grassland (GA2)
-  Wet grassland (GS4)
-  Buildings and artificial surfaces (BL3)
-  Acid-oligotrophic lake (FL2)
-  Limestone/marl lake (FL3)
-  Bog woodland (WN7) dominated - with pockets of open habitats (PF1, GS, HH1)
-  Bog woodland & wetland mosaic (WN7, FL, FS1, PF1, WN6)
-  Bog woodland with elements of Oak-Ash-Hazel woodland (WN7/WN2)
-  Wetlands mosaic (FL, FS1, PF2, WN6)
-  Wetlands & rich fen mosaic ((FL, FS1, PF2, PF1, WN6)
-  Riparian areas (streams or drains with fringing habitats)
-  Works areas (can contain BL3, ED2, ED3, WS1, GS, HD1)
-  Access (tracks or railways with associated habitats)
-  Agriculture (GA1, GS4, BC)
-  Windfarm (BL3)
-  Buffer
-  Bog woodland and heathland mosaic (WN7/HH1/HH3/PF2/GS3)
-  Regenerating degraded raised bog communities (on deep peat) with emerging bog woodland (PB1/PF2/WN7)
-  Oak-Ash-Hazel woodland (WN2)



BORD na MÓNA
Naturally Driven

Derrinlough Windfarm Potential Future Habitats

DRWG No.	Scale:	Drawn by:	Date:
BNM-ECO-20	1:30,000	MMC	20/01/2020

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Legend

Clongawney Habitat

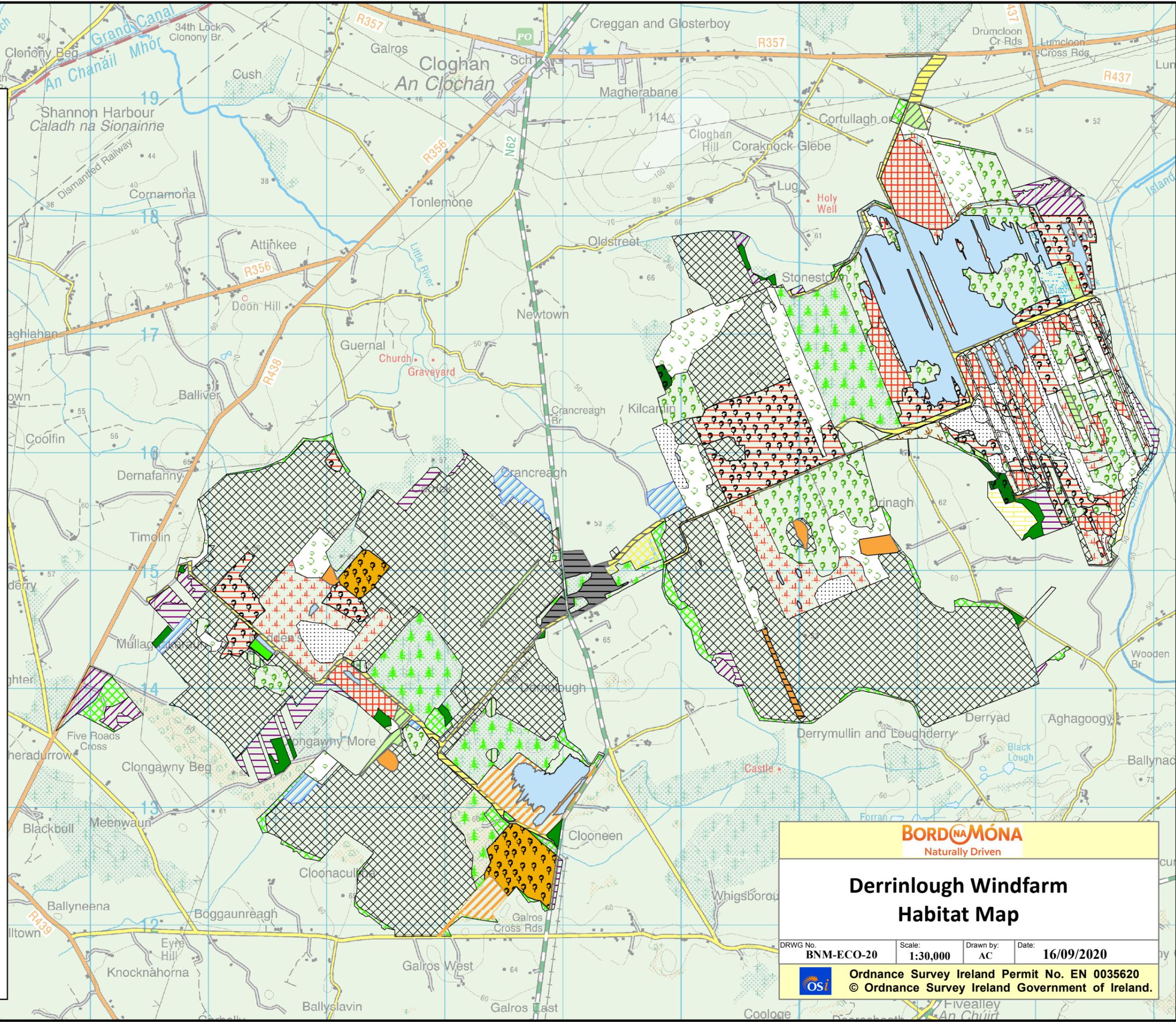
Hab_code2

- Raised Bog (PB1)
- Cutover Bog (PB4)
- Oak-Ash-Hazel woodland (WN2)
- Bog woodland (WN7)
- Conifer plantation (WD4)
- Scrub (WS1)
- Recently-planted woodland (WS2)
- Improved grassland (GA1)
- Dense Bracken (HD1)
- Bare peat (BnM*)
- Bare peat & Poor fen mosaic (BnM*)
- Pioneer Poor fen community (BnM*)
- Pioneer Poor fen community mosaic (BnM*)
- Open water (BnM*)
- Emergent Birch scrub (pioneer) (BnM*)
- Birch scrub (BnM*)
- Birch scrub & Poor fen mosaic (BnM*)
- Dry heath (BnM*)
- Pioneer dry heath (BnM*)
- Dry heath and Birch scrub mosaic (BnM*)
- Wet grassland (BnM*)
- Access (tracks or railways with adjacent habitats) (BnM*)
- Silt ponds (with fringing habitats) (BnM*)
- Works Areas (BnM*)

Drinagh Habitat

Hab_code2

- Raised Bog (PB1)
- Cutover Bog (PB4)
- Bog woodland (WN7)
- Conifer plantation (WD4)
- Scrub (WS1)
- Improved grassland (GA1)
- Wet grassland (GS4)
- Dense Bracken (HD1)
- Tilled land (BC3)
- Bare peat (BnM*)
- Bare peat & Poor fen mosaic (BnM*)
- Pioneer Poor fen community (BnM*)
- Pioneer Poor fen community mosaic (BnM*)
- Reedbeds (BnM*)
- Open water (BnM*)
- Emergent Birch scrub (pioneer) (BnM*)
- Birch scrub (BnM*)
- Birch-Willow woodland (BnM*)
- Birch scrub & Poor fen mosaic (BnM*)
- Birch scrub & dry grassland mosaic (BnM*)
- Gorse scrub (BnM*)
- Dry heath (BnM*)
- Dry heath & Bracken mosaic (BnM*)
- Dry grassland (BnM*)
- Wet grassland (BnM*)
- Dry grassland & Poor fen mosaic (BnM*)
- Access (tracks or railways with adjacent habitats) (BnM*)
- Silt ponds (with fringing habitats) (BnM*)
- Works Areas (BnM*)

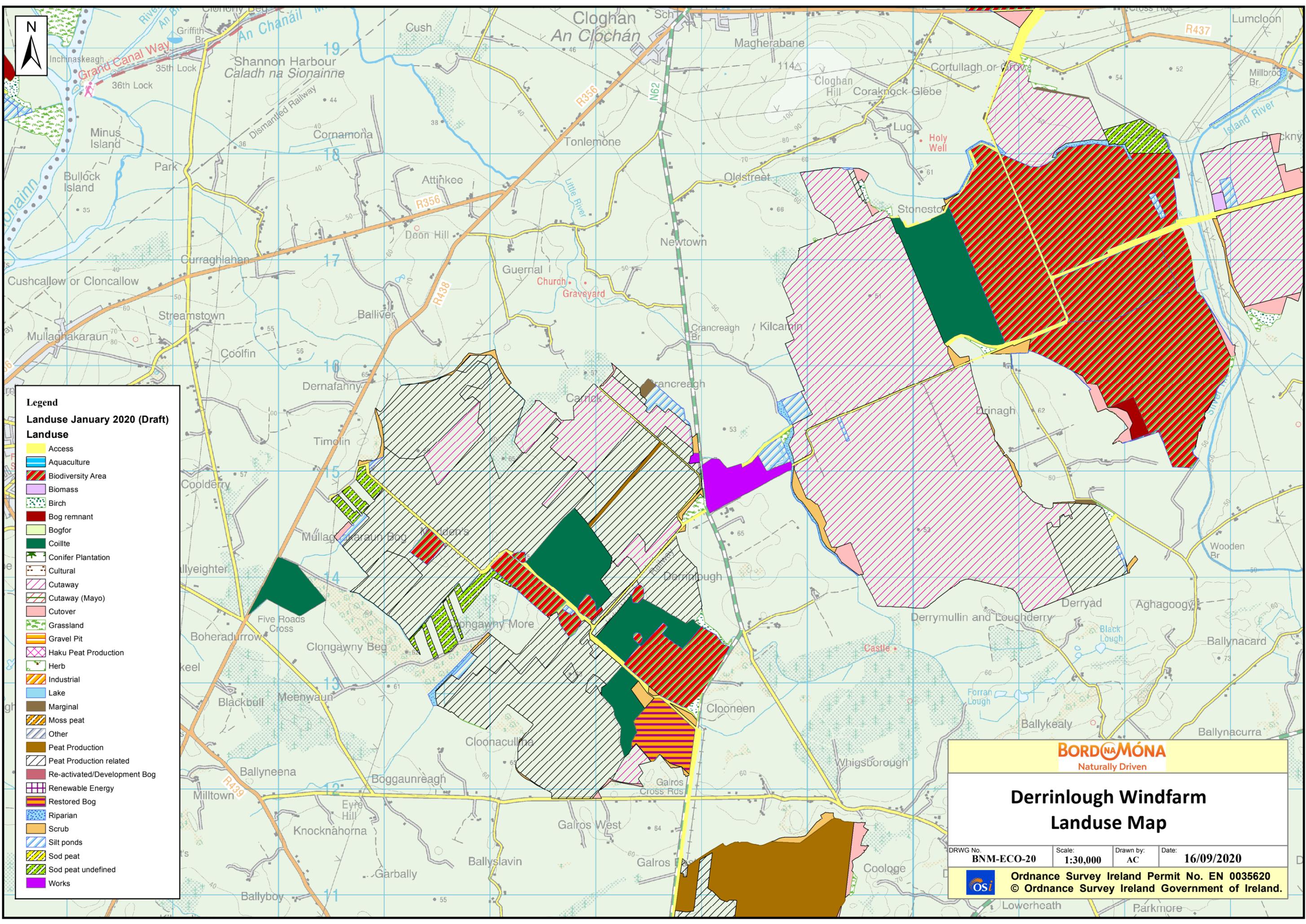


BORD NA MÓNA
Naturally Driven

Derrinlough Windfarm Habitat Map

DRWG No. BNM-ECO-20	Scale: 1:30,000	Drawn by: AC	Date: 16/09/2020
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Legend
Landuse January 2020 (Draft)
Landuse

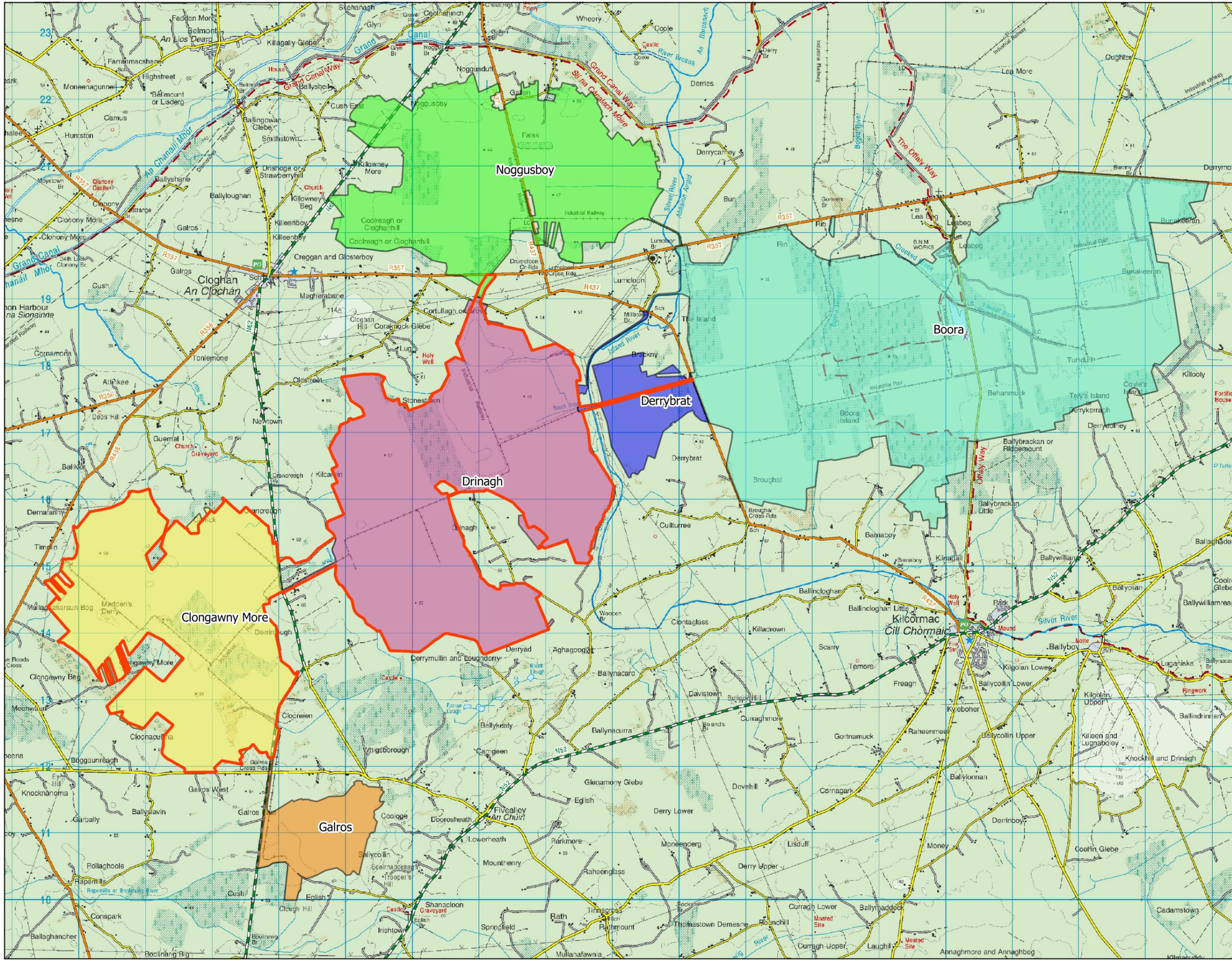
- Access
- Aquaculture
- Biodiversity Area
- Biomass
- Birch
- Bog remnant
- Bogfor
- Coilte
- Conifer Plantation
- Cultural
- Cutaway
- Cutaway (Mayo)
- Cutover
- Grassland
- Gravel Pit
- Haku Peat Production
- Herb
- Industrial
- Lake
- Marginal
- Moss peat
- Other
- Peat Production
- Peat Production related
- Re-activated/Development Bog
- Renewable Energy
- Restored Bog
- Riparian
- Scrub
- Silt ponds
- Sod peat
- Sod peat undefined
- Works

BORD na MÓNA
 Naturally Driven

**Derrinlough Windfarm
 Landuse Map**

DRWG No. BNM-ECO-20	Scale: 1:30,000	Drawn by: AC	Date: 16/09/2020
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Map Legend

- EIAR Site Boundary
- IPC Licensed Areas
 - Boora
 - Clongawny More
 - Derrybrat
 - Drinagh
 - Galros
 - Noggusboy

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Drawing Title	
Wind Farm in context of IPC Licensed Lands	
Project Title	
171221 - BnM Clongawny Drinagh WF	
Drawn By	Checked By
DOS	PR
Project No.	Drawing No.
171221	Fig 6-1
Scale	Date
1:50000	22.09.20

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APPENDIX 7

**DRAFT OFFALY COUNTY
DEVELOPMENT PLAN 2021-2027**

1.

OFFALY COUNTY DEVELOPMENT PLAN 2021-2027

At present Offaly County Council have commenced the review of the existing Offaly County Development Plan 2014-2020 by preparing the new Offaly County Development Plan 2021-2027. The Draft County Development Plan is currently at the second stage of public consultation, this stage of the drafting process is due to be complete by October 2020.

The Draft Offaly County Development Plan 2021-2027 (Draft Plan) sets out the land use plan and overall strategy for the proper planning and sustainable development of the functional area of County Offaly over the lifetime of the plan. As noted within the draft plan it is the strategic vision of the Draft County Development Plan:

“To create a sustainable and competitive county that supports the health and wellbeing of our people and places, from urban to rural, with access to employment opportunities supported by high quality housing and physical, social and community infrastructure for all, in a climate resilient manner and with respect for our biodiversity.”

The draft plan aims to build on previous successes and to strengthen the strategic advantages of the county to ensure that the elements including infrastructure meet their potential. The draft plan also lists the following strategic aims:

“(ix) Make more efficient use of key resources such as land, water, energy, waste and transportation infrastructure.”

“(xi) Achieve transition to a competitive, low carbon, climate resilient and environmentally sustainable economy. This should be facilitated through reducing the need to travel, by integrating land use and sustainable modes of transport, and by reducing the use of non-renewable resources. In line with this, promote active and healthy lifestyles through increased opportunities for walking, cycling and active sport recreation.”

Chapter 3 of the draft plan sets out the councils considerations surrounding ‘Climate Action and Energy’. The draft plan notes that Ireland’s climate is changing in terms of “sea level rise, higher average temperatures, changes in precipitation patterns, more frequent weather extremes, the spread of invasive alien species and increased risk of wildfires”. It is acknowledged within the draft plan that the impacts and risks associated with climate change can be reduced and managed through mitigation and adaptation actions. The following is set out within the draft plan:

“Climate adaptation involves taking steps to adjust human and natural systems in response to existing and anticipated impacts and to take advantage of new opportunities that may arise. Adaptation also brings opportunity through green growth, innovation, jobs and ecosystem enhancement as well as improvements in areas such as water and air quality.”

Offaly County Council recognise the potential economic benefit of a transition from fossil fuel based energy production through to investment in renewable energy, the promotion of the green enterprise sector and the creation of green collar jobs.

Section 3.2.6 of the draft plan sets out Offaly County Councils considerations surrounding wind energy. It is noted that site suitability is an important factor in determining the suitability of wind farms, this includes having regard to adverse impacts such as ‘residential amenities, landscape, including views or prospects, wildlife, habitats, designated sites, protected structures or bird migration paths and compatibility with

adjoining land uses’. A draft wind energy strategy has been prepared as part of the draft Offaly County Development Plan 2021-2027 (discussed in Section 2.5.1.2 of this RFI).

In relation peatlands it is a consideration of Offaly County Council within the draft plan that peat-fired electricity generation will be phased out early this decade. The draft plan recognises the potential which Offaly’s circa 80,000 hectares of industrial peatlands offer for opportunities which include amenity, tourism, biodiversity services, ‘wild areas’, flood management, climate mitigation, energy development, industry, education, conservation along with more. Furthermore the following is noted:

“The Council considers that there is significant potential to develop a Green Energy Hub in County Offaly, which focuses on the higher order aspects of the industry such as research, new technologies, headquarter development, assembly, maintenance and financing, due to its extensive area of peatlands, its long history in power generation and its proactive position in relation to renewable energy developments over the past decade.”

The following relevant policy is listed within the draft plan surrounding climate change and the development of renewable energy:

➤ **CAEP-04**

- a) *It is Council policy to support and facilitate European and national objectives for climate adaptation and mitigation as detailed in the following documents, taking into account other provisions of the Plan (including those relating to land use planning, energy, sustainable mobility, flood risk management and drainage);*
- *Climate Action Plan (2019 and any subsequent versions);*
 - *National Mitigation Plan (2017 and any subsequent versions);*
 - *National Climate Change Adaptation Framework (2018 and any subsequent versions);*
 - *Any Regional Decarbonisation Plan prepared on foot of commitments included in the emerging Regional Spatial and Economic Strategy for the Eastern and Midland Region;*
 - *Relevant provisions of any Sectoral Adaptation Plans prepared to comply with the requirements of the Climate Action and Low Carbon Development Act 2015, including those seeking to contribute towards the National Transition Objective, to pursue, and achieve, the transition to a low carbon, climate resilient and environmentally sustainable economy by the end of the year 2050; and*
 - *Offaly Climate Change Adaptation Strategy.*

➤ **CAEP-06**

- b) *It is Council policy to raise general awareness of issues associated with climate action and climate change mitigation and adaptation.*

➤ **CAEP-07**

- c) *It is Council policy to support local, regional, national and international initiatives for climate adaptation and mitigation and to limit emissions of greenhouse gases through energy efficiency and the development of renewable energy sources which make use of all natural resources, including publicly owned lands, in an environmentally acceptable manner.*

➤ **CAEP-08**

- d) *It is Council policy to support the transition to a competitive, low carbon, climate-resilient and environmentally sustainable economy by 2050, by way of reducing greenhouse gases, increasing renewable energy, and improving energy efficiency.*

➤ **CAEP-09**

- e) *It is Council policy to support the National Dialogue on Climate Action in an effort to increase awareness of climate change, behavioural change and adaptation actions and in doing so provide an ongoing platform for planning climate resilience with a focus on personal responsibility at all levels.*

➤ **CAEP-21**

- f) *It is Council policy to actively promote and support the 'Just Transition' and the EU Programme for Coal Regions in Transition, in particular to support communities which have been dependent on the peat industry for decades.*
- **CAEP-22**
- g) *It is Council policy to encourage and facilitate the production of energy from renewable sources, such as from bioenergy, waste material, solar, hydro, geothermal and wind energy, subject to proper planning and environmental considerations.*
- **CAEP-23**
- h) *It is Council policy to encourage developers of proposed large scale renewable energy projects to carry out community consultation in accordance with best practice and to commence the consultation at the commencement of project planning.*
- **CAEP-34**
- i) *It is Council policy to recognise the importance of wind energy as a renewable energy source which can play a vital role in achieving national targets in relation to reductions in fossil fuel dependency and therefore greenhouse gas emissions.*
- **CAEP-35**
- j) *It is Council policy that in assessing planning applications for wind farms, the Council shall:*
 - a) *have regard to the Department of the Environment, Heritage and Local Government's Guidelines for Planning Authorities on Wind Energy Development (or any update of this document) including applying appropriate setback distances as identified in the Guidelines;*
 - b) *have regard to 'Areas Open for Consideration for Wind Energy Developments' in the Wind Energy Strategy Designations Map from the County Wind Energy Strategy;*
 - c) *require a 2 km separation distance from turbines to town and village settlement boundaries in the county;*
 - d) *have regard to Development Management Standard 109 on wind farms contained in Chapter 13 of this Plan; and*
 - e) *have regard to existing and future international, European, national and regional policy, directives and legislation.*

Further to the above the following climate action and energy objectives are also listed:

- **CAEO-01**
- k) *It is an objective of the Council to implement the current Climate Change Adaptation Strategy for County Offaly.*
- **CAEO-02**
- l) *It is an objective of the Council to achieve a reasonable balance between responding to government policy on renewable energy and in enabling the wind energy resources of the county to be harnessed in an environmentally sustainable manner.*
- **CAEO-03**
- m) *It is an objective of the Council to implement the Council's Wind Energy Strategy as follows:*
 1. *In 'Areas Deemed Open for Consideration for Wind Energy Development' as identified in Map No. 10 'Wind Energy Strategy Designations', the development of windfarms and smaller wind energy projects will be considered;*
 2. *In all other areas, wind energy developments shall not normally be permitted –except as provided for under relevant exemption provisions in the Planning and Development Regulations 2001 (as amended); and*
 3. *Applications for re-powering (by replacing existing wind turbines) and extension of existing and permitted wind farms will be assessed on a case by case basis and will be subject to criteria listed in Development Management Standard 109 contained in Chapter 13 of Volume 1 of this County Development Plan and the Section 28 Ministerial Wind Energy Development Guidelines.*

Chapter 5 of the draft Plan sets out the economic development of the county over the lifetime of the draft plan. Under this section of the draft plan the potential of cutaway bogs is noted, it is considered that cutaway bogs have potential land uses that can enhance both the employment, renewable energy generation, and tourism sectors of the county. The council also recognise the following:

“The Council recognises that the energy sector, both renewables and non-renewables, is currently a significant employer in the county and has potential for considerable growth over the lifetime of this plan. The Council will encourage and facilitate the development of renewable energy projects in rural areas.”

The following relevant policies have been included under Chapter 5 of the draft Plan:

➤ **REDP-09**

n) *As part of Offaly County Council’s recognition of the contribution that rural areas make to social and economic wellbeing, it is Council policy to support and protect existing rural economies such as (i) valuable agricultural lands to ensure sustainable food supply, (ii) the value and character of the open countryside and (iii) the diversification of rural economies to create additional jobs and maximise opportunities in emerging sectors, such as agri-business, renewable energy, tourism, and forestry enterprise.*

➤ **REDP-14**

o) *It is Council policy to support the development of renewable energy in rural areas, where it is considered appropriate i.e. where it is demonstrated that such development would not result in significant environmental effects. Such development will be assessed on a case-by-case basis.*

Chapter 13 of the draft Plan sets out the development management standards for the county. The following standards relate to climate change and/or renewable energy:

➤ **DMS-108 Peatlands**

p) *In the consideration of development on or adjacent to peatland areas, the following guiding principles should apply:*

- *Consideration of the potential contribution of peatlands to climate change mitigation and adaptation including renewable energy production;*
- *Consideration of habitats and species of environmental significance;*
- *Consideration of the potential contribution of peatlands to an existing or proposed greenway/blueway/peatway network;*
- *Consideration of the ecosystem services and tourism potential provided by peatlands;*
- *Development of peatlands shall ensure that there are no negative impacts on water quality and hydrology;*
- *Consideration of peatland stability;*
- *Achieving of a carbon emissions balance; and*
- *Incorporation of fire mitigation measures such as fire breaks or ensuring access points and routes are suitable for travel by emergency services.*

➤ **DMS-109 Wind Farms**

q) *When assessing planning applications for wind energy developments the Council will have regard to;*

- *the Wind Energy Development Guidelines for Planning Authorities, DoEHLG, (2006) and any amendments to the Guidelines which may be made; and*
- *the Wind Energy Strategy Designations Map from the County Wind Energy Strategy showing areas identified as ‘Areas Open for Consideration for Wind Energy Developments’ and ‘Areas not deemed suitable for Wind Energy Developments’, and specific policy for wind development in these areas as outlined in Section 8 of the County Wind Energy Strategy;*

- *2 km separation distance from turbines to town and village boundaries in the county as required by policy CAEP-35 of this Plan.*

In addition to the above, the following local considerations will be taken into account by the Council in relation to any planning application;

- *Impact on the visual amenities of the area;*
- *Impact on the residential amenities of the area;*
- *Scale and layout of the project, any cumulative effects due to other projects and the extent to which the impacts are visible across the local landscape;*
- *Visual impact of the proposal with respect to protected views, scenic routes and designated scenic landscapes;*
- *Impact on nature conservation, ecology, soil, hydrology, groundwater, archaeology, built heritage and public rights of way;*
- *Impact on ground conditions and geology;*
- *Consideration of falling distance plus an additional flashover distance from wind turbines to overhead transmission lines;*
- *Impact of development on the road network in the area; and*
- *Impact on human health in relation to noise disturbance (including consistency with the World Health Organisations 2018 Environmental Noise Guidelines for the European Region), shadow flicker and air quality.*

In summary the Draft Offaly County Development Plan 2021-2027 acknowledges the importance of combating climate change and deriving more energy from renewable sources. It is evident that Offaly County Council are broadly supportive of the development of renewable energy within the county and also recognise the importance of achieving a competitive, low carbon, climate resilient and environmentally sustainable economy. Accordingly the proposed development is broadly compliant with the relevant provisions of the Draft Offaly County Development Plan 2021-2027.

1.1

Offaly County Development Plan 2021-2027 County Wind Energy Strategy

The County Wind Energy Strategy (draft WES) will form part of the Draft Offaly County Development Plan 2021-2027. The draft WES will guide the development of wind energy developments in the county up to the year 2027. The draft WES builds upon the current Wind Energy Strategy contained in the previous Offaly County Development Plan 2014-2020 and takes account of new and updated legislation, policy and guidelines at International, European, National and Regional levels.

Within the WES the following objectives have been set out with regards to the development of wind energy within the County:

- 1. Reflect and plan for technological advances in wind farms over the next number of years.*
- 2. Support wind energy as a renewable energy source which can play a vital role in achieving national targets in relation to reductions in fossil fuel dependency and greenhouse gas emissions;*
- 3. Identify key areas within the county that are ‘Open for Consideration for Wind Energy Developments’ or ‘Unsuitable for Wind Energy Developments’ based on wind speed, access to the electricity grid and substations, and avoidance of adverse impacts on the landscape and designated sites.*

4. *Consider the potential for micro-generation (generation that is less than 11 kW) wind energy developments and for small community based proposals outside key areas within the county that are ‘Open for Consideration for Wind Energy Developments’*
5. *Ensure full compliance with the requirements of EU SEA Directive 2001/42/EC and Statutory Instrument 436/2004 [Planning and Development (Strategic Environmental Assessment) Regulations 2004] on the assessment of the effects of certain plans and programmes on the Environment, and the Planning and Development Act 2000 (as amended), the EU Habitats Directive (92/43/EEC) and EU Birds Directive (2009/147/EC).*

According to Section 4 of the draft WES Offaly’s current total installed capacity (at the time of drafting) comprises of 3 wind farms (total 36 turbines) with an installed capacity of 98.5 MW. Based on the national installed wind capacity of 3,748 MW from Quarter 2 of 2019, the installed wind capacity in County Offaly therefore represents just 2.63% of the total installed wind capacity within Ireland.

The WES have identified areas which are suitable for wind energy developments based on the following criteria:

- *Existing Wind Speeds and accessibility to electricity transmission and distribution grids*
- *Evaluation of the landscape and its sensitivity for wind energy developments*
- *Overlay of the Wind Energy Mapping with Landscape Evaluation and Sensitivity Analysis with information regarding built and natural heritage, archaeological and amenity designations in the Development Plan and existing settlements within the county*

The draft WES has identified 12 potential wind energy areas within the county, the site of the Derrinlough Wind Farm is located in ‘Area 7- Area generally south of Cloghan and Birr Environs’. As per the draft WES the area south of Cloghan is characterised by a predominantly flat and in places slightly undulating landscape with a number of significant tracts of peatlands and transitional woodlands, and coniferous forestry in places. Further it is noted that:

“There also exists good wind speeds and reasonable access to the grid. The extensive tracts of flat peatlands in this area offer potential to accommodate a wind farm layout with depth, comprising a grid formation giving a better sense of balance and visual cohesion.”

Furthermore, within the draft WES when referring to ‘Area 7’ it is acknowledged that there is a precedent of windfarm and renewable energy projects developed in the area (Meewaun Wind Farm). Under the recommendation for this area it was deemed *“Open for consideration for Wind Energy development’ in principle”*.

The following policy is listed within the draft Wind Energy Strategy:

“It is the policy of the Council to assess proposals for new wind energy developments in accordance with Map No. 10 ‘Wind Energy Strategy Designations’, Climate Action Energy Objective 03 (Chapter 3 Climate Action and Energy) and the following parameters:

1.Areas Deemed Open for Consideration for Wind Energy Developments

These areas are open for consideration for wind energy development as these areas are characterised by low housing densities, do not conflict with European or National designated sites and have the ability by virtue of their landscape characteristics to absorb wind farm developments. Notwithstanding this designation, wind farm developments in these areas will be evaluated on a case by case basis subject to criteria listed in Development Management Standard 109 contained in Chapter 13 of Volume 1 of this County Development Plan and the Section 28 Wind Energy Development Guidelines.

2.Areas Not Deemed Suitable for Wind Energy Developments

(a) This area is considered to be generally unsuitable for wind farm development due to significant environmental, heritage and landscape constraints and housing density.

(b) Individual small scale turbines will be considered on a case by case basis having regard to relevant exemption provisions in the Planning and Development Regulations 2001 as amended.

(c) Applications for re-powering (by replacing existing wind turbines) and extension of existing and permitted wind farms will be assessed on a case by case basis and will be subject to criteria listed in Development Management Standard 109 contained in Chapter 13 of Volume 1 of this County Development Plan and the Section 28 Wind Energy Development Guidelines.”

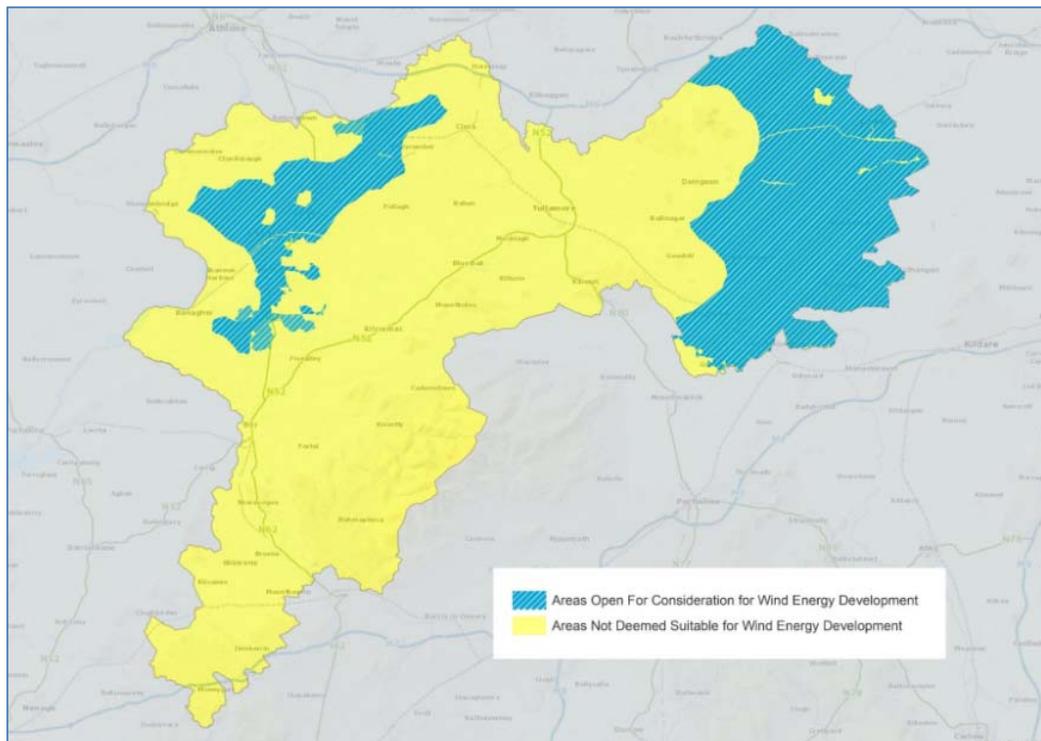


Plate 1-1 Map No.10 Wind Energy Strategy Designations (source: Offaly County Development Plan 2021-2027: Draft Stage Wind Energy Strategy)

