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APPENDICES

1 INTRODUCTION

1.1 OVERVIEW

Planning permission is sought by ESB "The Applicant" for planning permission for the removal of the partially built grid connection and for the development of the full length of a new grid connection over a distance of approximately 14.8 km, to connect the already consented Derreenacrinnig West Wind Farm to the existing Ballylicky substation in Co. Cork within the townlands of Derreenacrinnig West, Barnagowlane West, Glanareagh, Gortnacowly, Ards Beg, Ardrah, Laharanshermeen, Maulraha, Maulikeeve, Derryarkane, Cappanaboul, Skahanagh, Gortroe, Shandrum Beg, Shandrum More, Dromloughlin, Ballylicky, Crossoge, Co Cork.

The proposed development involves the following works:

(a) removal of approximately 9.6 km of 20 kV overhead line (OHL) along the route, the OHL to be removed consists of 138 wood poles (ranging from 9m to 12.5m above ground) supporting electrical conductor lines and ancillary structures and equipment.

(b) following removal of the OHL, it is proposed to construct approximately 10.8 km of 20 kV overhead line (OHL) along the route, the OHL to be constructed consists of c. 157 wood poles (ranging from 9m to 12.5m above ground) supporting electrical conductor lines and ancillary structures and equipment.

(c) installation of approximately 3.3km of underground cable ducting and associated electrical cabling, and all other ancillary works including joint bays, culverts, marker posts and all associated developments."

This EIAR includes an evaluation of the Grid Connection route and is assessed in combination with the wind farm and the removal of the existing grid connection.

1.1.1 Planning History and Background to the Project Proposals

A planning application was submitted by George O 'Mahony for a 10 year planning permission for development of a wind farm comprising seven number wind turbines with a hub height of 55 metres and a rotor diameter of 52 metres, an electrical compound, sub-station building, four number car parking spaces, associated site roads and site works.

A decision to grant planning permission was made in October 2011 by Cork County Council under Reg. Ref. 10/857 for a wind farm, comprising 7 wind turbines, an electrical compound and sub-station and all related electrical equipment, subject to 29 conditions. The decision was appealed by third parties to An Bord Pleanála who subsequently upheld the grant of planning permission on 05th December 2012, subject to 16 conditions under An Bord Pleanála PL88.239767 Decision. A copy of that Appeal Decision is set out at **Appendix A.**

Following the grant of planning permission, the wind farm developer received a connection offer from ESB in 2014. This connection was accepted as a non-contestable offer which means that the wind farm developers agree that the works would be carried out by the applicant, ESB. ESB subsequently commenced works on the Grid Connection as part of the Overhead Line [OHL] and Under Ground Connection [UGC]. Work to the Grid Connection commenced in October 2017.Prior to the construction of the grid connection, ESBI carried out an Exempted Development Screening Study for ESB of the proposed grid connection, to determine whether or not it would fall within the planning exemptions available for such development.

The planning permission for the consented Derreenacrinnig West Wind Farm was implemented, and work commenced on site on the 28th of August 2017. All pre-commencement conditions relating to the wind farm have been discharged. Civil works at the wind farm site are well advanced although there is no activity at present. Works to the grid connection commenced in October 2017.

The planning permission for the consented wind farm was implemented and works commenced on site on the 28th of August 2017. Civil works at the wind farm site are well advanced although there is no activity at present until such time as planning permission for the grid connection is granted. Construction of the grid connection commenced in October 2017. All works have now ceased on the project.

1.1.2 Planning Application Reference 19/0010

A planning application for the construction of the unbuilt grid connection was submitted to Cork County Council in January 2019 under planning application reference 19/10.That planning application related to the "*installation of approximately 3.2km of underground cable ducting and associated electrical cabling, approximately 1.2km* of overhead line …*The works, which will take place at separate locations along the 14km grid connection route, are required to completed the grid connection from Derreenacrinnig West Windfarm to the ESB Ballylickey substation."*

Planning Appeal Reference ABP/305790-19

The Decision to Grant was appealed by a Third Party to ABP under planning appeal reference ABP/305790-19. The decision of Cork County Council to grant planning permission was upheld by ABP on the 02/06/2020.

1.1.3 Application for Substitute Consent

An application for Substitute Consent under Section 177E of the Planning and Development Act 2000[As Amended] was sought by ESB [ESB] to regularise planning permission for the partially built grid connection to connect the already consented Derreenacrinnig West Wind Farm to the existing Ballylicky substation in Co. Cork.

The application submitted to ABP sought to retain 5 sections of the partially constructed grid connection which consisted of 9.7 km of overhead lines [OHL] as shown on Drawing No. 4636-P-GCR-00-1.1.

The remedial EIAR included an evaluation of the existing Grid Connection route and was assessed in combination with the wind farm and that part of the grid connection which has not yet been constructed and which is the subject of an application for planning permission to Cork County Council under planning reference 19/10.

Cork County Council had provided a prepared a report that was submitted to ABP which concluded that the grid connection forms part of the essential infrastructure of the permitted windfarm, is supported by national, regional and local policy, and is in accordance with the proper planning and sustainable development of the area.

ABP granted substitute consent on the 09/06/2020 under case reference SU04.305609 (305609). The Inspector’s report had completed an EIA of development and was satisfied that the EIAR was prepared by competent experts. The Inspector concluded in paragraph 7.14.1 “*Having regard to the nature and scale of the development, to the environmental information available in connection with the current application, including the EIAR and other information provided by the developer and the submission from the planning authority, it is concluded that the development which is the subject of the current application is not likely to have had significant effects on the environment, either directly or indirectly or cumulatively with other developments including the permitted windfarm at Derreenacrinnig West and the completion of the grid connection to it.”*

1.1.4 Judicial Review

The decision to grant substitute consent and the decision to grant planning permission by ABP were challenged by a third party by way of Judicial Review [JR] under Section 50 of the Planning and Development Act, 2000, as amended. That challenge was upheld by the High Court [2020] 548 JR].

Whilst various grounds were cited in the challenge, the core grounds of the JR centred on the fact that the substitute consent procedure was in breach of European Law and that Ireland had failed to correctly transpose the requirements of Directive 2011/92/EU as amended. A core ground of the challenge was that the decision to grant substitute consent was premised on an earlier decision to grant leave to apply for substitute consent which took place without public participation. These grounds had been cited in previous unrelated cases before ABP. This resulted in legislative changes in December 2020 to the Planning and Development Act 2000. The JR was in the Courts system at the time the legislation was amended.

In March 2021, the High Court issued an Order quashing both decisions related to the grid connection issued by ABP in June 2020.

In December 2020, amended planning legislation was adopted by the Oireachtas in relation to the substitute consent process, in order to provide for increased public participation. Specifically, it provides for public participation in the Seeking Leave to Apply for Substitute Consent stage.

The current application is being made under Section 34 of the Planning and Development Act 2000, as amended, as it seeks to permission to remove the existing grid connection infrastructure initially, and to reconstruct it. Therefore, the amended substitute consent legislation is not relevant to this planning application.

ESB has considered various options in relation to consenting the grid connection and concluded that the Section 34 process is the most prudent way to proceed. Whilst planning legislation provides for a planning consent to be achieved via a combination of a Section 34 application and a Substitute Consent application as previously consented by ABP, ESB notes the issues raised in the JR in relation to splitting the consenting process into different applications and has decided to proceed on the basis of a singular Section 34 application.

1.1.5 Statutory Undertaker

Under the Electricity (Supply) Act 1927, ESB were conferred powers as a statutory undertaker to, amongst other things, provide or carry out works for the provision of electricity. Under the Electricity Regulation Act, 1999, which amongst other things established and gave powers to the Commission for Energy Regulation and made amendments to certain provisions of the Electricity (Supply) Act, 1927, "electricity undertaking" is defined as *"any person engaged in generation, transmission, distribution or supply of electricity, including any holder of a licence or authorisation under this Act,....."*

ESB will design, plan and construct the grid route between the consented Derreenacrinnig West Wind Farm, and the existing ESB Substation at Ballylicky. ESB is an undertaker authorised to provide an electricity service (for the purposes of Class 26 & Class 27 of the Planning and Development Regulations 2001 (as amended) by virtue of its power to provide or carry out works for the provision of electricity.

1.1.6 The Status of The Grid Connection

ESB have carried out the partial construction of a new 20kV grid connection between the consented Derreenacrinnig West Wind Farm, Derreenacrinnig, Co. Cork and the existing ESB Substation at Ballylicky, Co. Cork. This grid connection route traverses through the townlands *of Ardrah, Ards More (East), Ards Beg, Barnagowlane West, Ballylicky, Crossoge, Derreenacrinnig West, Dromlickacrue, Derryarkane, Dromclarig, Gortroe, Gortnacowly, Glanareagh, Laharanshermeen, Maulikeeve, Maularaha, and Shandrum More.*

The partially completed existing grid connection will be removed as part of this planning application. The extent of the OHL to be removed is shown in **Figure 1.2.**

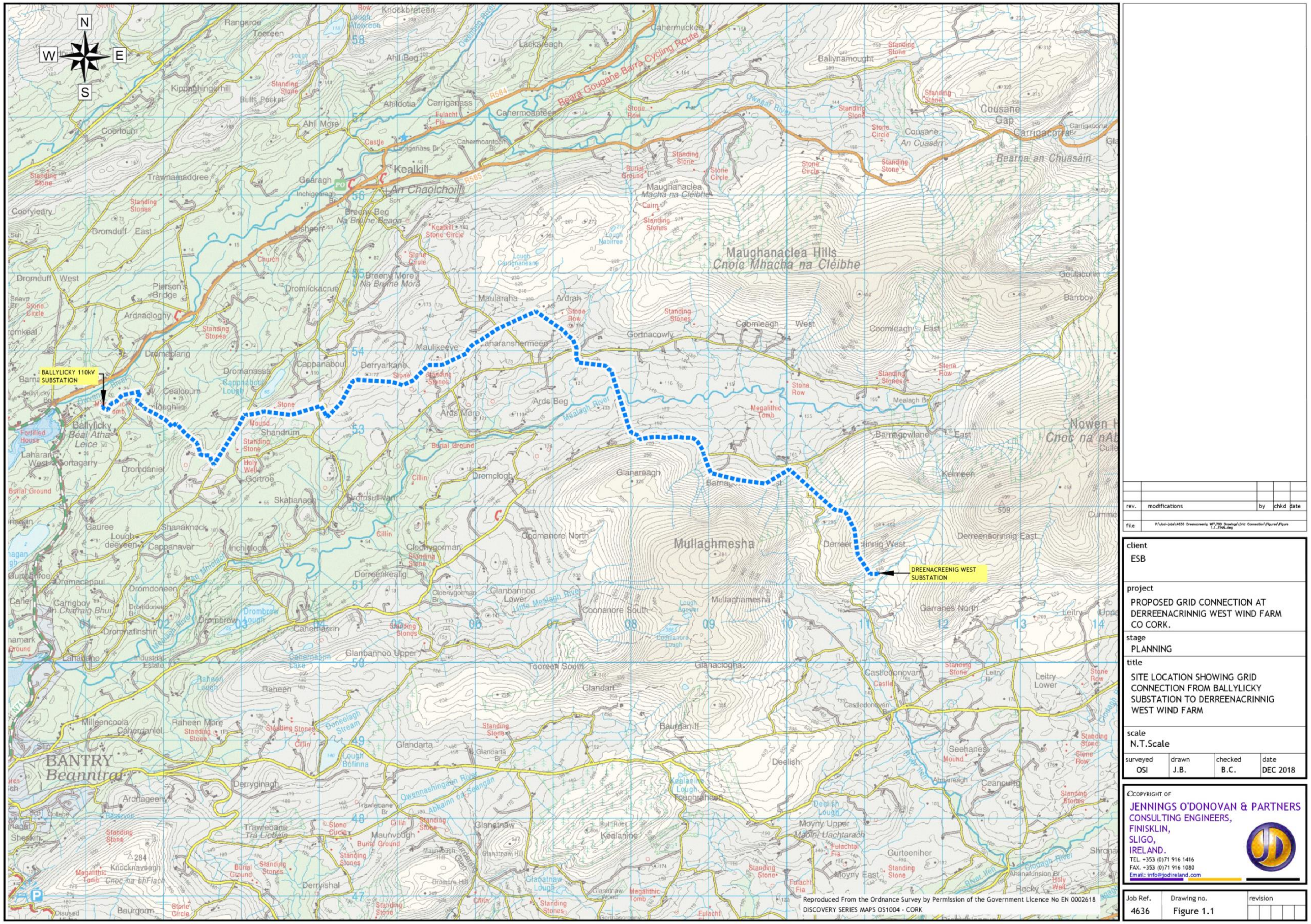


Figure 1.1 Site Location showing Grid Connection from Ballylicky Substation to Derreenacrinnig West Wind Farm

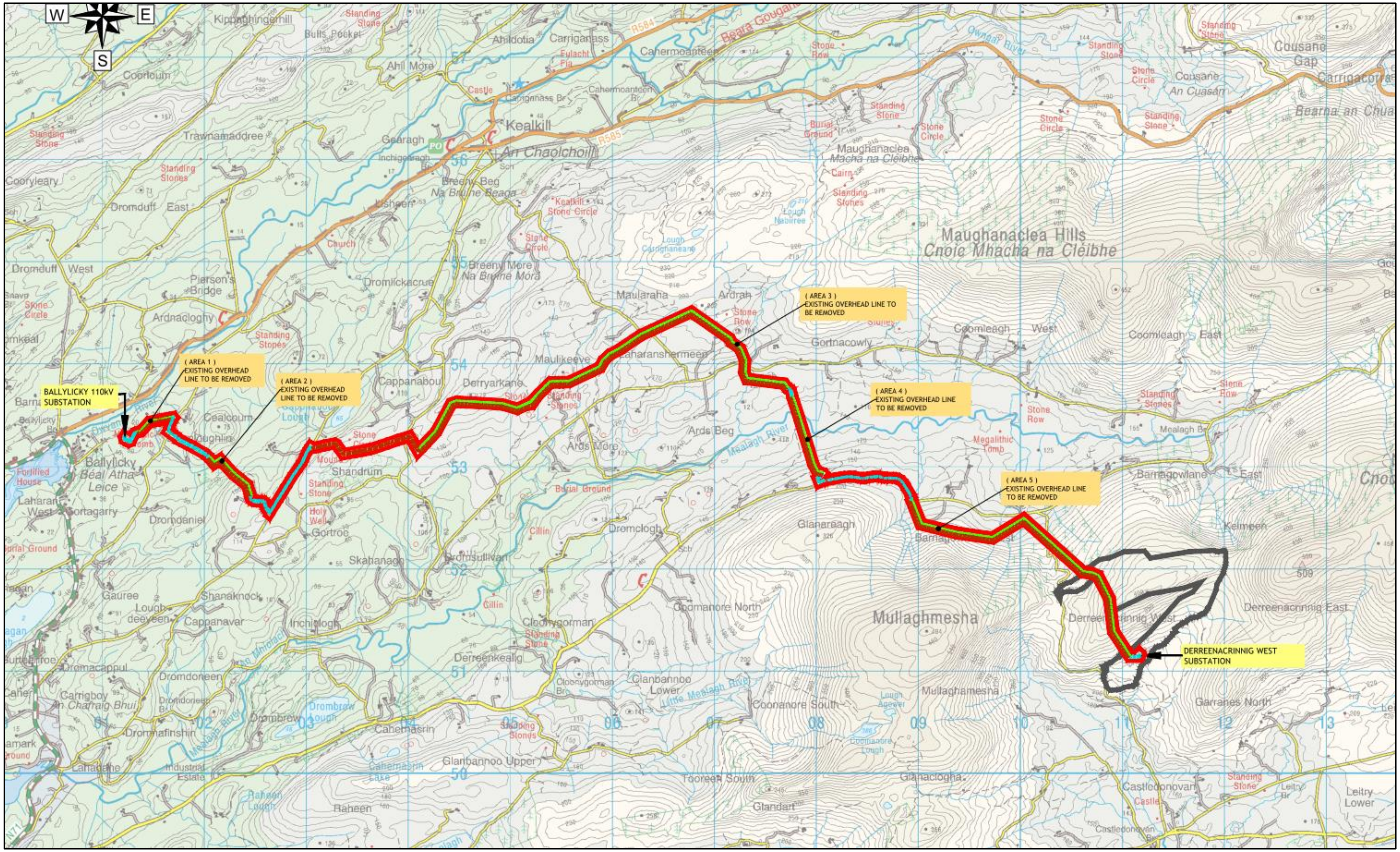


Figure 1.2 Site Location Plan showing the existing overhead grid connection subject of the removal as part of the Planning Applications

1.1.7 The As Built Grid Connection

The as constructed Grid Connection is approximately 9.6 km and will be removed as part of the planning application proposal. Accordingly, "the project" comprises the permitted turbine and on-site infrastructure development ("the permitted development") and the existing grid connection development and the proposed grid connection.

1.1.8 The Proposed Grid Connection

Following the removal of the as the built grid connection, the proposed grid will consist of a 20kV Electrical Connection of which, 10.75 km will be 20kV overhead line (OHL) mounted on single wooden pole sets and 3.3 km will be ducted underground power cable in 6 separate locations, so as to connect the consented Derreenacrinnig West Wind Farm to the existing Ballylicky Substation, Co Cork.

The grid connection consists of a linear site running in an east to west direction as shown in **Figure 1.1**. However, it should be noted that although the likely revised significant effects of the grid connection of the Derreenacrinnig West Wind Farm are identified, analysed and evaluated in this revised EIAR, the planning application before Cork County Council is in relation to the grid connection only. Where reference is made to both the proposed wind farm development and the cable route together in this revised EIAR, the term 'project' will be used.

For the purpose of assessing the entire project in compliance with the EIA Directive, this EIAR assesses both the as built grid connection, the proposed grid connection works and the permitted turbines and on-site infrastructure development. However, it is important to note that planning permission is sought for the 'existing grid connection works only.

The application site is located in the townlands of Derreenacrinnig West, Barnagowlane West, Glanareagh, Gortnacowly, Ards Beg, Ardrah, Laharanshermeen, Maulraha, Maulikeeve, Derryarkane, Cappanaboul, Skahanagh Gortroe Shandrum Beg, Shandrum More, Dromloughlin, Ballylicky, Crossoge, Co Cork. ("the Development Site").

1.1.9 Screening for Appropriate Assessment

Assessments under Article 6(3) of the Directive involves a number of stages that assess the likelihood of a plan or project to result in significant effects to European Sites. The initial Screening stage examines the likelihood of a project, either alone or in combination with other projects or plans, to result in significant effects to the integrity of European Sites. If the

Screening concludes that significant effects are likely, an Appropriate Assessment is required. In effect, the Screening assesses the need for an Appropriate Assessment.

A Screening Assessment of the development, incorporating the electricity cable grid connection and the consented Wind Farm was carried out for the European Sites occurring within its zone of influence. The Screening Assessment concluded that the proposed development would not have the potential to result in likely significant effects to European Sites occurring within the wider zone of influence of the development. As such, an Appropriate Assessment was not required for the proposed development. A copy of that Screening Assessment is set out at **Appendix G**]

The grid connection, the subject of this EIAR should be considered in the following context:

- It does not traverse any Natura 2000 site and there was no removal of or interference with habitat within any European site;
- The AA Screening carried out as part of the Exempted Development Screening Study carried out in March 2017 concluded that the "*project alone, or in-combination with other projects will not have any significant direct or indirect adverse impacts on Glengarriff Harbour and Woodland SAC, Derryclogher (Knockboy) Bog SAC and Caha Mountains SAC.*"
- There was no interference with protected species and there is no known rare or protected flora or habitat along the route of the grid connection; and
- There have been no environmental and ecological impacts arising from the constructed grid connection works.

1.1.10 Planning Appeal Reference ABP-305609-19

An Bord Pleanála completed an Appropriate Assessment Screening exercise in relation to the potential effects of the proposed development on European Sites, taking into account the nature, scale and location of the development for which substitute consent is sought, the Appropriate Assessment Screening Report submitted with the application and the Inspector's report and submissions on file. In completing the screening exercise, the Board adopted the report of the Inspector and concluded that, by itself or in combination with other development in the vicinity, the proposed development would not be likely to have a significant effect on any European Site in view of the site's conservation objectives, and a Stage 2 Appropriate Assessment and submission of a Natura impact statement is not therefore, required.

Section 6 of The Inspector's Report considered Appropriate Assessment:

"I note that the applicant submitted as Appendix C of its remedial EIAR two Screenings for Appropriate Assessment. The first related specifically to the application for substitute consent. This assessment concluded that the project alone, or in-combination with other projects will not have any significant direct or indirect adverse impacts on Glengarriff Harbour and Woodland SAC, Derryclogher (Knockboy) Bog SAC and Caha Mountains SAC and that a Stage 2 Appropriate Assessment is not considered necessary. The second Screening for Appropriate Assessment considered the overall development, namely the windfarm development itself, the completed sections of grid connection the subject of this application and the sections of the grid connection the subject of Appeal Ref. ABP-305790-19. The applicant's assessment concluded that no significant adverse effects directly or indirectly will occur on the integrity of Natura 2000 sites as a result of the proposed construction and operation of the works, and it was not necessary to carry out a Stage 2 Appropriate Assessment."

Paragraph 6.3set out the Inspector's considerations on appropriate assessment:

- *The Board will note that the proposed development is not directly connected with or necessary to the management of any European Site.*
- *The Board will also note that the proposed development would not traverse any European site nor be on, in or close to any such site.*
- *The nearest European Sites relevant to the grid connection proposal are Derryclogher (Knockboy) Bog SAC (Site Code 001873), the Bandon River Special Area of Conservation (Site Code: 002171), the Caha Mountains Special Area of Conservation (Site Code: 000093), and Glengarriff Harbour and Woodland SAC (Site Code: 000090).*
- *The above referenced European sites are distant from the grid connection corridor, located to the east at Dunmanway, north-west at and to the north of Coomhola Mountain, and west at Glengarriff.*
- *The potential sources of impact arising from the proposal are hydrological, arising from the potential construction impacts on watercourses.*
- *There is no known hydrological pathway directly connecting the grid corridor to the above referenced European sites.*

Paragraph 6.4 of the Inspector's report concluded the following:

"It is reasonable to conclude that on the basis of the available information, which I consider adequate in order to issue a screening determination, that the proposed development, individually or in combination with other plans or projects would not be likely to have a significant effect on any designated European Site and a Stage 2 Appropriate Assessment and submission of a NIS is not therefore Required."

1.1.11 An Bord Pleanála Reference ABP/ PL88.239767

The 2010 Permission was subject to an Environmental Impact Statement (“EIS”) and an Environmental Impact Statement (“EIS”) was submitted with that application to assess the Wind Farm, sub-station, car parking, associated site roads and ancillary works including the sourcing stone from an on-site borrow pit at Derreenacrinnig West, Drimoleague, Co Cork.

1.2 ENVIRONMENTAL IMPACT ASSESSMENT

1.2.1 Environmental Impact Assessment Requirement and National Legislation

The EIA Directive 85/337/EEC, as amended by Directive 2011/92/EU and Directive 2014/52/EU contains a legal requirement to carry out an environmental impact assessment (EIA) of public or private projects likely to have significant effects on the environment, prior to their authorisation. It is key legislation in EU environmental policy. The EIA Directive aims to determine the likely significant effects of a project on the environment. The EIA process involves a number of stages, namely screening, scoping and the production of an Environmental Impact Assessment Report (EIAR).

European Union Directive 2011/92/EU (“the EIA Directive”) requires that, before consent is given for certain public and private projects, an assessment of the effects on the environment is undertaken by the relevant competent authority. The EIA Directive has been transposed to Irish legislation, for the purposes of this EIA Development, by the Planning and Development Act 2000, as amended (“the Planning Acts”), and the Planning and Development Regulations 2001, as amended (“the Planning Regulations”).

Section 171A (1) of the Planning Acts defines an EIA as an assessment, which includes an examination, analysis and evaluation, carried out by a planning authority or An Bord Pleanála:

> “*that shall identify, describe and assess in an appropriate manner, in light of each individual case and in accordance with Articles 4 to 11 of the Environmental Impact Assessment Directive, the direct and indirect effects of a proposed development on the following:*
>
> *(a) human beings, flora and fauna,*
>
> *(b) soil, water, air, climate and the landscape,*
>
> *(c) material assets and the cultural heritage, and*
>
> *(d) the interaction between the factors mentioned in paragraphs (a), (b) and (c)*”.

Section 172(1)(a)(ii)(I) requires projects of a class specified in Part 2 of schedule 5 of the Planning Regulations to be subject to an EIA where:

"(I) *such development would exceed any relevant quantity, area or other limit specified in that Part*".

Part 2 of schedule 5 of the Planning Regulations includes the following classes of EIA project:
Class 3(i)

"Installations for the harnessing of wind power for energy production (wind farms) with more than 5 turbines or having a total output greater than 5 megawatts."

Class 10(dd)

"*All private roads which would exceed 2000 metres in length"*

Class 15

"*Any project listed in this Part which does not exceed a quantity, area or other limit specified in this Part in respect of the relevant class of development but which would be likely to have significant effects on the environment, having regard to the criteria set out in Schedule 7*".

An EIS was carried out by the competent authority in 2010. The EIA Directive requires that wind farm developments are subject to an EIA where the project is likely to have significant effects on the environment considering design, location, nature and size of the project.

1.2.2 EIA Definition

The Revised EIA Directive defines EIA as a process. Article 1(2)(g) states that EIA means:
"(i) the preparation of an environmental impact assessment report by the developer, as referred to in Article 5(1) and (2);
(ii) the carrying out of consultations as referred to in Article 6 and, where relevant, Article 7;
(iii) the examination by the competent authority of the information presented in the environmental impact assessment report and any supplementary information provided, where necessary, by the developer in accordance with Article 5(3), and any relevant information received through the consultations under Articles 6 and 7;
(iv) the reasoned conclusion by the competent authority on the significant effects of the project on the environment, taking into account the results of the examination referred to in point (iii) and, where appropriate, its own supplementary examination; and
(v) the integration of the competent authority's reasoned conclusion into any of the decisions referred to in Article 8a".

In addition, the DHPCLG have produced guidelines titled '*Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment*' [August 2018].

This document, in addition to DHPCLG Circular Letter PL/1/2017, dated 15th May 2017 *"Implementation of Directive 2014/52/EU on the Effects of Certain Public and Private Projects on the Environment (EIA Directive) – Advice on Administrative Provisions in Advance of Transposition*" ("the Revised EIA Directive Circular") have been used in the preparation of this EIAR to ensure, compliance with the New EIA Directive.

The following sections provide an overview of the implications of the Revised EIA Directive, to the extent relevant to the Proposed Development[1].

1.2.2.1 EIA Definition

The Revised EIA Directive defines EIA as a process. Article 1(2)(g) states that EIA means:

> *"(i) the preparation of an environmental impact assessment report by the developer, as referred to in Article 5(1) and (2);*
> *(ii) the carrying out of consultations as referred to in Article 6 and, where relevant, Article 7;*
> *(iii) the examination by the competent authority of the information presented in the environmental impact assessment report and any supplementary information provided, where necessary, by the developer in accordance with Article 5(3), and any relevant information received through the consultations under Articles 6 and 7;*
> *(iv) the reasoned conclusion by the competent authority on the significant effects of the project on the environment, taking into account the results of the examination referred to in point (iii) and, where appropriate, its own supplementary examination; and*
> *(v) the integration of the competent authority's reasoned conclusion into any of the decisions referred to in Article 8a".*

1.2.2.2 Factors of the Environment

The New EIA Directive requires the EIA to identify, describe and assess, in an appropriate manner and in light of each individual case, the direct and indirect significant effects of the Proposed Development on factors of the environment including:

(a) population and **human health**;

[1] The Revised EIA Directive amends the EIA Directive in areas such as Exemption for Defence and Civil Emergency Projects, Joint / Coordinated Procedures, Exemptions, Screening, Screening Determination, Scoping Opinion, Conflict of Interest etc. Whilst these issues are of clear relevance to the EIA process, they are not considered specifically relevant to the EIA preparation process with regard to the Proposed Development.

(b) **biodiversity**, with particular attention to species and habitats protected under the Habitats and Birds Directives;

(c) **land**, soil, water, air and climate;

(d) material assets, cultural heritage and the landscape;

(e) the interaction between the factors referred to in points (a) to (d).

The implications of the Revised EIA Directive in in relation to human health are considered **in Section 4: Population and Human Health** of this EIAR; the implications in relation to biodiversity are considered in **Section 5: Biodiversity**; and the implications in relation to land are considered in **Section 2: Project Description**, **Section 5: Biodiversity**, **Section 6: Soils and Geology**, **Section 7: Water**, **Section 11: Material Assets** and **Section 12: Cultural Heritage**.

1.2.2.3 Alternatives to the Proposed Development

Article 5(1) of the EIA Directive sets out the information to be contained in an EIS, and these provisions have been clarified by the Revised EIA Directive, in particular in relation to the requirement that the EIA Report includes a description of the *reasonable* alternatives studied by the developer, which are *relevant to the project and its specific characteristics*, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment.

The implications of the EIA Directive in relation to alternatives are considered **in Chapter 2:** Section 2.13-2.16**, Consideration of Alternatives** of this EIAR.

1.2.2.4 Competent Experts and Quality of EIA

Article 5(3) of the 2014 EIA Directive states that, in order to ensure the completeness and quality of the EIAR, (a) the Applicant shall ensure the EIAR is prepared by competent experts; (b) the competent authority shall ensure that it has, or has access to, sufficient expertise to examine the EIAR; and (c) where necessary, the competent authority shall seek from the Applicant any supplementary information, in accordance with Annex IV (the information to be contained in the EIAR), which is directly relevant to reaching a reasoned conclusion on the significant effects of the Proposed Development / EIA Development on the environment.

The Revised EIA Directive Consultation states that:

> "*It is not proposed to define the terms 'competent experts' or 'sufficient expertise' in legislation given the broad and diverse range of EIA topics and the different areas of specialist expertise.*

> *It is proposed that the competency of experts preparing an EIAR should be a matter for each competent authority, having regard to the diverse range of EIA topics and areas of specialist expertise.*
>
> *Guidance will address the issue of 'expertise' in both the preparation and assessment of EIARs.*
>
> *It would be good practice for the EIAR to state who prepared each element of the EIAR and list the qualifications and experience of each such person to assist the competent authority satisfy itself as to the competency of the experts who prepared the EIAR. The level of expertise required for each element of the EIAR would depend on the nature and importance of that element vis-à-vis the size, nature and location of the project and the receiving environment and the likely significant impact on that environment*".

This EIA Report ("EIAR") has been prepared by Jennings O'Donovan & Partners Limited on behalf of the Applicant to accompany the application for Planning Permission for the Development. This EIAR takes into account the overall project as a whole including the Proposed Development (i.e., the development for which planning permission is sought) and all direct and indirect effects, and cumulative impacts and interactions, including all relevant ancillary and subsidiary elements of the overall project.

This EIAR identifies, describes and assesses the Development as a whole, taking into account the 2012 Permission, and any other existing and permitted developments, described and assessed. Together, each of these elements comprises the EIA Development which is the subject of this EIAR. This EIAR includes the Applicant's reasoned conclusions as to the significance of any such environmental effects, to assist the competent authority to comply with Article 8a of the Revised EIA Directive.

The Applicant considers that each of the experts involved in the preparation of this EIAR should be deemed to be competent where, having regard to the task he or she is required to perform and taking account of the scope of the study for which he or she undertakes work, the person possesses sufficient training, experience and knowledge appropriate to the nature of the work to be undertaken.

JOD staff are degree qualified in their respective specialist fields and have developed their competence through both experience on the job and through training. Each team member has developed the following:

- Sufficient knowledge of the specific tasks to be undertaken and the risks which may arise; and

- Sufficient experience and ability to carry out their duties in relation to the project and to take appropriate actions required under the EIA Directive.

Additionally, Jennings O'Donovan & Partners Limited, has attained certificates in line with industry standards as follows:

- ISO 9001: 2015 – Quality Management;
- ISO 14001:2015 – Environmental Management; and
- ISO 45001:2018 – Safety Management.

Project Team

JOD staff are degree qualified in their respective specialist fields and have developed their competence through both job experience and through training. Each team member has developed the following:

- Sufficient knowledge of the specific tasks to be undertaken and the risks which may arise; and
- Sufficient experience and ability to carry out their duties in relation to the project and to take appropriate actions required under the EIA Directive.

As provided in **Section 1.4.1**, specialist consultancies have been employed to complete some of the EIAR sections. Each section of the EIAR includes a Statement of Authority regarding the competency of the author and includes a summary of relevant qualifications and experience.

1.2.2.5 Electronic Notification of the Public and Electronic Access to Information to Enable Public Consultation

Article 6(2) and Article 6(5) of the Revised EIA Directive provide for the availability of information (including in electronic form) to provide for the effective participation of the public concerned in the decision-making process.

Article 97 of the Planning Regulations requires the Applicant to submit a copy of the EIAR to the planning authority in electronic form. This requirement has been complied with in the case of this EIAR. It is noted that the EIA Directive places additional requirement of the planning authority to make documents available electronically.

1.2.2.6 Information to be Included in a Decision to Grant

Article 8a (1) of the Revised EIA Directive states:

"The decision to grant development consent shall incorporate at least the following information:

(a) the reasoned conclusion referred to in Article 1(2)(g)(iv);
(b) any environmental conditions attached to the decision, a description of any features of the project and/or measures envisaged to avoid, prevent or reduce and, if possible, offset significant adverse effects on the environment as well as, where appropriate, monitoring measures".

The Revised EIA Directive Consultation states that:
"This is a new provision indicating the information to be incorporated into a grant of development consent. The first part refers to the reasoned conclusion by the competent authority on the significant effects on the environment, having considered the EIAR and any supplementary information provided by the developer.

Other information which must be incorporated into a positive consent decision includes the following:

- *Any environmental conditions attached;*
- *A description of any features and measures envisaged to avoid, prevent or reduce and, if possible, offset significant adverse effects on the environment;*
- *Monitoring measures, where appropriate".*

1.2.2.7 Information to Be Included in the EIAR

Article 5(1)(a) to (f) of the Revised EIA Directive provides information to be provided by the developer:
"1. Where an environmental impact assessment is required, the developer shall prepare and submit an environmental impact assessment report. The information to be provided by the developer shall include at least:

(a) a description of the project comprising information on the site, design, size and other relevant features of the project;
(b) a description of the likely significant effects of the project on the environment;
(c) a description of the features of the project and/or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment;
(d) a description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment;

(e) *a non-technical summary of the information referred to in points (a) to (d); and*

(f) *any additional information specified in Annex IV relevant to the specific characteristics of a particular project or type of project and to the environmental features likely to be affected."*

The EIA Directive Circular notes that this is the minimum information that should be provided.

Annex IV of the Revised EIA Directive sets out the information to be included in the EIAR (as referenced to in Article 5(1)(f)):

"*1. Characteristics of projects*

The characteristics of projects must be considered, with particular regard to:

(a) the size and design of the whole project;

(b) cumulation with other existing and/or approved projects;

(c) the use of natural resources, in particular land, soil, water and biodiversity;

(d) the production of waste;

(e) pollution and nuisances;

(f) the risk of major accidents and/or disasters which are relevant to the project concerned, including those caused by climate change, in accordance with scientific knowledge;

(g) the risks to human health (for example due to water contamination or air pollution).

2. Location of projects

The environmental sensitivity of geographical areas likely to be affected by projects must be considered, with particular regard to:

(a) the existing and approved land use;

(b) the relative abundance, availability, quality and regenerative capacity of natural resources (including soil, land, water and biodiversity) in the area and its underground;

(c) the absorption capacity of the natural environment, paying particular attention to the following areas:

(i) wetlands, riparian areas, river mouths;

(ii) coastal zones and the marine environment;

(iii) mountain and forest areas;

(iv) nature reserves and parks;

(v) areas classified or protected under national legislation; Natura 2000 areas designated by Member States pursuant to Directive 92/43/EEC and Directive 2009/147/EC;

(vi) areas in which there has already been a failure to meet the environmental quality standards, laid down in Union legislation and relevant to the project, or in which it is considered that there is such a failure;

(vii) densely populated areas;

(viii) landscapes and sites of historical, cultural or archaeological significance.

3. Type and characteristics of the potential impact

The likely significant effects of projects on the environment must be considered in relation to criteria set out in points 1 and 2 of this Annex, with regard to the impact of the project on the factors specified in Article 3(1), taking into account:

(a) the magnitude and spatial extent of the impact (for example geographical area and size of the population likely to be affected);

(b) the nature of the impact;

(c) the transboundary nature of the impact;

(d) the intensity and complexity of the impact;

(e) the probability of the impact;

(f) the expected onset, duration, frequency and reversibility of the impact;

(g) the cumulation of the impact with the impact of other existing and/or approved projects;

(h) the possibility of effectively reducing the impact".

The EIA Directive Consultation document indicates that Annex IV will be transposed in full into national legislation.

The EIA Directive Circular states that:

"*The developer is required also to submit any additional information specified in a new Annex IV in the 2014 Directive where this information is relevant to the specific characteristics of the project, or type of project, and to the environmental features likely to be affected*".

This EIAR has incorporated for the construction, operational and decommissioning (demolition) phases:

- the reasonable alternatives studied by the developer;
- the resource efficiency and sustainability, biodiversity protection, climate change (e.g., greenhouse gas emissions), and risks of accidents and disasters and vulnerability to climate change;

- the importance of the sustainable use of soil, minimisation of land take, minimisation of erosion and organic matter loss, soil compaction, and soil sealing, subsurface and underground effects;
- biodiversity (with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC) and avoiding or minimising negative effects on this factor;
- the consideration and management of disaster risk prevention and concerns the risk of those accidents and/or disasters occurring and the implications for the likelihood of significant adverse effects on the environment;
- vulnerability (exposure and resilience) to major accidents, and/or natural disasters (as flooding, sea level rise, or earthquakes);
- the strengthening of public access to information, transparency, and timely environmental information; and
- that the parameters, duration and scale of post-consent monitoring should be proportionate to the level of potential risk to the environment.

1.2.3 National Guidance

The following documents have been referred to in the preparation of this EIAR:

- Environmental Protection Agency (2002) Guidelines on the information to be contained in Environmental Impact Statements;
- Environmental Protection Agency (2003) Advice notes on current Practice (in the preparation of Environmental Impact Statements);
- Environmental Protection Agency (2015) DRAFT Guidelines on the information to be contained in Environmental Impact Statements;
- The Revised EIA Directive Circular;
- The Revised EIA Directive Consultation; and
- The draft EPA Guidance (2017).

1.3 EIAR STRUCTURE

The EIAR is structured as follows:

- **Non-Technical Summary**
- **Volume I: EIAR Text:**
  - Section 1: Introduction
  - Section 2: Project Description & Consideration of Alternatives
  - Section 3: Planning Policy
  - Section 4: Population and Human Health

- Section 5: Biodiversity
- Section 6: Land, Soils and Geology
- Section 7: Hydrology and Hydrogeology
- Section 8: Air and Climate
- Section 9: Noise and Vibration
- Section 10: Landscape and Visual
- Section 11: Material Assets (including Traffic and Transport and Aviation)
- Section 12: Cultural Heritage
- Section 13: Interactions of the Foregoing

Volume II: EIAR Appendices:

Appendix A – Decision Notice Relating to Consented Wind Farm
Appendix B- An Bord Pleanála Appeal Decision ABP/305790-19
Appendix C- An Bord Pleanála Appeal Decision SU04.305609 (305609)
Appendix D – Scoping
Appendix E - Public Consultation Southern Star
Appendix F – ESB Spec for 20 kV UGC & OHL
Appendix G - Screening for Appropriate Assessment
Appendix H– Construction Environmental Management Plan for The Grid Connection
Appendix I – Construction Method Statement for The Grid Connection
Appendix J- Site Investigations for Dereenacrinnig West Wind FARM

1.4 EIAR PREPARATION

1.4.1 Introduction

This EIAR has been prepared by Jennings O'Donovan & Partners Limited, Consulting Engineers, Finisklin Business Park, Sligo, F91 RHH9 ("JOD"), on behalf of the Applicant.

Table 1.1 provides details of the author for each EIAR section.

Competent Experts and Quality of EIA

Article 5(3) of the Revised EIA Directive states that, in order to ensure the completeness and quality of the EIAR, (a) the Applicant shall ensure the EIAR is prepared by competent experts; (b) the competent authority shall ensure that it has, or has access to, sufficient expertise to examine the EIAR; and (c) where necessary, the competent authority shall seek from the Applicant any supplementary information, in accordance with Annex IV (the information to be contained in the EIAR), which is directly relevant to reaching a reasoned conclusion on the significant effects of the Proposed Development / EIA Development on the environment.

Table 1.1: EIAR Preparation Details

EIAR Section	Contributor
1: Introduction	Breena Coyle and David Kiely Jennings O'Donovan & Partners Limited, Finisklin Business Park, Sligo, F91 RHH9.
2: Project Description and Consideration of Alternatives	Breena Coyle and David Kiely Jennings O'Donovan & Partners Limited, Finisklin Business Park, Sligo, F91 RHH9.
3: Planning Policy	Breena Coyle Jennings O'Donovan & Partners Limited, Finisklin Business Park, Sligo, F91 RHH9.
4: Population and Human Health	Breena Coyle, Jennings O'Donovan & Partners Limited, Finisklin Business Park, Sligo, F91 RHH9.
5: Biodiversity	Doherty Environmental Ltd, Glanturkin, Guileen, Whitegate, Co. Cork.
6: Soils and Geology	Jennings O'Donovan & Partners Limited, Finisklin Business Park, Sligo, F91 RHH9. /Minerex Environmental Limited, Taney Hall, Eglinton Terrace, Dundrum, Dublin.
7: Water	Jennings O'Donovan & Partners Limited, Finisklin Business Park, Sligo, F91 RHH9/Minerex Environmental Limited, Taney Hall, Eglinton Terrace, Dundrum, Dublin.
8: Air and Climate	Dr Brian Doyle Jennings O'Donovan & Partners Limited, Finisklin Business Park, Sligo, F91 RHH9.
9: Noise	Noise and Vibration Consultants Limited, Durhamstown, Bohermeen, Navan, Co. Meath.
10: Landscape and Visual	Jennings O'Donovan & Partners Limited, Finisklin Business Park, Sligo, F91 RHH9.
11: Material Assets	David Kiely Jennings O'Donovan & Partners Limited, Finisklin Business Park, Sligo, F91 RHH9.
12: Cultural Heritage	John Cronin Associates, 3a Westpoint Trade Centre, Ballincollig, Co Cork.
13: Interactions of the Foregoing	Jennings O'Donovan & Partners Limited, Finisklin Business Park, Sligo, F91 RHH9.

No difficulties, such as technical deficiencies, lack of information or knowledge, were encountered in compiling any specific information of the EIAR.

1.4.2 Section Structure

Each technical assessment included in the EIAR has followed the same general format:

- Assessment Methodology and Significance Criteria: A description of the methods used in baseline surveys and in the assessment of the significance of effects;
- Baseline Description: A description of Proposed Development Site baseline relevant for the assessment, based on the results of surveys, desk information and consultations, and a summary of any information required for the assessment that could not be obtained;
- Assessment of Potential Environmental Effects: A description of how the baseline environment could potentially be affected for the EIA Development, including a summary of the measures taken during the design of the EIA Development to minimise effects;
- Mitigation Measures and Residual Effects - A description of measures recommended that will be implemented to minimise and/or off-set potential negative effects and a summary of the assessed level significance of the effects of the Proposed Development and/or the EIA Development after mitigation measures have been implemented;
- Cumulative Effects: A description identifying the potential for effects of the EIA Development to combine with those from other existing and/or permitted developments to affect resources;
- Summary of Significant Effects;
- Statement of Significance of effects; and
- Comparison with the original 2010 EIS, ("the 2010 EIS") for the 2012 Permission, to include commentary identifying any material variations in potential effects and levels of significance.

1.5 NEED FOR THE PROPOSED DEVELOPMENT

The grid connection between the consented Derreenacrinnig West Wind Farm and the Ballylicky 38kV Substation is required to connect the Derreenacrinnig Wind Farm to the national energy grid. The Dereenacrinning West Wind Farm has the capacity to generate up to 5.8 MW with seven turbines. The energy generated will be transferred from the permitted on-site substation to the national grid and therefore the 14km of cable to connect to the 38kV/ 100κV Ballylicky Substation is required to keep the wind farm energised.

The Dereenacrinning Wind Farm is consented and will help the government meet its 2030 renewable energy targets and avoid potential penalties from the European Commission. The grid connection works are required in order to allow the wind farm to become operational and transfer energy to the national grid.

1.6 THE APPLICANT

The applicant behind the 2010 Permission was George O'Mahony. The Applicant for the Proposed Development for which substitute consent is now sought is ESB ("the Applicant") who are providing the Grid Connection so as to connect the wind farm.

ESB are a statutory undertaker for operating the Grid Connection. The asset will be owned, operated and maintained by ESB.

ESB Networks (part of ESB Group and referred to as ESBN) will be responsible for, the construction, and subsequent operation, of the grid connection. ESBN may use contractor(s) from their approved frameworks to construct all or part(s) of the works.

1.6.1 Implementation Arrangements

Under the Electricity (Supply) Act 1927, ESB were conferred powers as a statutory undertaker to, amongst other things, provide or carry out works for the provision of electricity. Under the Electricity Regulation Act, 1999, which amongst other things established and gave powers to the Commission for Energy Regulation and made amendments to certain provisions of the Electricity (Supply) Act, 1927, "electricity undertaking" is defined as *"any person engaged in generation, transmission, distribution or supply of electricity, including any holder of a licence or authorisation under this Act,....."*

ESBN (on behalf of ESB) will design plan, construct and operate the grid route between the consented Derreenacrinnig West Wind Farm, and the existing ESB Substation at Ballylicky.

1.7 SCOPING AND CONSULTATION

The scoping and consultation process was carried out in accordance with the EIA Directive and in accordance with the Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports (EPA, August 2017).

The Revised EIA Directive Circular notes that:

"It is a requirement of the EIA process to consult with statutory consultees and to consider any submissions made by these consultees. Such submissions may contain expert specialist opinions on topics to be assessed in the EIA process…".

The purpose of this consultation process was to provide a focus for the EIA by identifying the key issues of relevance. As such, the consultation process aims to inform the various organisations of the existence of the project, thereby providing an opportunity to submit comments and to offer information relevant to the preparation of this EIAR.

The Grid Connection was assessed considering the potential cumulative impacts that could arise from the Derreenacrinnig West Wind Farm and in combination impacts from other plans and projects in the area.

Table 1.2 documents individuals and organisations that have been consulted as part of the EIA process. The purpose of this consultation process was to provide a focus for the EIA by identifying the key issues of relevance. As such, the consultation process aims to inform the various organisations of the existence of the project, thereby providing an opportunity to submit comments and to offer information relevant to the preparation of this EIAR. No responses following the scoping exercise have been received to date.

Table 1.2: Consultation Undertaken for EIAR in August 2021

Consultee/Organisation	Response Received
Agriculture	
Irish Farmers Association (IFA)	No response received to date
Department of Agriculture	No response received to date
Teagasc	No response received to date
Telecommunications	
ESB Telecoms	No response received to date
RTE (2RN)	Response received on the 09 September 2021
Broadcasting Authority Ireland	Response received on 09 September 2021
Virgin Media	Response received on 08 September 2021
Air Navigation	
IAA	No response received to date
Cork Airport	No response received to date
Ecology	
Bat Conservation Ireland	No response received to date
An Taisce	No response received to date
Development Application Unit	Acknowledgement of Scoping Report (09 September 2021)
Soils and Water	
Geological Survey Ireland	Response received on the 28th of September 2021

Consultee/Organisation	Response Received
Inland Fisheries Ireland (IFI)	Response received on the 09 September 2021
Irish Water	Response Received on the 28 September 2021
Other	
Bord Failte	No response received to date
Heritage Council	No response received to date
Department of the Environment	No response received to date
Office of Public Works (OPW)	No response received to date
Department of Arts, Heritage and the Gaelteacht	No response received to date
Department of Housing and Local Government	Acknowledgement of Scoping Report (09 September 2021)
Eirgrid	No response received to date
Department of Transport	Response received 23rd September 2021
An Taisce	No response received to date
Department of Agriculture	No response received to date
Teagasc	No response received to date
Department of Defence	No response received to date
Health Service Executive	Response received on the 05 October 2021
Transport Infrastructure Ireland	Response Received on the 23 September 2021
The Arts Council	Acknowledgement of Scoping Report (08 September 2021)

1.7.1 Pre Application Process

Prior to the submission of the planning application to Cork County Council, The Applicant, had published a consultation notice in The Southern Star on Saturday 11th September 2021. The public consultation notice set out the background to the planning application proposals and details of the proposals including a map showing the grid connection route. Contact details were provided as part of the public consultation notice for members of the public. The public were invited to make submissions to ESB in relation to the forthcoming applications. A copy of the Public Notice can be found at **Appendix E.**

In addition to the public consultation notice, representatives of the ESB and the wind farm developer met with officials of Cork County Council in June 2021 to discuss the forthcoming application. Key issues raised at that meeting were; the need for a comprehensive EIAR and an appropriate level of public consultation which resulted in a notice being placed in the Southern Star.

1.8 AVAILABILITY OF INFORMATION

A copy of the EIAR may be viewed online on the Cork County Council website or at the offices of Cork County Council.

A paper copy of the EIAR can be viewed, during office opening hours at the following addresses:

- The Offices of Cork County Council , West Cork , Norton House, Skibbereen
- Co Cork
- Jennings O'Donovan & Partners Limited, Consulting Engineers, Finisklin Business Park, Sligo, Co. Sligo, F91 RHH9.

Additionally, prior to lodging this application, the required information has been issued for the Department of Housing, Planning and Local Government's EIA Portal.

2 PROJECT DESCRIPTION

2.1 INTRODUCTION AND PROJECT DESCRIPTION

This section of the EIAR sets out details relating to the main project elements and provides details relating to the construction, operation and decommissioning of the proposed development. ESB "The Applicant". The Applicant is seeking planning permission for the removal of the partially built grid connection works for the erection of the full length, over a distance of approximately 14.8 km of a new grid connection between the Ballylicky ESB substation and Derreenacrinnig West Windfarm. The proposed development involves the following works:

(a) Removal of approximately 9.6 km of 20 kV overhead line (OHL) along the route, the OHL to be removed consists of 138 wood poles (ranging from 9m to 12.5m above ground) supporting electrical conductor lines and ancillary structures and equipment.
(b) Following removal of the OHL, it is proposed to construct approximately 10.75 km of 20 kV overhead line (OHL) along the route, the OHL to be constructed consists of c. 157 wood poles (ranging from 9m to 12.5m above ground) supporting electrical conductor lines and ancillary structures and equipment.
(c) installation of approximately 3.3 km of underground cable ducting and associated electrical cabling, and all other ancillary works including joint bays, culverts, marker posts and all associated developments.

The Development traverses the townlands of Derreenacrinnig West, Barnagowlane West, Glanareagh, Gortnacowly, Ards Beg, Ardrah, Laharanshermeen, Maulraha, Maulikeeve, Derryarkane, Cappanaboul, Skahanagh, Gortroe, Shandrum Beg, Shandrum More, Dromloughlin, Ballylicky, Crossoge, in Co. Cork ("the Development Site").

The principle of a wind farm development at the Proposed Development Site has already been approved by An Bord Pleanála with the grant of planning permission on 05th December 2012. A copy of that decision is set out at **Appendix A.**

2.2 THE NEED FOR THE DEVELOPMENT

The Grid Connection between the consented Derreenacrinnig West Wind Farm and the Ballylicky substation is required to connect the consented wind farm to the national grid. The Derreenacrinnig West Wind Farm will have the capacity to generate up to 5.8 MW with 7 no turbines in the Enercon E44/E48 range. The energy generated will need to be transferred from the on-site substation to the national grid and therefore there is a requirement to develop the necessary c.14 km of Grid Connection to connect to the 110kV substation.

The Derreenacrinnig West Wind Farm will help the Government meet its renewable energy targets and avoid potential penalties from the European Commission. The Grid Connection works are essential to allow the wind farm to become operational and transfer the energy to the national grid.

The development will be of benefit to the local economy providing additional key infrastructure which may assist in the further development of the area in addition to facilitating the Derreenacrinnig Wind Farm.

2.3 LEGAL CONTEXT

This EIAR reflects changes to the legislative context. The objective of the EIA Directive is to determine if the project is likely to have significant effects on the environment. The seven wind turbines and all related electrical infrastructure (as granted under CCC Reg. Ref. 10/857 / ABP PL88.239767 - the original planning permission) have already gone through the EIA process.

The existing grid connection has also undergone EIA under planning appeal reference SU04.305609. The Inspector in the determination of the appeal noted at 7.1.2 the following:

"I note that the applicant in the current application has sought to address the overall windfarm development in its submitted EIAR, while making discernible reference to the grid connection in its examination of environmental impacts to allow an assessment of that component within the context of the overall project. I consider this to be a reasonable approach to allow for a comprehensive assessment of environmental impacts. I further note that the consideration of environmental impacts in the EIAR has also included the impacts arising from a 'Do Nothing' scenario."

2.4 THE PROPOSALS

Removal of The Existing Partially Built Grid Connection

The location of the existing Grid Connection route to be removed as part of the planning application is shown in Figure 2.1. The site of the existing development is located between the townlands of Derreenacrinnig West and Ballylickey passing through the following townlands:

Derreenacrinnig West, Barnagowlane West, Glanareagh, Gortnacowly, Ards Beg, Ardrah, Laharanshermeen, Maulraha, Maulikeeve, Derryarkane, Cappanaboul, Skahanagh Gortroe Shandrum Beg, Shandrum More, Dromloughlin, Ballylicky, Crossoge, Co Cork.

The section of Over Ground Connection which has already been constructed [9.537km] which will be removed as part of the proposals.

Table 2.1: Existing Grid Connection to be Removed

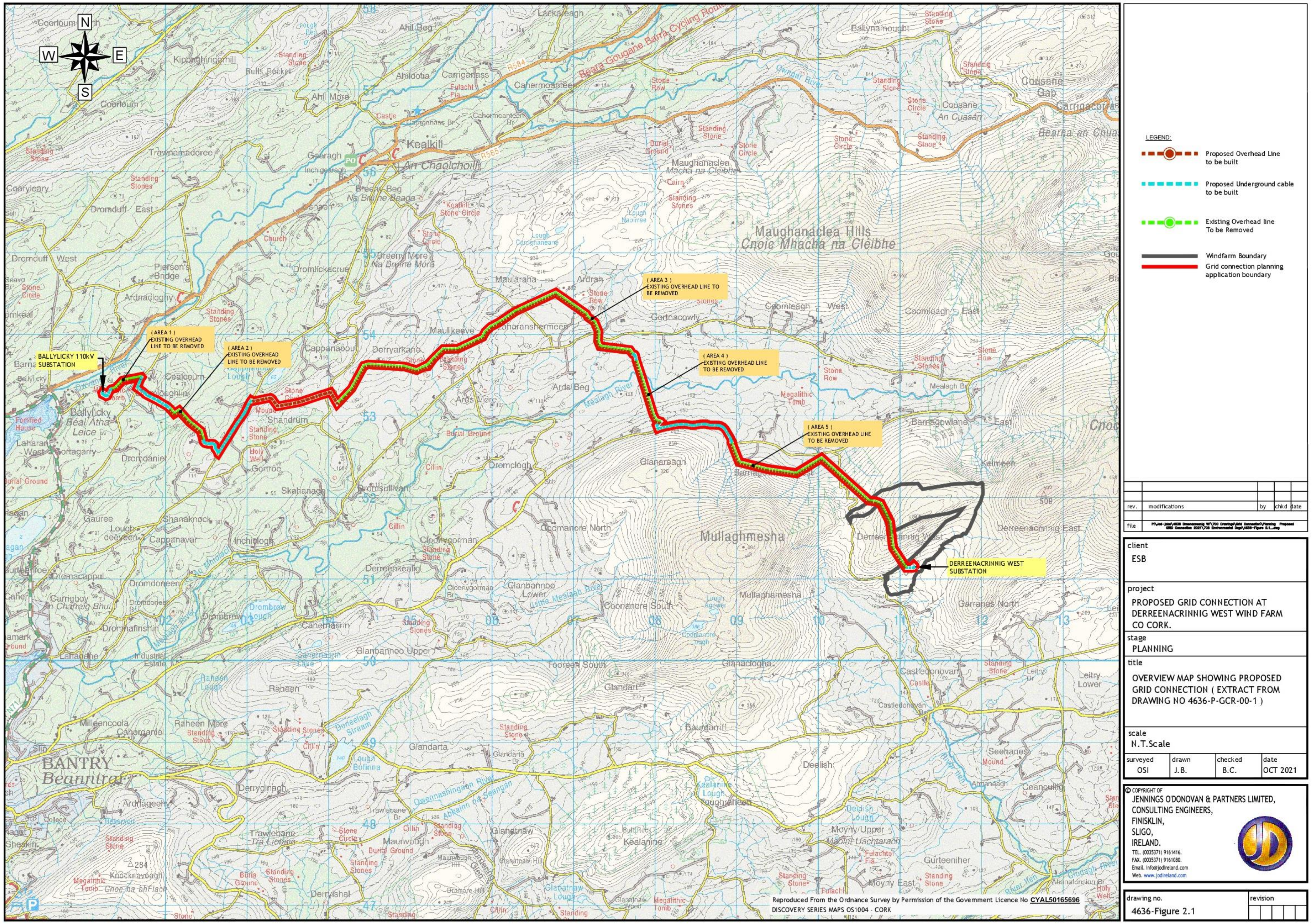
Area 1	Comprises 408 metres of Overhead Lines.
Area 2	Comprises 619 metres of Overhead Lines.
Area 3	Comprises 4,565 metres of Overhead Lines.
Area 4	Comprises 829 metres of Overhead Lines.
Area 5	Comprises 3,115 metres of Overhead Lines.

Overview of The Grid Connection Route

The Grid Connection originates from the Derreenacrinnig West Wind Farm and the route travels uphill across an area of wet heath occurring on the south-facing slopes of the ridge at Derreenacrinnig West. Descending from the crest of the ridge, the route cuts through first and second rotation forestry before passing through an area dominated by rough unenclosed grazing and wet heath. The route then travels west along the Mealagh River valley, predominantly through areas of improved pasture and wet grassland.

Originating at the Derreenacrinnig West Wind Farm, the OHL route travels uphill across an area of wet heath occurring on the south-facing slopes of the ridge at Derreenacrinnig West. Descending from the crest of the ridge, the route cuts through 300m of first and second rotation forestry before passing through an area dominated by rough unenclosed grazing and wet heath. The route then travels west along the Mealagh River valley, predominantly through areas of improved pasture and wet grassland.

The route turns northwest at Glanareagh hill and crosses the Mealagh River 1km southeast of Ardrah Bridge, before rising up the north side of the valley to Ardrah townland. From here, the route turns southwest again and descends steadily towards Shandrum, crossing areas of improved and unimproved grassland with occasional areas of heath and mature coniferous forestry. Between Shandrum and Ballylicky substation, the route environs are dominated by improved grassland and grassy verge along the margins of the public road in which the underground section of the route will be laid. The extent of the existing grid connection is shown in the **Figures 2.1- 2.5.**


LEGEND:
Proposed Overhead Line to be built
Proposed Underground cable to be built
Existing Overhead line To be Removed
Windfarm Boundary
Grid connection planning application boundary
BALLYLICKY 110kV SUBSTATION
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(AREA 2) EXISTING OVERHEAD LINE TO BE REMOVED
(AREA 3) EXISTING OVERHEAD LINE TO BE REMOVED
(AREA 4) EXISTING OVERHEAD LINE TO BE REMOVED
(AREA 5) EXISTING OVERHEAD LINE TO BE REMOVED
DERREENACRINNIG WEST SUBSTATION
Maughanaclea Hills
Cnoic Mhacha na Cléibhe
Mullaghmesha
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PROPOSED GRID CONNECTION AT DERREENACRINNIG WEST WIND FARM CO CORK.
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date OCT 2021
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FAX. (00353 71) 9161080.
Email. info@jodireland.com
Web. www.jodireland.com
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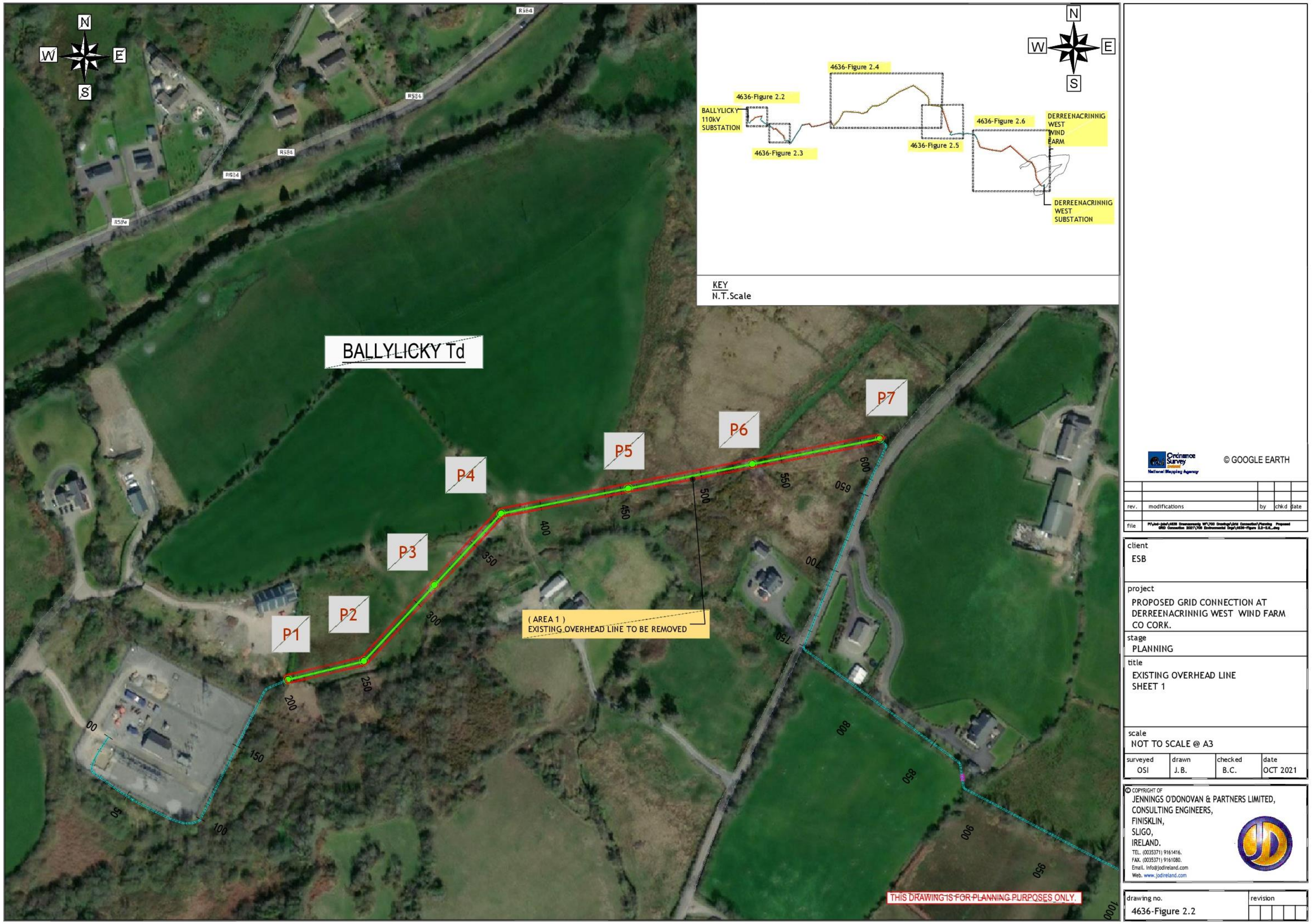
Figure 2.1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BALLYLICKY 110kV SUBSTATION
DERREENACRINNIG WEST WIND FARM
DERREENACRINNIG WEST SUBSTATION
© GOOGLE EARTH
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date OCT 2021
JENNINGS O'DONOVAN & PARTNERS LIMITED, CONSULTING ENGINEERS, FINISKLIN, SLIGO, IRELAND.
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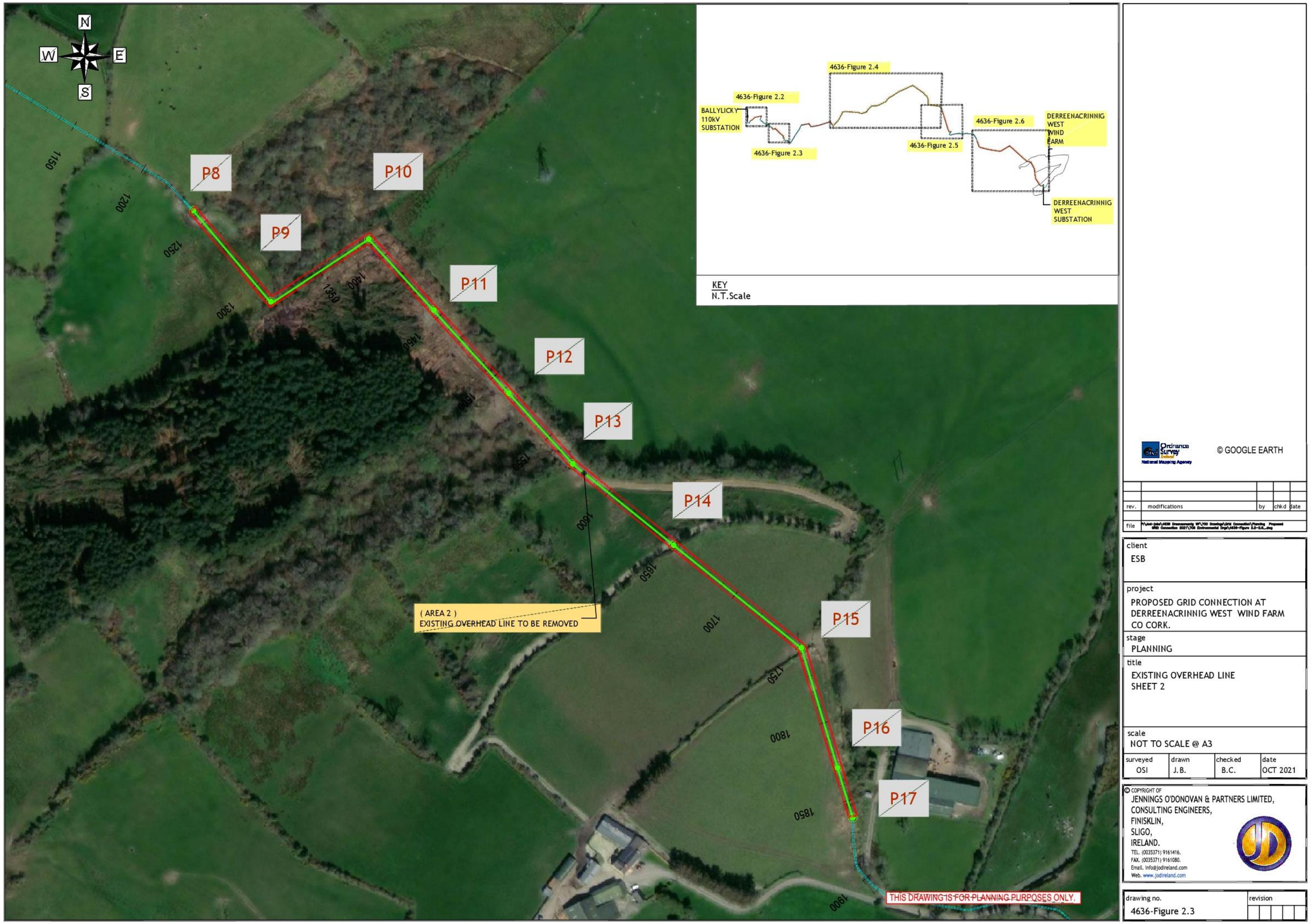
Figure 2.2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BALLYLICKY 110kV SUBSTATION
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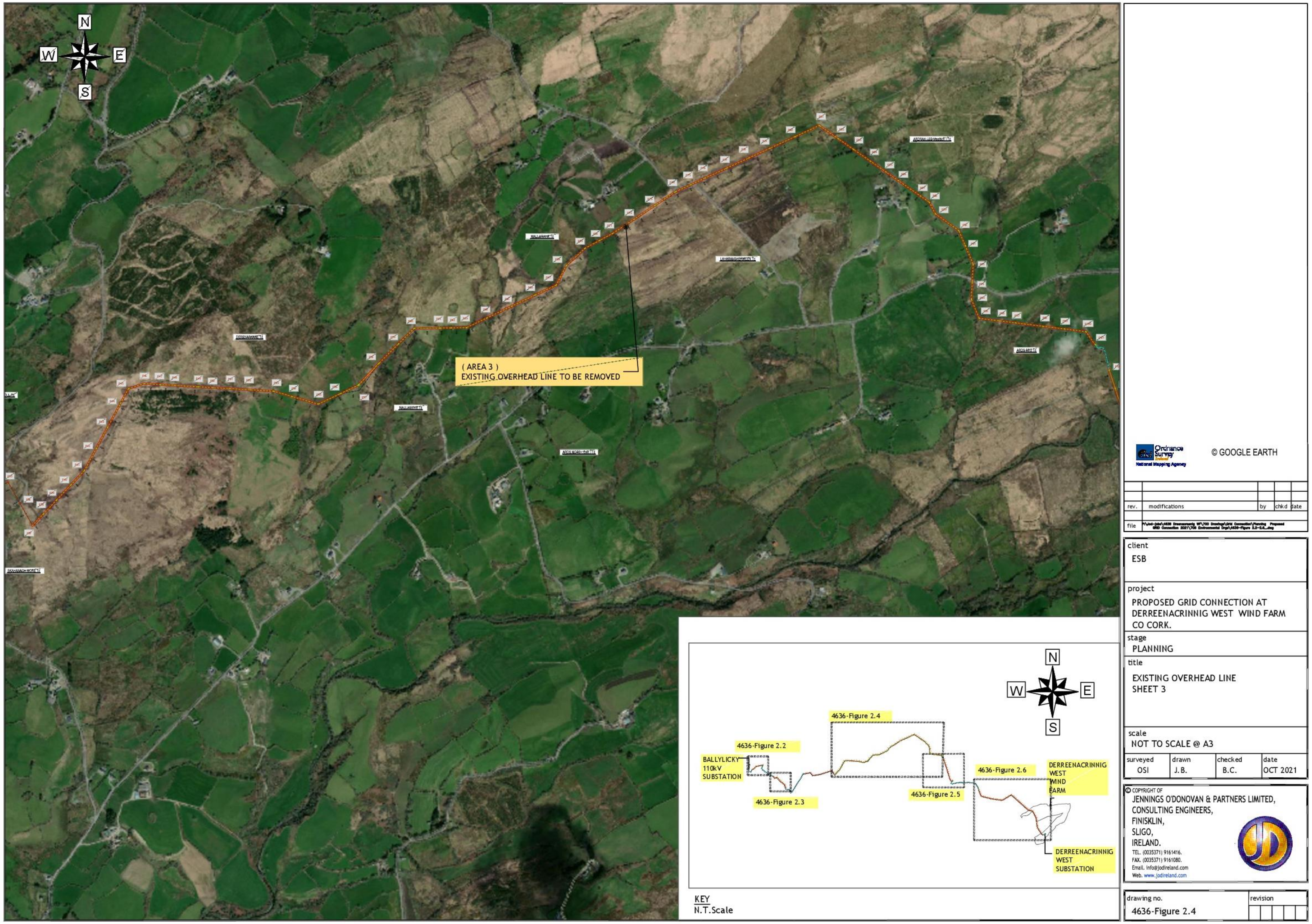
Figure 2.3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BALLYLICKY 110kV SUBSTATION
4636-Figure 2.3
4636-Figure 2.5
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DERREENACRINNIG WEST WIND FARM
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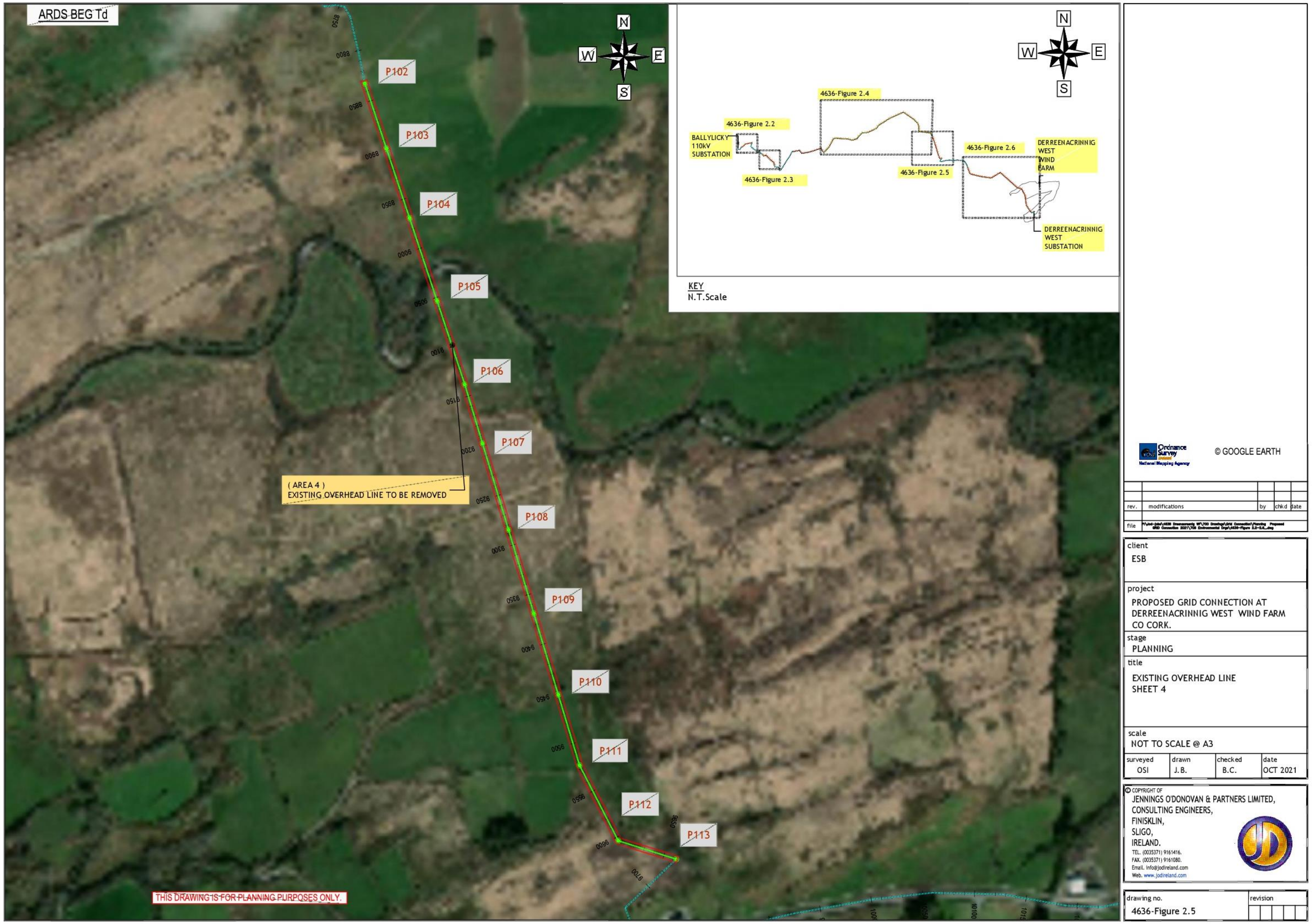
Figure 2.4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4636-Figure 2.4
4636-Figure 2.2
BALLYLICKY 110kV SUBSTATION
4636-Figure 2.3
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DERREENACRINNIG WEST WIND FARM
DERREENACRINNIG WEST SUBSTATION
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Figure 2.5

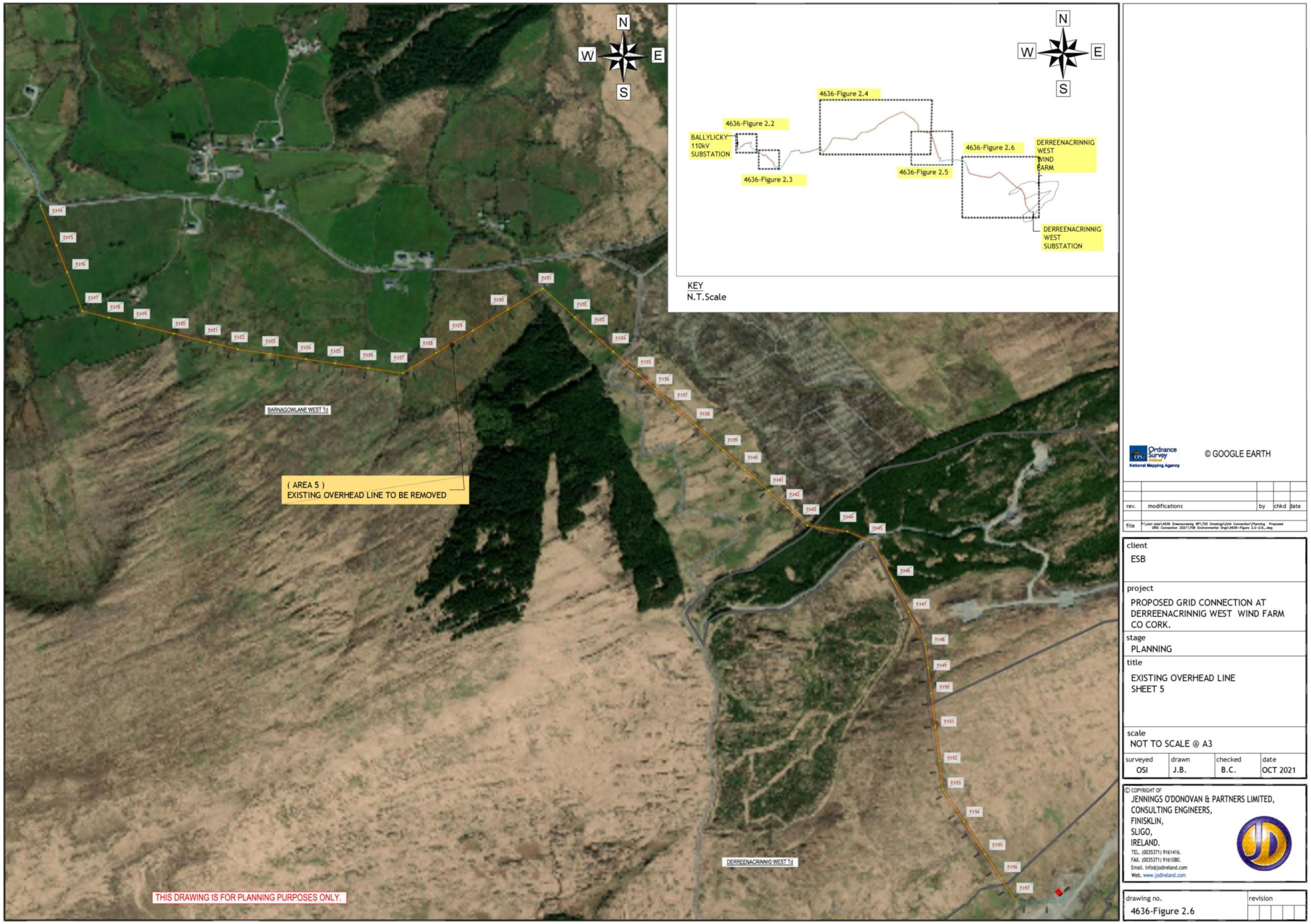


Figure 2.6 Aerial View of Habitats along the Route

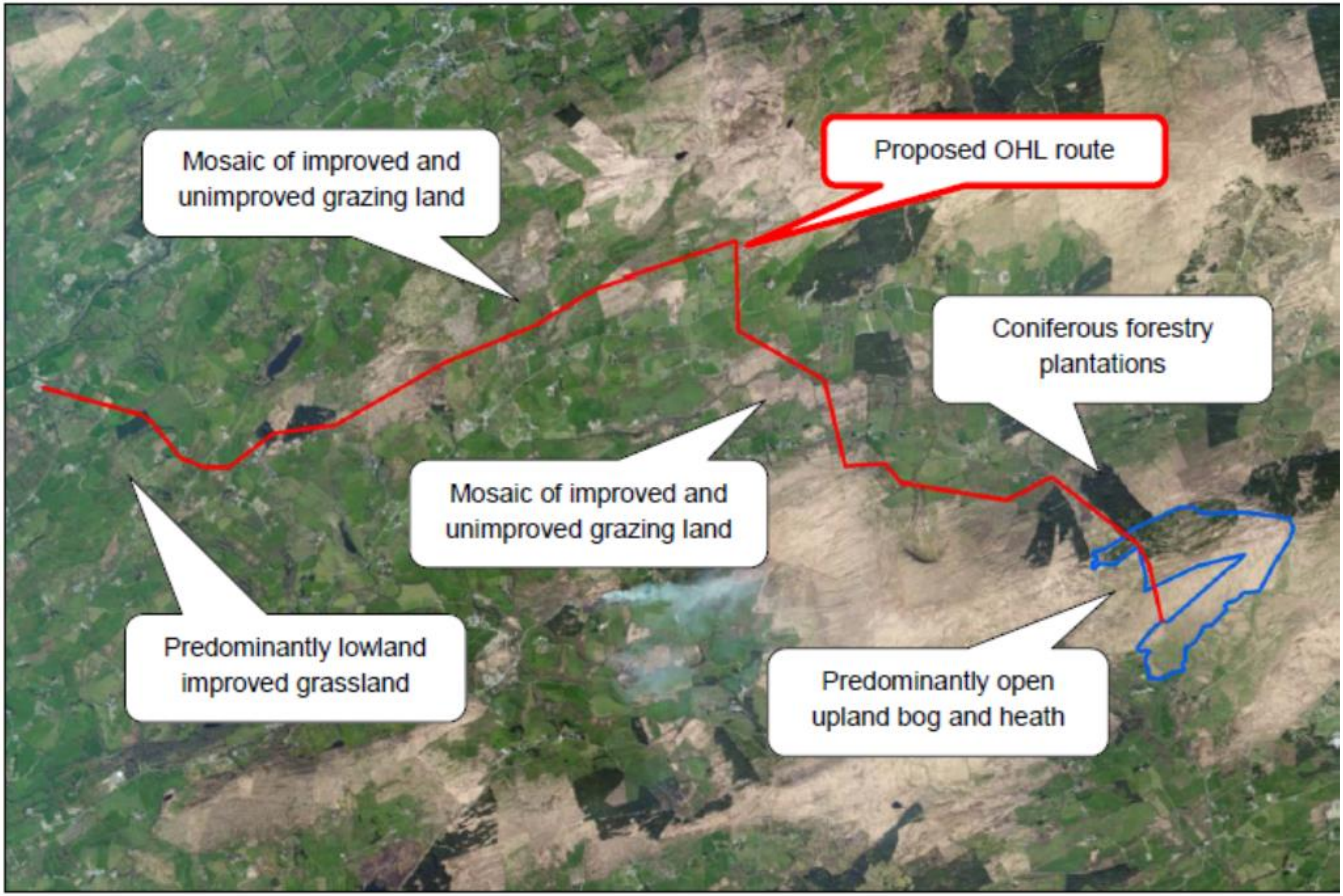


Figure 2.7 Proposed Grid Connection Route

Land Use of The Existing Grid Connection

The environs of the route are dominated by agriculture, with a small degree of commercial forestry. The eastern extent of the route traverses a more upland area with more unenclosed or unimproved grazing of sheep and dry stock cattle rearing. The section in the lower Mealagh valley and the western extent of the route crosses more improved agricultural land with increased fertiliser usage, though stocking densities are unlikely to be very high.

Proposed Grid Connection Route

The proposed Grid Connection, the subject of a planning application, will be constructed by ESB to the requirements and specifications of ESB. The asset will be owned, operated and maintained by ESB. The design principle of the proposed development is to develop a Grid Connection between the consented Derreenacrinnig West Wind Farm substation and the 110kV substation in Ballylicky. The design of the OHL as constructed complies with appropriate technical and operational requirements including mechanical and operational requirements as set out in the ESB Specifications for 20kV for Overhead Lines.

Six sections of underground cable, amounting to approximately 3.3km are required to the western half of the route. The underground route will result in temporary disturbance to improved agricultural grassland and road verges. In addition, discrete sections of six hedgerows will be temporarily disturbed during the excavation of trenches to accommodate the underground trench.

The Consented Derreenacrinnig West Wind Farm Project

The existing permission (Cork County Council P/10/00857 An Bord Pleanála Reference PL88.239767) was granted for a:

> *"10-year planning permission for development of a wind farm comprising seven (7) number electricity generating wind turbines with a hub height of 55 metres and a rotor diameter of 52 metres, an electrical compound, sub-station building, four number car parking spaces, associated site roads and site works. It is proposed to source stone from an on-site borrow pit, all in the townland of Derreenacrinnig West, Drimoleague, County Cork."* ("the 2012 Permission)

The consented wind farm also included foundations and hardstanding areas in respect of each turbine, new internal site access tracks, upgrade of existing access tracks, associated drainage, one borrows pit, an on-site substation and welfare facilities, temporary compounds as well as temporary minor alterations to the public roads for the delivery of turbines to the site (turbine delivery route). The turbines will be connected via associated underground cables which will run predominately along the access track network linking back to a proposed on-site substation.

Lands along the grid connection route and within and surrounding the consented Wind Farm are not subject to any nature conservation designations under national and European legislation. Habitats of County Importance include the wet heath habitat, particularly the examples at Laharanshermeen and Ards Beg, the dry heath along the ridge line of Derreenacrinnig West and the wet willow woodland. The humid acid grassland is considered to be of local (higher) value while other habitats such as gorse scrub, conifer plantation, recently felled woodland improved agricultural grassland, amenity grassland and built land are of local (lower) value. Overall, the lands occurring within the route corridor range from local (low value) to national ecological value.

No significant change will result from the proposed development. It is envisaged that access to pole locations in enclosed and improved agricultural areas will use existing farm access points. In the more upland areas along the eastern sector of the route, where open bog and heath habitats will be encountered, construction materials will be transported by means of tracked machinery along demarcated access routes, which will be defined in advance based on site-specific geotechnical and ecological surveys. Low ground pressure machinery will be used in peat areas and bog mat access routes will be installed in areas of particularly poor bearing. These bog mat routes will be removed on completion.

2.5 SITE LOCATION AND ENVIRONS

2.5.1 Introduction / Existing Land Use / Permitted Land Use

The Derreenacrinnig West Wind Farm site is located in an elevated position (402m) at Derreenacrinnig West, approx. 11.5km east of Bantry, 5.8km north of Drimoleague and approx. 11.6km east of Dunmanway. Derreenacrinnig West forms part of a ridge trending west from Nowen Hill (530m) toward Mullaghmesha (494m).

The total Wind Farm site area is approximately 81 hectares and ranges in elevation from 200 m to 402 m OD (Malin Head). The site can be located on Discovery Series Map No. 85 at the approximate grid co-ordinates E 111,310 N 52,180. The site is irregular in outline, approximately 1.6 kilometres in length and up to 1.7 kilometres in width. The development will comprise of 7 electricity generating wind turbines with a hub height of up to 55 m and a rotor diameter of up to 52 m, an electrical compound and substation building, car parking spaces, borrow pit, associated site roads and site works.

The wind farm site extends from the local road at Castledonovan on the southern slopes of Derreenacrinnig West, over the ridge to include the upper northern slopes of the hill. The southern slopes are relatively steep with extensive areas of exposed rock. Agricultural tracks provide access to the southern areas of the site. There is a difference of approx. 200m between the lower elevations of the site and the ridge line. The south-eastern site boundary is formed for a large part by a tributary of the Ilen, flowing southwest. The northern slopes of the hill, are partly under forestry, accessed from the local road to the west. Within this forestry area, there is an area previously used for the extraction of rock, presumably associated with forestry road construction.

The Wind Farm and Grid Connection route is set out at **Figure 1.1: Site Location Map**. The proposed wind farm site is not covered by any nature conservation designation. There is no designated area within 5km of the proposed site. Carriganass Castle pNHA, code 002099, is the closest designated area, approximately 7km to the north west of the proposed Derreenacrinnig West site. This pNHA is a nursery roost for the Daubenton's bat. The 2012 Planning Permission allows the development of an area contained within the Proposed Development Site to be used for the construction and subsequent operation of a wind farm.

The As Built Grid Connection

The as built Grid Connection traverses mainly agricultural land as shown in **Figures 2.2-2.6**. The as Built Grid Connection comprises 5 separate sections for Overhead Lines, running in an East – West direction. (See **Table 2.2**)

In addition to the identification, description and assessment of the Existing Development included the existing permission (the 2012 Permission), this EIAR identifies, describes and assesses the Proposed Development as a whole, taking into account the 2012 grant of planning permission, the 20kV Substation, and any other existing and permitted developments.

2.6 THE PROPOSED GRID CONNECTION

In accordance with the Group Processing Principles set out by the Commission for Energy Regulation (CER), ESB as the Distribution System Operator specified the connection method in the Derreenacrinnig West Wind Farm's ESB Connection Agreement to be via a new dedicated 20kV connection from the Derreenacrinnig West Wind Farm site to a proposed 20kV bay which will be constructed within existing Ballylicky Substation.

Construction of the 20k V Grid Connection

The proposed 20kV grid connection will connect the permitted 7-turbine Derreenacrinnig Wind Farm to the existing Ballylicky 110kV substation in County Cork. The new Grid Connection will be constructed to the requirements and specifications of ESB Networks. The 20kV overhead line conductor construction type is 150mm2 AAAC (All Aluminium Alloy Conductor) designed according to ESB Networks' Functional Design Specification for MV Overhead Lines'. 157 standard 20kV single poles, with an average span distance of 85m is required. The wooden poles are standard ESB Networks 20kV wooden poles which vary in length on this project between 11 and 13 metres. The top of pole diameter varies between 200mm and 220mm. The actual height of pole above ground will vary between 8.8m and 10.7m and between 2.2 to 2.3m of the pole will not be seen as it will be buried in the ground.

Proposed Underground Grid Connection

Six discrete sections of underground ducted line occur along the proposed grid connection route including:

Table 2.2: Proposed Grid Connection

Area 1 UGC	201.5m of underground cables from Ballylicky Substation.
Area 2 UGC	624.5m metres of underground cable in Crossoge and Dromlouglin townlands.
Area 3 UGC	1081m of the grid connection route will be ducted along the verge of the existing local road at Glencreagh.
Area 4 UGC	112.3 metres in the townland of Gortnacowley.

Area 5 UGC	963m within the carriageway of the road at Glanareagh and 110 metres in lands.
Area 6 UGC	113m of Grid Connection at Derreenacrinnig West.

2.7 THE REMOVAL OF THE AS CONSTRUCTED 20kV OVERHEAD LINE & CONSTRUCION OF THE PROPOSED NEW 20kV GRID CONNECTION

2.7.1 Removal of The as Constructed 20kV Line

The removal of the as constructed sections of the 20kV overhead line will be carried out in accordance with ESB Networks Overhead Line Poling Standards. This will require the overhead line electrical conductor to be removed in advance of all wood pole structures and associated equipment being removed.

2.7.2 Removal of overhead line electrical conductor

In advance of the removal of the wood poles, the strung sections of electrical conductor will be removed along the entire as-constructed overhead line route. This work will involve

- Disconnection of conductor from all wood pole structures, This is carried out in sections, typically between angle/strain points of the overhead line.
- The conductor is mechanically coiled/rolled onto drums and removed from site for appropriate reuse or disposal. This equipment will be brought to site on vehicle drawn trailer

Additionally, all cables, earth wires, stay wires shall be completely removed from all poles to be removed. This equipment will be either removed from site by ESBN for appropriate disposal or reused as part of the proposed new grid connection.

2.7.3 Removal of Wooden Poles along entire as constructed line route

The age and condition of the pole will influence the method chosen to retire it. Poles shall never be pulled directly out of the ground – prior excavation of the pole foundation shall always be carried out.

Prior to any works being undertaken, the following will be carried out:

- Arrangements in relation to access, temporary fencing, security of livestock etc. will be discussed with landowners are implemented in advance of works.

- Pollution control measures will be implemented.
- Traffic management measures to be implemented whenever any poling works are likely to interfere with traffic or pedestrians.
- A controlled entry zone will be established.

Approved Methods of Wood Pole retirement are as follows:

1. 360˚ Tracked Excavator with Approved Split Bucket or 180˚ Rubber Tyre Excavator with Approved Pole Erector Grab, loosening the soil and lifting the pole. This method is not suitable if the pole to be retired has been assessed as seriously defective by ESBN.

2. 360˚ or 180˚ Excavator; Controlled Push Down Method.

Excavator Controlled Push Down Method

- Dig a trench in the direction of the push down 150mm from pole and 1000mm deep, with a taper back towards digger.
- For the push-down: Set up excavator 90°degrees to trench a minimum of 4m back from pole. Under the guidance of the PICP the machine operator positions the back actor between 1m and 1.5m high beside the pole on the opposite side of the trench.
- With the machine in position: Switch off excavator, Person In Charge of Poling (PICP) to choke a 2m (2000kg) sling around pole, and Attach to the eye at the end of the excavator arm via a 2000kg shackle
- All personnel to move outside of the extended Construction Exclusion Zone (CEZ)
- On the instruction of the PICP when the area is clear: The machine operator will take slack in the sling, and Push against the pole in a slow and smooth action, until the pole is lowered safely to the ground.

When the pole is on the ground, it will be removed from site if required or reused as part of the proposed new grid connection.

ESBN will supervise and photograph/ record the removal of the entire overhead line and poles.

It is ESBN standard policy to make good any ground damaged during poling activities in partnership with the associated landowners.

2.7.4 Construction of New 20kV Grid Connection

The new Grid Connection will be constructed to the requirements and specifications of ESB Networks. The 20kV overhead line conductor construction type is 150mm2 AAAC (All Aluminium Alloy Conductor) designed according to ESB Networks' Functional Design Specification for MV Overhead Lines'. 157 standard 20kV single poles, with an average span distance of 85m is required. The wooden poles are standard ESB Networks 20kV wooden poles which vary in length on this project between 11 and 13 metres. The top of pole diameter varies between 200mm and 220mm. The actual height of pole above ground will vary between 8.8m and 10.7m and between 2.2 to 2.3m of the pole will not be seen as it will be buried in the ground. Figure 2.8 below shows the typical structure type to be used on this project.

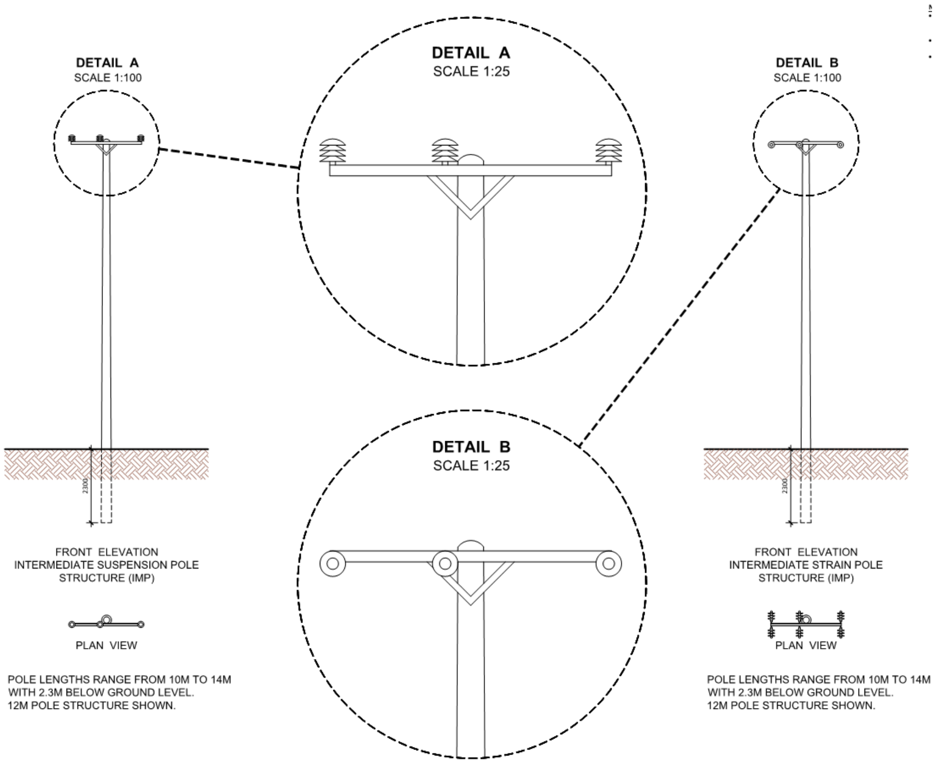


Figure 2.8 - Typical 20kV single circuit overhead power line.

Plate 1 - Photograph of a Typical 20 kV Pole with Excavation

Pole and line installation works will be standard for a 20kV ESB overhead line:

- Where possible, existing poles that have been removed previously will be utilised in the construction and erection of the proposed new grid connection provided their conditions enable their reuse from a technical/structural aspect.
- If required, new Poles will be carried from adjacent roadways to each erection site and placed into an excavated hole using a wheeled or tracked excavator fitted with a pole grab attachment
- The pole hole is manually backfilled and tamped down to a minimum depth of 1.0m until the backfill is capable of supporting the pole; the excavator then continues the backfilling and tamping
- Where rock is encountered, the pole hole is formed using a hydraulic rock-breaker attachment mounted on the excavator
- Where the line changes direction and at pole set locations with poor ground conditions, stay wires will be required. These wires are supported by means of stay blocks, which are made of wooden sleepers and are buried underground
- Stringing of the conductor involves pulling out polypropylene rope along the route by hand, attaching the conductors and then pulling into position with stringing machine.

The 20k V underground power cable construction type is 20kV XLPe cable to be ducted according to ESB Networks' 'Specification for the Installation of Ducts & Structures for

Underground 10-20kV Power Cables & Communication Cable'. The 20kV power cable will be laid in a single 125mm diameter uPVC duct in a cable trench.

Cable Duct Design

The 20kV power cable will be laid in a cable trench according to:

- ESB Drawing 1A: '20kV Single Circuit Standard Trench Cross - Section' on page 1 of the ESB specification document. (Note only one 110mm Communications duct at 750mm below the finished surface is required for this installation).
- ESB Drawing 2A: '20kV Single Circuit Joint Bay - Section' on page 1 of the ESB specification document.

The typical trench cable arrangement will be 1 duct. The typical trench dimensions will be 325mm wide and 950mm deep following the ESB' Standard Detail for a Single Circuit 20kV Underground Cable

2.7.5 Joint Bays Locations for the Proposed Grid Connection

Joint Bays are the locations where individual lengths of cables will be joined and are typically 500 to 700m metres apart. A joint bay is constructed in a pit. The bay typically is approximately 2.5 metres x 1.815m x 1.21m deep. A reinforced concreted slab is constructed in the bay to accommodate the joint enclosure.

The Joint Bay locations have been dictated by suitable terrain and access to facilitate the operation of cable pulling equipment at any phase of the development and future operation of the installation in accordance with the ESB own specifications.

Trench Layout

The trench layout shall be as per the appropriate ESB drawings. The specification of the relevant Local Authorities must be followed for the excavation and reinstatement of the ducted cable trenches. When the trench has been excavated to the required depth and all loose material and protruding stones have been removed, a bedding layer of sand shall be laid and compacted to a minimum thickness of 50mm.

Plate 2: Typical Trench Construction within roads

Ducts

All joining ducts shall be laid in straight lines to even gradients. Once the ducts have been installed and backfilled with lean-mix concrete and with Clause 804 stone the duct run must be thoroughly cleaned by pulling the appropriate size of ESB approved duct brush through the duct.

All reinstatement works shall be in accordance with the NRA Specification for Road Works and any conditions specified in the Road Opening Licence

Details of the construction methodology are detailed in dedicated CMS but are summarised below:

- Preparatory Works
    - Preparatory Trial Pit Survey along the cable route
    - Access to the start point and setting out
    - Access to joint bays
    - Silt Attenuation Features and watercourse set back buffer
    - Joint Bay Excavation
- Trenching Works
    - Storage of Materials

- Trench Operations
- Managing excess material from trench

2.8 CONSTRUCTION SEQUENCE

The outline construction period and the Contractor’s proposed sequence of works will take due cognisance of the requirements of the stipulated Planning Conditions and by the Contractors Contractual obligations.

The outline construction methodology is discussed under the following headings:

- Construction Method – Removal of Existing Overhead Cable
- Construction Method
- Cable Ducting / Grid Connection
- Expected Duration of the Works
- Working Hours
- Noise Management
- Ecological Management
- Handling and Disposal of Waste Material

2.8.1 Phasing of Works

Prior to the commencement of construction, the contractor will prepare day to day method statements and work programmes that outline a detailed phasing of works. Due to the nature of the development, it is likely that a number of construction crews will be working along the route at any one time. These crews will be suitably spread across the route to ensure that cumulative traffic related impacts are not experienced by local residents, landowners or businesses. ESB Network’s Project Manager will ensure that the phasing of work is undertaken in accordance with the prepared method statements and in accordance with a detailed works programme

2.9 PROJECT CONSTRUCTION AND COMMISSIONING

2.9.1 Machinery to be used during removal of the sections of as constructed overhead line and construction of new grid connection

The items of construction plant and machinery, which will typically be used during the course of construction, are as follows:

- 1 Excavator Operator
- 1 no. tracked excavator

- 1 no. rubber wheeled excavator
- 1 no. tracked dumper
- No or tractor and trailer
- Various delivery and collection vehicles

2.9.2 General Method

The underground cable will be developed in 100m sections. Once one section of 100m has been excavated and the majority reinstated, the second 100m can be excavated and so on for the length of the grid connection. The excavated trench will be approximately 325mm wide. Trackway material within the temporary working area will be stripped and stockpiled adjacent to the excavation with subsoil being stockpiled separately.

Any earthen banks impacted will be carefully excavated with surface sods stored separately and maintained. Other earthen banks will be fenced off to prevent them from being damaged by construction traffic.

The duct trench will be excavated, and the material will be stockpiled. No dewatering of the trench is anticipated. Should dewatering be required it will be discharged through sedimats or similar which will capture the sediment prior to discharge to the roadside drain.

The base of the excavated trench will be lined with sand. The pipeline duct sections will be lowered into the trench by side booms and backfilled with lean-mix concrete, Clause 804 gravel and the original excavated material. All soil and road layers will be reinstated in reverse order to which they were excavated.

2.9.3 Storage of Equipment and Materials

It is expected that a tracked dumper or tractor and trailer will be used for the construction of the underground cable. Concrete, Clause 804 material, bundles of 125 mm PVC diameter duct and a water trailer will be used, and these will need to be stored overnight and when not in use. All equipment will be stored on or immediately adjacent to the trench on the existing road that as far as possible drains away from any watercourse.

2.9.4 Pollution Prevention & Control

2.9.4.1 Refuelling

The issue of accidental spillage of hydrocarbons such as diesel and lubrication oil during refuelling of plant machinery is a potential risk during the construction phase.

Where possible, fuel will be brought to site in a bunded fuel bowser. The carriage of Dangerous Goods by Road Regulations 2003 classifies diesel as a dangerous substance.

If dangerous goods are being transported by road, then they must now be conveyed in a container which complies with the ADR. ADR is the European Agreement on the international and national Carriage of Dangerous goods by Road under Directive 95/55/EC. The manufacturer of the bunded fuel bowser must supply with each bowser:

- a copy of the Institutional Bio-safety Committee (IBC) approval certificate,
- a test certificate for the 'leakproofness' test,
- An identification plate attached to the container.

Such containers are suitable for diesel and kerosene and are designed to help companies comply with current and pending EU Environmental Regulations by eliminating accidental spillage. The outer container bund has in excess of 110% capacity of the inner container. For loads in excess of 1,000 litres transported by road, the vehicle driver must have undergone training and hold a special licence.

Re-fuelling off-site is the most effective way of controlling hydrocarbon spillages from construction plant. Where possible, re-fuelling of construction plant will take place off site, in order to reduce the risk of impact to zero. Off-site refuelling should occur at a controlled fuelling station.

Re-fuelling will not occur within 20m of any watercourse and all machinery will be maintained in good working order, free from leakage of fuel or hydraulic fluid. Equipment, fuel transfer areas and attenuation measures must be checked regularly during the construction phase.

The incident management plan of the construction phase CEMP must include an approved, certified clean-up consultancy, nominated by the contractor and available on 24-hour notice to commence a clean-up in the event of a hydrocarbon spillage.

Sampling of soils and adjacent surface waters will be undertaken on a regular basis to ascertain that **no pollution by hydrocarbons has occurred.**

2.9.4.2 Servicing

Where it is necessary to service machinery on-site, drip trays will be used, and no vehicle maintenance will occur within 20m of any watercourse. All machinery will be maintained in good working order, free from leakage of fuel or hydraulic fluid.

Parking of vehicles overnight or in periods of cessation of operations will be on hardstand areas and never close to open excavations or surface watercourses.

On site discharge of wash water from concrete mixers will be avoided at all times.

2.9.4.3 Disposal

Oily water condensate and recovered oil from any accidental spillage will be disposed of by recycling and the services of a specialist, licensed, waste oil recycler will be engaged for this task.

Any contaminated surface soils (in the unlikely event that contamination occurs) will be removed and similarly disposed of by a specialist, licensed contractor. Disposal will be undertaken with prior approval from Cork County Council.

2.9.5 Mitigation Measures

2.9.5.1 Construction Phase:

- Oils, greases and hydraulic fluids will be stored in bunded containers at least 20m from any watercourse.
- Refuelling of machinery will be carried out as described under 'Refuelling' outlined earlier in Section 2.5.6.
- Excavated soil should be stored at least 50m from watercourses and 20m form surface drains.
- Drainage will be via overland filtration, or through a stilling pond as necessary.
- A Construction Management Plan (CMP) will be provided to IFI prior to commencement to outline good practice and contain mitigation measures and provide a mechanism for compliance with legislation and statutory consents.
- Monitoring of the watercourses will be carried out during construction at watercourse crossing locations along the underground cable route to see that construction works are not significantly impacting the watercourse.
- Truck rutting will be kept to a minimum by confining plant and machinery movement to the development footprint area.
- A working wayleave of 3m will be maintained along the existing roadway.

- Plant will travel slowly across bare ground at a maximum of 5km/hr. If truck rutting is observed, then bog mats or rolling road will be employed.
- Silt fencing will be erected at a setback distance of 5m from the joint bays during excavation.
- Any excess construction material shall be removed from the works areas and disposed of in a fully licensed landfill.
- No re-fuelling of machinery will take place on site or within 50metres of any watercourse.
- All construction workers will be given a toolbox talk addressing the environmental topics and the drilling prior to commencement of construction.
- If truck rutting is observed, then bog mats or rolling road will be employed.
- No concrete will be batched on site. Concrete will be delivered from off site. Concrete will be transferred into a power barrow outside of the 50m watercourse buffer zone. Concrete contaminated water should be pumped away from the site and contained for disposal at an appropriately licensed facility off site.
- Any channel/riparian area will be fully reinstated post construction to minimise erosion potential.

2.9.5.2 Operational Phase:

During the operation of the underground cable maintenance may be required in the event of a cable fault. If this is necessary, the following methods will be employed:

- All vehicles visiting the site will be refuelled off-site.
- Trained personnel will carry out maintenance /repair when required. An emergency response will be included in their training for accidental hazards that could potentially occur on-site.

2.9.6 Spoil Management

For general trenching operations it is estimated that for each 100m section of duct, 30m3 of subsoils will be excavated. This material will be stored adjacent to the trench with 10m3 of this material being reinstated in the trench. The remaining 20m3 will be transported to a licenced facility for disposal. However, for trenches in roads, all material will be disposed to a licenced facility. Road surfacing material will be excavated separately and disposed of separately to a licenced facility. A Waste Management is provided (Management Plan No 4) attached to the CEMP. (**Appendix H**)

2.10 TESTING AND COMMISSIONING

Plant commissioning will follow completion of the plant construction phase and will involve setting up and testing the equipment so that it is fully functional and that all technical, environmental and safety requirements have been met. Commissioning takes approximately 2 weeks.

2.11 OPERATION AND MAINTENANCE

Periodic maintenance may be required on the underground cable throughout its lifetime.

2.12 DECOMMISSIONING

When the Derreenacrinnig West Wind Farm ceases operation, the proposed Grid Connection cable will be removed or repurposed to augment the local electricity supply. The Derreenacrinnig West Wind Farm has a permission for a 25 year operational life (Condition 3 of the grant of planning (Ref: PL: 88:239767 & Ref 10/857), after which the turbines and associated infrastructure will need to be decommissioned in accordance with a plan that has been agreed with Cork County Council.

2.13 SITE SELECTION AND CONSIDERATION OF REASONABLE ALTERNATIVES

2.13.1 Introduction

This Chapter provides a description of the alternatives considered by The Applicant in the design of the EIA Development and the consented Derreenacrinning West Wind Farm.

It considers the following:

- The ‘Do Nothing Scenario’
- Alternative Locations
- Alternative Layouts
- Alternative Grid connection options
- Alternative processes for the Proposed Development
- Alternative scales for the proposed turbines

Alternatives were assessed having regard to commercial, construction, operational, technical, and key environmental constraints.

2.14 DEVELOPMENT BRIEF

The development brief looked a number of alternative grid connections before arriving at the preferred option, the Existing Development. The Development Brief for the permitted windfarm was to find an optimum fit within the technical and environmental parameters of the Site, including maximising the use of existing infrastructure.

2.15 METHODOLOGY

2.15.1 Guidance

The following guidance has been reviewed as part of this assessment:

- Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2017).
- Environmental Impact Assessment of Projects - Guidance on the preparation of the Environmental Impact Assessment Report (European Union, 2017).
- Transposition of 2014 EIA Directive (2014/52/EU) in the Land Use Planning and EPA Licencing Systems (DoHPCLG, 2017).
- Directive 2014/52/EU of the European Parliament and amendment to Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment; and
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (Department of Housing, Planning and Local Government, 2018).
- Advice Notes on Current Practice (in the preparation of Environmental Impact Statements) (EPA, 2003); and
- Guidelines on the information to be contained in Environmental Impact Statements (EPA, 2002).

2.15.2 Approach to Alternatives

The Environmental Impact Assessment of Projects - Guidance on the preparation of the Environmental Impact Assessment Report' (European Union, 2017) states that reasonable alternatives "*must be relevant to the proposed project and its specific characteristics, and resources should only be spent on assessing these alternatives*" and that "*the selection of alternatives is limited in terms of feasibility. On the one hand, an alternative should not be ruled out simply because it would cause inconvenience or cost to the Developer. At the same time, if an alternative is very expensive or technically or legally difficult, it would be unreasonable to consider it to be a feasible alternative*".

The Draft EPA Guidelines state that "*It is generally sufficient to provide a broad description of each main alternative and the key issues associated with each, showing how environmental considerations were taken into account is deciding on the selected option.*"

2.16 SITE SELECTION AND EXAMINATION OF ALTERNATIVES

2.16.1 Requirements for Alternatives Assessment

The European Commission sets out that:

Article 5(1) of the Revised EIA Directive 2014/52/EU requires:

"*Where an environmental impact assessment is required, the developer shall prepare and submit an environmental impact assessment report. The information to be provided by the developer shall include at least: ...*

(d) a description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment".

Annex IV of the Revised EIA Directive (Information Referred to in Article 5(1) (Information for the Environmental Impact Assessment Report) states that:

"*… 2. A description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studies by the developer, which are relevant for the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of environmental effects*".

The Revised EIA Directive Consultation states that transposition of these provisions is mandatory, and that:

"*Guidance will be developed on the requirement to study reasonable alternatives, including reference to the fact that some alternatives may already have been studied in relevant SEAs. The guidance will also deal with relevant considerations, including 'do nothing' alternative(s), alternative site(s), alternative design(s)/layout(s), alternative processes(s), alternative mitigation measure(s). Reference will also be made to the requirement that "reasonable alternatives ... relevant to the project and its specific characteristics" are required to be studied*".[2]

"This chapter will present a representative range of the practicable **grid connection** alternatives considered. The alternatives **have been** described with 'an indication of the main reasons for selecting the chosen option' **A** broad description of each **reasonable** alternative and the key issues associated with each, showing how environmental considerations were **taken into account when** deciding on the **final grid connection route**.

[2] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32014L0052

The Draft EPA Guidelines on the information to be contained in an Environmental Impact Assessment Report (2017) state:

"*It is generally sufficient to provide a broad description of each main alternative and the key issues associated with each, showing how environmental considerations were taken into account in deciding on the selected option. A detailed assessment (or 'mini-EIA') of each alternative is not required*."

The EU Guidance Document (EU, 2017) [please provide full reference] states that reasonable alternatives "must be relevant to the proposed project and its specific characteristics, and resources should only be spent assessing these alternatives".

It also states that "the selection of alternatives is limited in terms of feasibility. On the one hand, an alternative should not be ruled out simply because it would cause inconvenience or cost to the Developer. At the same time, if an alternative is very expensive or technically or legally difficult, it would be unreasonable to consider it to be a feasible alternative".

During the grid connection design and route selection process, alternative layouts and routes were fully considered in light of potential environmental impacts.
This chapter outlines the design evolution of the grid connection and fully considers the following elements:

- *'do nothing'*
- *alternative routes,*
- *alternative designs / layouts,*
- *alternative processes,*
- *alternative scale, and*
- *Current alternatives*

This Chapter will first assess the "Do-Nothing" Scenario i.e., the consequences likely to have occurred, if the grid connection had not been construction. This Chapter will then consider the Grid Connection Alternative Routes, Design, Processes and Scale which were considered by the Applicant. The Chapter will then assess the "Current Alternatives", i.e., the removal of the grid connection cable.

2.16.2 The Do-Nothing Scenario

The do-nothing alternative **assessed in this Chapter** describes consequences **and impacts** that are reasonably likely to occur. It **does not** exaggerate or catastrophize environmental consequences that may occur without the proposed project.

It is best practice in Environmental Impact Assessments (EIA) to consider the 'Do Nothing' alternative – i.e., where no development occurs. Under a 'Do Nothing' alternative, the grid connection would have been constructed. The land upon which such the development occurred – primarily comprising public, forestry and agricultural land and forestry- would remain unchanged (unless it had been developed for some separate purpose). Consequently, any environmental impacts, identified in this EIAR, positive and negative, would not have occurred. Critically, in the Do-Nothing scenario, Derreenacrinning West Wind Farm could still have been constructed creating a demonstrable unmet need for a grid connection that would have had to be met by the Existing Development or by another grid connection solution.

The 'Do Nothing' scenario will scenario will undermine current Government targets under Climate Action Plan. 2019. The Climate Action Plan 2019 sets out ambitious levels for renewable energy to 2030, (70% from renewables by 2030) which will support the EU renewable energy target of 32%.

Having regard to all the above, the 'Do Nothing' scenario will result in an increase in renewable energy generation and an additional saving of CO2 per year over the existing windfarm or 'do nothing' scenario. The 'do nothing' scenario will therefore not additionally contribute to Ireland's commitment to meet its EU and national emissions targets and a significant potential use of County Council's renewable energy capacity will remain underutilised. Additionally, the opportunity for development contributions would be lost and rates and investment in County Cork would be lost and community benefits from The Development would be lost.

2.16.3 Grid Connection Alternatives

In Ireland, connecting into the national grid is the statutory responsibility of the Commission for Energy Regulation (CER) with the Enduring Connection Policy (ECP) process largely influenced by national policy and the need to provide capacity on the national electricity grid for renewable energy production. In processing connection applications and modifications, ESB and / or Eirgrid must give due consideration to the efficient development of the transmission and distribution networks but must also give due regard to the environment.

Prior to the commencement of development of the as built grid connection, a number of alternative grid connection routes were considered as part of a high-level assessment. Key consideration was given to environmental matters. For example, some locations had more inherent environmental sensitivities than others. It was possible to avoid such routes in favour of a route which has fewer constraints and more capacity to sustainably assimilate the grid connection.

2.16.4 Route Screening Analysis

Following the omission of two of the routes as a result of the technical and environmental considerations, a more detailed analysis was carried out of the preferred route as shown on **Figure 2.9** having regard to the following:

- *Route Length*
- *Environmental Designations*
- *No of Major River Crossings*
- *No of other Water Crossings*
- *No of Houses Along Route (Approx.)*
- *No of Urban Areas (Town/ Village)*
- *No of Archaeological Constraints*
- *Avoidance of Protected Structures*
- *Topographical Constraints*
- *Quality of River Crossings*
- *Impact on residents*

Three options were explored in further detail as part of the Route Screening Analysis, and these are presented in **Figure 2.9.** Consideration was given to alternative options from the outset of the project where the key consideration was given to the avoidance of adverse effects on the environment. The three options identified above do not traverse any European Sites which was a key in the selection of a grid connection route.

A number of options were explored for the Grid Connection as part of the EIAR. Consideration was given to various grid connection route alternatives. Both overhead and underground cables (and/or a mix of both) were considered to be technically feasible and viable alternatives for this project.

Table 2.1: Route Option Characteristics

Route Option Characteristics	Option No. 1	Option No. 2	Option No. 3
Route Length	14.97 km	11.63 km	13.36 km
No of Major River Crossings	1	1	1
No of other Water Crossings	7	6	11
No of Houses Along Route (Approx.)	12	36	21
No of Urban Areas (Town/ Village)	1	1	1
No of Archaeological Constraints	4	5	4
Topographical Constraints [Highest Point]	230m	210m	270m
Topographical Constraints [Sharpest Rise]	120-170m	120-200m	200-270m

2.16.5 Proximity to ESB Substation

Ballylicky Substation was chosen by the applicant (ESB) as being the most favourable electricity node to connect into and a connection offer was made by ESB to the wind farm development on this basis. Each of the route options shown in **Figure 2.9** connect in to Ballylicky Substation. Both overhead and underground grid connections were considered as options. Therefore, the next step of the process was to select the optimum route option. The key criteria in selecting the route options are as follows:

- Minimise Environmental Constraints.
- Routes were selected to minimise the number of watercourse crossings.
- Minimise disruption to local residents.
- Minimise traffic and transportation obstruction.
- Minimise Archaeological Constraints.
- Outcomes of Engagement with landowners.
- Minimise underground cable route length to keep the construction period as short as possible and minimise financial outlay.

The processes associated with the construction and operation of the Grid Connection were identified by the Design and EIAR evaluation teams and also through consultation with interested parties.

Environmental Impacts

Key consideration was given to Environmental considerations. In some cases (e.g. river crossings) an overhead line can have a lower environmental impact than a trenched cable crossing. This was another key consideration in the determination of the preferred route. River crossings were unavoidable as each of the identified routes involve a river crossing.

Archaeological Constraints

Key consideration was given to archaeological sites are part of the preferred grid connection route. There are two recorded archaeological sites located within 100 metres of the yet to be constructed overhead circuit portion of the grid connection route.

There are three recorded archaeological sites located within 100 metres of the yet to be constructed underground cable portions of the grid connection route. There will be no direct, negative impacts on any recorded archaeological monument due to the construction of the remaining section of the Overhead Grid Connection.

There is no predicted direct, negative impact on the known archaeological resources due to the proposed construction of the underground cable portion of the grid connection route. While the route does pass through the zone of two recorded monuments in Shandrum Beg townland the nature of the topography in the area, combined with the construction of the road that will carry the cable, substantially reduces the archaeological potential of this section of the route.

Landowner Engagement

Landowner consent was another critical factor in determining the preferred route. For example, Option 2 and Option 3 shown in **Figure 2.9** were considered less viable due to landowners not being willing to engage in a reasonable way with these options.

Technical Feasibility

Over longer distances and higher power levels, there are fundamental electrical engineering constraints on how much power can be transported efficiently on cables. Out of the three route options shown in **Figure 2.9,** option 1 proved to be the most technically feasible.

Visual Impact

In terms of visual impact each of the options explored are located within a High Landscape Area in the Cork County Development Plan. The preferred Grid Connection route was considered to have the least visual impact, is located where possible, close to forestry for background screening.

A search was conducted on the Cork County Council Planning portal within the townlands of the proposed 20kV grid connection in relation to permitted plans and projects that may have the potential to result in cumulative impacts have been undertaken. The searches revealed no additional large scale permitted projects that have the potential to result in likely significant cumulative impacts. Planning applications identified in the townlands and vicinity of the 20Kv grid connection were small scale domestic or small scale agricultural, equestrian, electrical or retention applications. No large scale permitted developments were identified within the scope of the search, aside from Derreenacrinnig West Wind Farm.

The environs of the proposed route are dominated by agriculture, with a small degree of commercial forestry. The eastern extent of the route traverses a more upland area with more unenclosed or unimproved grazing of sheep and dry stock cattle rearing. The section in the lower Mealagh valley and the western extent of the route crosses more improved agricultural land with increased fertiliser usage, though stocking densities are unlikely to be very high.

The cumulative impacts in terms of neighbouring developments will be negated by the employment of a construction design to the highest standards, incorporating best practice methods. Considering this, significant effects on the environment are not likely, as outlined in the following sections.

The proposed Grid Connection route has been revised due to take into account topographical constraints of the area and buffers of existing archaeological features. The proposed Grid Connection was chosen to give appropriate buffers and set back distances to watercourse, archaeological features and visual amenities.

Option 1

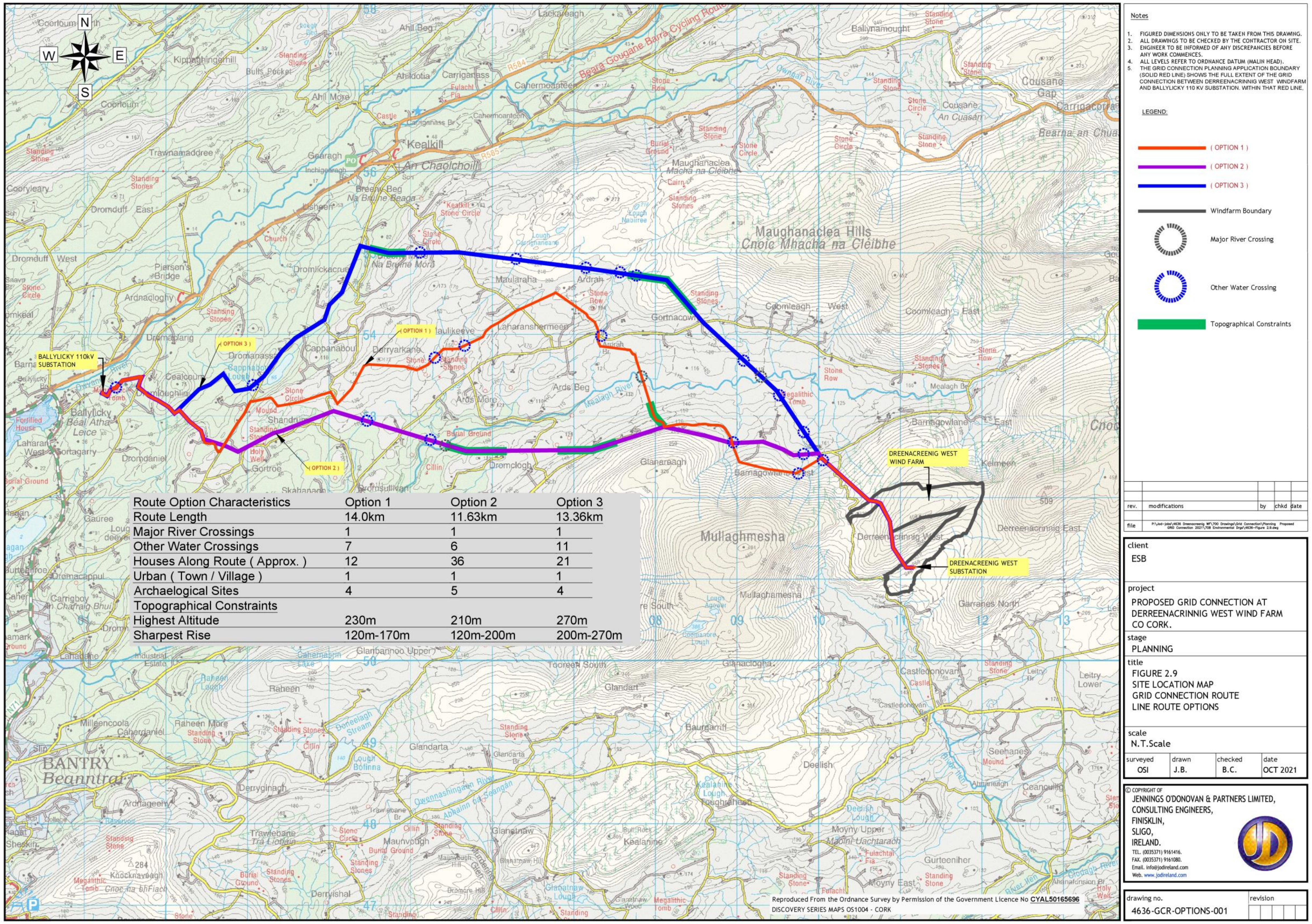
Option 1 was considered to be the preferred route option as it posed the least environmental constraints and was a more cost-effective option than Option 2 and 3. In terms of residential amenity it was the route which encountered the least number of residential properties in comparison to Option No. 2 and No. 3. The levels along the route are more favourable when compared to Option No.’ 2 and 3.

Option 2

Option 2 located to the south of the site of The Derreenacreenig West Wind Farm was discounted on the basis that it is located in close proximity to a number of archaeological sites. There are a number of dwellings along this route which were not receptive to the proposals and on that basis that option was discounted.

Option 3

Option 3 located to the north of The Derreenacreenig West Wind Farm was discounted because of topographical constraints relating to steep gradients and irregular landform. The route explored as part of option 3 entailed a number of stream and river crossings.



Route Option Characteristics	Option 1	Option 2	Option 3
Route Length	14.0km	11.63km	13.36km
Major River Crossings	1	1	1
Other Water Crossings	7	6	11
Houses Along Route (Approx.)	12	36	21
Urban (Town / Village)	1	1	1
Archaeological Sites	4	5	4
Topographical Constraints			
Highest Altitude	230m	210m	270m
Sharpest Rise	120m-170m	120m-200m	200m-270m

Figure 2.9 – Alternatives Considered

2.16.6 Reasonable Alternatives

If the development, as permitted by the 2012 Permission is not carried out, non-renewable energy sources will be required to supply a greater proportion of Irish energy generation current and future energy demands. This will further contribute to greenhouse gas and pollutant production and impede Ireland's commitment to meet its EU and national emissions targets and to strive towards sustainable development. The proposed EIA Development is intended to produce renewables energy to meet national policy and international legally binding commitments.

2.16.7 Current Alternatives

The removal of the partially constructed grid connection route without the construction of an alternative would result in the Permitted Wind Farm being unable to export clean electricity to the national grid.

The construction of any alternative grid connection route to the preferred route which has been constructed has the potential for significant impacts on the environmental receptors. As set out in this chapter, the existing grid connection route was assessed and considered the optimum route from an environmental perspective. This is supported by the conclusions of this EIAR, which has assessed the significant environmental effects which have occurred, or which are occurring, or which can reasonably be expected to occur as a result of the constructed grid connection.

There are no new reasonable alternative grid connection routes which change this position. Furthermore, alternative grid connection routes and designs would need to be sought and implemented to provide a grid connection from the consented windfarm to the national grid. It is therefore considered that any alternative grid connection route would likely result in significantly greater environmental impacts that the current route and would not be desirable from an environmental perspective.

2.16.8 Alternatives Considered for the Consented Wind Farm

As detailed in **Section 2.6 of the 2010 EIS** the Proposed Development. The 2010 EIS had assessed alternatives prior to beginning the project design.

The alternatives included 3 options:

- Option 1 – Glannannoo Upper

- Option 2 – Garranes North
- Option 3 – Derreenacrinnig West

2.16.9 Alternative Processes

Alternatives processes were considered with respect to alternative technologies for the generation of electricity for supply to the national grid. **EIAR Section 3: Planning Policy** provides an Ireland context for the international and national policy for increasing electricity generation from renewable energy sources. This has a number of drivers and benefits such as the security of energy supply, security of the cost of electricity (due to variability of international fossil fuel costs) and reducing emissions.

Alternatives processes were also considered as part of the consented DWWF with respect to other renewable energy technologies. While solar and hydropower are established renewable generating technologies, the potential for this technology to generate significant amounts of energy is limited in Ireland compared to wind energy. This is mainly due to few inter-related factors: Ireland is a low-lying country with few high mountains, those available are not extensive in the local geographic area and fish spawning grounds are afforded a high degree of protection.

2.17 CONCLUSION

Following the consideration of landscape sensitives; environmental considerations; planning policy considerations; proximity to dwellings the preferred grid connection route to Ballylickey as shown as Option 1 was considered to be the optimum and least environmentally sensitive route for all the reasons identified above.

2.18 PROPOSED DEVELOPMENT SITE INFRASTRUCTURE AND CONSTRUCTION

2.18.1 Cumulation with other Existing and/or Approved Projects

A search was conducted on the Cork County Council Planning portal within the townlands of the proposed 20kV grid connection in relation to permitted plans and projects that may have the potential to result in cumulative impacts have been undertaken. The searches revealed no additional large scale permitted projects that have the potential to result in likely significant cumulative impacts. Planning applications identified in the townlands and vicinity of the 20kV grid connection were small scale domestic or small scale agricultural, equestrian, electrical or retention applications. No large scale permitted developments were identified within the scope of the search, aside from Derreenacrinnig West Wind Farm.

The grid connection runs through a number of rural townlands in the County of Cork connecting the permitted Derreenacrinnig West Wind Farm site with the existing Ballylicky Substation.

At the end of the operational duration, all infrastructure will be decommissioned and in so far as is practical, dismantled and removed from the Proposed Development Site. The development is low impact, and represents a temporary use in the landscape, which is fully reversible in nature.

2.18.2 Other Development in the Area

The permitted Barrboy Wind Farm is located approximately 2km north east of the proposed Derreenacrinnig West Wind Farm site, consisting of 5 turbines with a hub height of 46m and a roto diameter of 62m. Planning permission was granted and never implemented, and this permission has now lapsed.

From an assessment of the planning applications on the Cork County Council planning website there are other plans and projects in the vicinity of the c.14.8 km underground cable grid connection route. The main project that needs consideration in relation to cumulative impacts is the consented Derreenacrinnig West Wind Farm (Cork County Council Pl. Ref. 10/857) which is where the grid connection begins.

Aside from the Derreenacrinnig West Wind Farm other planned or consented projects in the area consist mainly of applications for new single dwellings and extensions to existing dwellings. Many of these applications date from some years back and so it is likely many will have already been constructed or will not be carried out at all.

3 PLANNING POLICY

3.1 INTRODUCTION

This section sets out the planning policy context relevant to the proposed EIA Development by providing an overview of the international, national and regional legislation and policy of relevance, as well as a detailed review of the planning policy framework within which the application will be assessed.

The planning policy assessment demonstrates that The Development is consistent with the European, National and Local Plan Policies. In particular, the proposed development will help to meet the objectives of the Climate Action Plan 2019. The proposed windfarm will make an important contribution to the Ireland’s renewable energy targets

The proposed grid connection between the consented Derreenacrinnig West Wind Farm and the Ballylicky 110kV Substation is required to connect the Derreenacrinnig West Wind Farm to the national energy grid. The energy generated will need to be transferred from the consented on-site substation to the national grid and therefore it is proposed to develop the necessary 14.8 km of cable to connect to the 20kV Ballylicky Substation.

The Derreenacrinnig West Wind Farm itself is consented and will help the government meet its 2030 renewable energy targets and avoid potential penalties from the European Commission. The grid connection works are needed to allow the wind farm to become operational and transfer energy to the national grid.

This development is also of considerable benefit to the local economy providing additional key infrastructure which may assist in the further development of the area.

3.2 STATEMENT OF AUTHORITY

This section has been prepared by Breena Coyle, Senior Town Planner in Jennings O'Donovan & Partners Limited (JOD). She has a Masters in Environment Planning from Queens University and has over 12 years’ experience in Environmental Planning throughout Ireland and the UK She has a clear understanding of the legislative framework and has experience in the development of windfarms from the pre-planning process through to construction.

Table 3.1: Irish Planning Legislation Framework

Planning and Development Act 2000 (as amended)	The Planning and Development Act 2000 (as amended) sets out the planning framework. It consolidates all previous planning acts and is the basis for the Irish planning code, setting out the detail of regional planning guidelines, development plans and local area plans as well as the basic framework of the development management and consent system. The statutory basis for the carrying out of Environmental Impact Assessment (EIA).
Planning and Development Regulations 2001 (as amended)	The Planning and Development Regulations 2001 (as amended) implement the Planning and Development Act 2000 by prescribing the details of the planning code.
EIA Directives	The EIA Directives (from 1985 to 2014)44 set out the requirement for an EIA in European law. The 2011 EIA Directive has been superseded by Directive (2014/52/EU) which entered into force on 15 May 2014. The EIA Directives have been transposed into Irish legislation by way of a number of EIA Regulations from 1989 to 2018. EIA provisions in relation to planning consents are currently contained in the Planning and Development Act, 2000 (as amended) (Part X) and in Part 10 of the Planning and Development Regulations, 2001 (as amended).48 Developments for the purpose of Part 10 (i.e., those developments requiring an EIA) are set out in Schedule 5 (Parts 1 and 2) of the Planning and Development Regulations 2001 (as amended).
Climate Action and Low Carbon Development Act 2015	The Act provides for the establishment of a national framework with the aim of achieving a low-carbon, climate-resilient, and environmentally sustainable economy by 2050 (referred to in the Act as the “national transition objective”). The Act was commenced in the days before the historic COP21 agreement in Paris where consensus was reached by 200 countries on the need to reduce greenhouse gas emissions.
Climate Action and Low Carbon Development (Amendment) Act 2021	The Climate Action and Low Carbon Development (Amendment) Act 2021 was enacted on the 23rd of July 2021. The Act sets out that Ireland is now on a legally binding path to net-Zero emissions no later than 2050, and to a 51% reduction in emissions by the end of this decade. The Act provides the framework for Ireland to meet its international and EU climate commitments and to become a leader in addressing climate

	change. The Act provides the framework for Ireland to meet its international and EU climate commitments and to become a leader in addressing climate change. The Act sets out amongst other things the following: •The Act embeds the process of setting binding and ambitious emissions-reductions targets in law •The Act provides for a national climate objective, which commits to pursue and achieve no later than 2050, the transition to a climate resilient, biodiversity-rich, environmentally-sustainable and climate-neutral economy •Actions for each sector will be detailed in the Climate Action Plan which must be updated annually •Government Ministers will be responsible for achieving the legally-binding targets for their own sectoral area with each Minister accounting for their performance towards sectoral targets and actions before an Oireachtas Committee each year •Local Authorities must prepare individual Climate Action Plans which will include both mitigation and adaptation measures and will be updated every five years. Local Authority Development Plans must be aligned with their Climate Action Plan •Public Bodies will be obliged to take account of Climate Action Plans in the performance of their functions
Climate Action Plan 2019	The objective of the Plan is to enable Ireland to meet its EU targets to reduce its carbon emissions by 30 per cent between 2021 and 2030 and lay the foundations for achieving net zero carbon emissions by 2050. This is an ambitious target to meet. The Plan sets out 180 actions that need to be taken and extends to all sectors of the economy. In the related articles available below you will find a summary of the key measures in focus sectors.
The National Planning Framework 2018-2027	The National Planning Framework (NPF) (which is given statutory recognition in the Planning and Development (Amendment) Act 2018).

	The National Planning Framework is intended to guide development and investment through a shared set of national objectives and principles. It is then left to the three regional planning bodies and the 31 city and county councils to take a lead in refining these into more detailed plans.
The National Development Plan (NDP) 2018-2027	The National Development Plan sets out the investment priorities that will underpin the implementation of the National Planning Framework, through a total investment of approximately €116 billion. This represents a very substantial commitment of resources and is expected to move Ireland close to the top of the international league table for per capita public investment. The NDP will be subject to review in 2021.
Regional Planning	The Local Government Reform Act 2014 provided for the dissolution of the eight regional authorities and two regional assemblies and for their replacement with three new regional assemblies. The Regional Spatial and Economic Strategy (RSES) for the Southern Region provides a long-term regional level strategic planning and economic framework, to support the implementation of the National Planning Framework, for the future physical, economic and social development for the Southern Region.
The Cork County Development Plan 2014-2020	Under Section 9 of the Planning and Development Act 2000 (as amended), each planning authority is obliged to make a Development Plan for the whole of its functional area. The Development Plan (City/County Development Plan [CDP]) is a statutory land-use plan generally consisting of a written statement and associated maps. The Development Plan is the statutory land use plan which sets out a strategy for the proper planning and sustainable development for the area.
The Draft Cork County Development Plan 2022-2028	The Draft Cork County Development Plan guides future growth and development in the County. The new Cork County Development Plan sets out the policy objectives and the overall strategy for the proper planning and sustainable development of the County over the plan period from 2022 to 2028. The Plan sets out an approach centred on the core principle of sustainability with a focus on creating vibrant, liveable, climate resilient communities.
The Wind Energy Development Guidelines 2006	The Wind Energy Development Guidelines 2006 offer advice to planning authorities on planning for wind energy through the development plan process and in determining applications for planning

	permission. The guidelines are also intended to ensure a consistency of approach throughout the country in the identification of suitable locations for wind energy development and the treatment of planning applications for wind energy developments.
The Draft Wind Energy Guidelines 2019	The key aspects for the new wind energy guidelines include the following: • a visual amenity setback of 4 times the turbine height between a wind turbine and the nearest residential property, subject to a mandatory minimum distance of 500 metres • the elimination of shadow flicker • the application of a more stringent noise limit, consistent with World Health Organisation standards • the introduction of new obligations in relation to community engagement with local communities along with the provision of community benefit measures • An EIAR and planning application for the grid connection must address the direct effects and any short, medium and long-term, permanent and temporary, positive and negative, indirect, secondary, cumulative and transboundary effects of the whole project, i.e., the wind energy development and the grid connection.
The National Landscape Strategy for Ireland 2015-2025	Ireland signed and ratified the Council of Europe's European Landscape Convention (ELC) which came into effect on 1 March 2004. The Convention has been ratified by thirty-eight countries. It obliges Ireland to implement policy changes and objectives concerning the management, protection and planning of the landscape. The National Landscape Strategy will be used to ensure compliance with the ELC and to establish principles for protecting and enhancing it while positively managing its change. It is a high-level policy framework to achieve balance between the protection, management and planning of the landscape by way of supporting actions.

3.3 INTERNATIONAL POLICY

This section of the EIAR highlights the international perspectives with regard to Climate Change and Wind Energy. Ireland is party to both the United Nations Framework Convention on Climate

Change and the Kyoto Protocol, which together provide an international legal framework for addressing climate change.

3.3.1 The United Nations Framework Convention on Climate Change

3.3.1.1 Initial Treaty (1992)

The United Nations Framework Convention on Climate Change (“UNFCCC”) was set up in 1992 and sets an overall framework for intergovernmental efforts to tackle the challenge posed by climate change. The UNFCCC recognises that the climate system is a shared resource whose stability can be affected by industrial and other emissions of carbon dioxide and other greenhouse gases.

3.3.1.2 The Paris Agreement (2016)

The Paris Agreement seeks to accelerate and intensify the actions and investment needed for a sustainable low carbon future. Its central aim is to strengthen the global response to the threat of climate change by keeping a global temperature rise this century well below 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius. The Agreement also aims to strengthen the ability of countries to deal with the impacts of climate change.

The Paris Agreement commits the EU as a whole to reduce greenhouse gas emissions by at least 40% by 2030, compared with 1990 levels.

3.3.1.3 The Forthcoming UN Climate Change Conference of The Parties (COP 26) UK 2021

The UK will host the 26th UN Climate Change Conference of the Parties (COP26) in Glasgow on 31 October – 12 November 2021. The COP26 summit will bring parties together to accelerate action towards the goals of the Paris Agreement and the UN Framework Convention on Climate Change.

COP26 Goals include:

1. Secure global net zero by mid-century and keep 1.5 degrees within reach

Countries are being asked to come forward with ambitious 2030 emissions reductions targets that align with reaching net zero by the middle of the century.

To deliver on these stretching targets, countries will need to:

- *accelerate the phase-out of coal*
- *curtail deforestation*
- *speed up the switch to electric vehicles*
- *encourage investment in renewables.*

2. Adapt to protect communities and natural habitats

3. *Mobilise finance*

4. Work together to deliver

- *We can only rise to the challenges of the climate crisis by working together.*
  At COP26 we must:
- *finalise the Paris Rulebook (the detailed rules that make the Paris Agreement operational)*
- *accelerate action to tackle the climate crisis through collaboration between governments, businesses and civil society.*

3.4 EUROPEAN UNION POLICY

In 2011, the European Council reaffirmed the EU objective of reducing greenhouse gas emissions by 80-95% by 2050 compared to 1990.

The EU adopted the 2020 Climate and Energy Package by the European Council in December 2008.

The objectives of the package include:

- Reduce GHG emissions by at least 20% compared to 1990 levels
- Reduce primary energy consumption by 20% compared with projected levels
- Achieve a 20% level of EU energy consumption from renewable sources

The Renewables Directive (EU Directive 2009/28/EC) introduced legally binding targets on Member States for the consumption of renewable energy (from electricity, heating and cooling, and transport) by 2020. This included the overall, legally binding target of 16% of Irish energy requirements from renewable sources by 2020.

The European Council agreed on a 2030 climate and energy policy framework for the EU (2030 Framework for Climate and Energy, 2014.). The Council endorsed a binding EU wide target of a reduction in GHG emissions of at least 40% by 2030, compared to 1990 levels. The Framework aims to move the economy and energy system of the European Union towards a low-carbon economy.

3.4.1.1 The European Green Deal 2019

The European Green Deal 2019 resets the European Commission’s commitment to tackling climate and environmental-related challenges. The European Green Deal is a plan to make the EU's economy sustainable. The EU aims to be climate neutral in 2050. Reaching this target will require action in all sector economy, including:

- Investing in environmentally friendly technologies
- supporting industry to innovate
- rolling out cleaner, cheaper, and healthier forms of private and public transport
- decarbonising the energy sector
- ensuring buildings are more energy efficient
- working with international partners to improve global environmental standards

3.4.1.2 European Objectives for 2050

The EU will be climate neutral by 2050. To do this, it will carry out a series of initiatives that will protect the environment and boost the green economy.

3.5 NATIONAL, REGIONAL AND LOCAL POLICY

This sub-section contains information on national policy considered to be relevant to the Development and in particular how Ireland is responding to climate change. The 2014 National Policy Position on Climate Action and Low-Carbon Development establishes the fundamental national objective of achieving transition to a competitive, low-carbon economy by 2050. **Figure 3.1** sets out an overview of National Planning Policy Context.

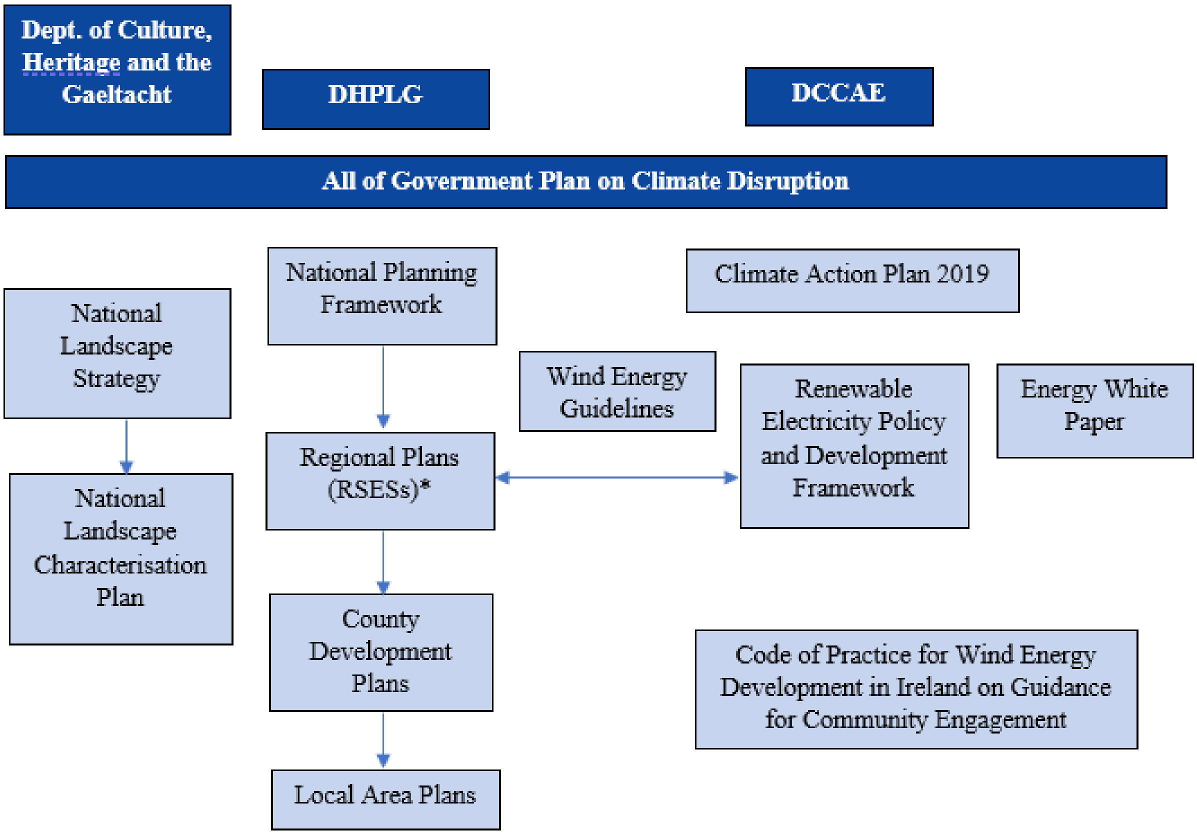


Figure 3.1: Overview of National Planning Policy Context

3.5.1 The Climate Action and Low Carbon Development (Amendment) Act 2021

The Climate Action and Low Carbon Development (Amendment) Act 2021 supports Ireland's transition to Net Zero and achieve a climate neutral economy by no later than 2050. It will establish a legally binding framework with clear targets and commitments set in law, and ensure the necessary structures and processes are embedded on a statutory basis so as to achieve our national, EU and international climate goals and obligations in the near and long term.

The Act includes the following key elements:

- Places on a statutory basis a 'national climate objective', which commits to pursue and achieve no later than 2050, the transition to a climate resilient, biodiversity-rich, environmentally-sustainable and climate-neutral economy
- Embeds the process of carbon budgeting into law, Government is required to adopt a series of economy-wide five-year carbon budgets, including sectoral targets for each relevant sector, on a rolling 15-year basis, starting in 2021
- Actions for each sector will be detailed in the Climate Action Plan, updated annually
- A National Long Term Climate Action Strategy will be prepared every five years

3.5.2 The Climate Action Plan 2019

The Climate Action Plan 2019 was published by the Government on 17 June 2019. The aim of the plan is to make Ireland a world leader in responding to climate change. The Plan is ambitious, affecting almost every sector of the economy. The key difference however, between this Plan and previous ones is that it creates new governance structures necessary to implement the far-reaching changes. The key focus of the Plan is to identify how the Government plans to reduce Ireland's growing greenhouse gas emissions.

The goal is that Ireland will achieve its EU emission reduction targets for the year 2030. The Plan includes a new commitment to make Ireland 100% carbon neutral by 2050. The Plan contains 183 action points designed to achieve our national climate change targets. The scale of the challenge is huge, and the Plan identifies the need for everyone to contribute to tackling the challenges posed by climate change. It includes increased renewable electricity targets, the end of single use non-recyclable plastics and new building regulations. It will impact how our homes and businesses are heated, how we generate and consume electricity, how we travel and how food is produced.

The goal in the energy sector is to make Ireland less dependent on imported fossil fuels. To achieve this, energy needs to be decarbonised by harnessing renewable resources, particularly wind (both onshore and offshore), solar PV and biomass powered CHP.

The targets set out in the Climate Action Plan 2019 envisages a radical step-up of our existing targets in order to meet the required level of emissions reduction by 2030, including:

- A reduction in CO2 eq. emissions by 50–55% relative to 2030 NDP projections
- An increase in electricity generated from renewable sources to 70%
- An objective to meet 15% of electricity demand by renewable sources contracted under Corporate PPA’s

The Climate Action plan sets out four key measures to meet these targets:

1. **Harnessing Renewable Energy**

The transition to 70% renewable electricity will be made possible by a significant increase in onshore wind, offshore wind and solar PV. The Renewable Electricity Support Scheme (RESS) will be a key policy measure to drive this growth. The first RESS auction was decided in August 2020 with further auctions scheduled over the coming years.

Although RESS is expected to be designed as a series of technology neutral auctions based on the lowest levelised cost of energy (LCOE), the Government has set out the following indicative levels of renewable electricity generation in the Plan:

- at least 3.5 GW of offshore wind
- up to 8 GW of onshore wind
- up to 1.5 GW of grid scale solar energy

The Plan also envisages that 15% of electricity demand will be met by renewable sources contracted under Corporate PPA's. It is expected that a key driver in the growth of Corporate PPA's will be the expected increase in data centres, which will lead in turn to a massive increase in demand for electricity.

2. Phasing out Fossil Fuels

Removing fossil fuels from the grid will be essential in the coming years. There are plans to replace coal fired generation with low carbon and renewable technologies. Bord Na Mona are committed to transitioning away from peat by 2028. There will be an end to coal burning at ESB's Moneypoint generation plant by 2025.

3. Micro-generation

There will be a change in the electricity market rules in order to enable micro-generated electricity to be sold by businesses and householders to the grid. The Plan provides this should include provision for a feed-in-tariff for micro-generation to be at set at least at the wholesale price point. Mechanical electricity meters will be replaced by new smart meters in households by 2024 under the Smart Metering Programme.

4. Other Measures

Other measures include continued support for the DS3 programme, support for research on nascent ocean energy technologies, (e.g floating wind, tidal and wave technologies), and continued support for the development of combined heat and power generation (CHP).

3.5.3 Department of Communications Climate Action and Environment: Renewable Electricity Support Scheme 2018 (RESS)

The RESS was developed by the Government in July 2018. Unlike previous schemes, renewable projects seeking support will compete against one another. This is intended to maximise financial benefits arising from falling technology costs. The new RESS is also intended to support increased community participation in wind farm projects and to facilitate an expansion of renewable electricity up to 55% by 2030. That target of 55% has now been superseded in the Climate Action Plan 2019 which sets out that a target 70% of power generation should come from renewable energy.

3.5.4 Project Ireland 2040

Ireland has developed a strategic outlook for the future development of the country under the 'Project Ireland 2040.' Project Ireland 2040 comprises two plans, The National Planning Framework (NPF) and the ten-year National Development Plan (NDP) which will guide strategic development and infrastructure investment at the national level. A review of the NDP is to be published in July 2021. The NDP 2018-2027 sets out investment priorities of €21.8 billion for climate action for the 10-year period, €7.6 billion is to come from the Exchequer. The remaining investment is to be made by Ireland's semi-state companies and by the private sector. In addition, some €8.6 billion funding has been made available for sustainable mobility projects, mostly in public transport. This substantial funding increase will facilitate upscaling of investments and implementation of actions needed to move the country towards its 2030 climate targets.

Section 1.5 of the NPF sets out that "sustainability is at the heart of long-term planning and the National Planning Framework seeks to ensure that the decisions we make today, meet our own needs without compromising the ability of future generations to meet their needs."

The NPF with the NDP will also set the context for each of Ireland's three regional assemblies to develop their Regional Spatial and Economic Strategies taking account of and co-ordinating Local Authority County and City Development Plans in a manner that will ensure national, regional and local plans align. The National Planning Framework is based on a set of values that will ensure Ireland's "long term economic, environmental and social progress for all parts of the country".

The NPF sets a number of shared goals for Ireland which the Development will contribute to achieving, including:

•Strengthened Rural Economies and Communities
•A Strong Economy, supported by Enterprise, Innovation and Skills
•Transition to a Low Carbon and Climate Resilient Society

NPF Chapter 9 states that "The Government is committed to a long-term climate policy based on the adoption of a series of national plans over the period to 2050, informed by UN and EU policy. This is being progressed through the National Mitigation Plan and the National Climate Change Adaptation Framework, both of which will be updated and reviewed periodically.

In addition to legally binding targets agreed at EU level, it is a national objective for Ireland to transition to be a competitive, low carbon, climate resilient and environmentally sustainable economy by 2050, guided by a long-term vision based on:
•an aggregate reduction in carbon dioxide (CO2) emissions of at least 80% (compared to 1990 levels) by 2050 across the electricity generation, built environment and transport sectors; and
•in parallel, an approach to carbon neutrality in the agriculture and land-use sector, including forestry, which does not compromise capacity for sustainable food production."

The NPF states that in relation to rural areas and renewable energy that:

Transition to a Low Carbon and Climate Resilient Society

"*The National Climate Policy Position establishes the national objective of achieving transition to a competitive, low carbon, climate-resilient and environmentally sustainable economy by 2050. This objective will shape investment choices over the coming decades in line with the National Mitigation Plan and the National Adaptation Framework. New energy systems and transmission grids will be necessary for a more distributed, renewables-focused energy generation system, harnessing both the considerable on-shore and off-shore potential from energy sources such as wind, wave and solar and connecting the richest sources of that energy to the major sources of demand.*

UN Sustainable Development Goals

There is significant alignment between the UN SDGs and the National Planning Framework's National Strategic Outcomes (NSOs) in areas such as climate action, clean energy, sustainable cities and communities, economic growth, reduced inequalities and innovation and infrastructure, as well as education and health."

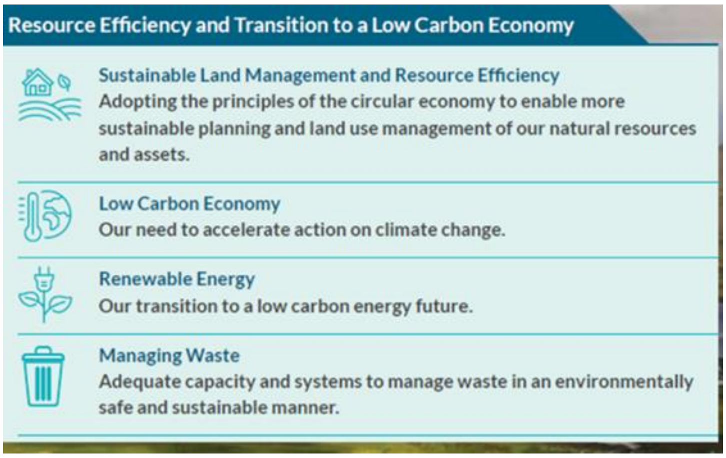
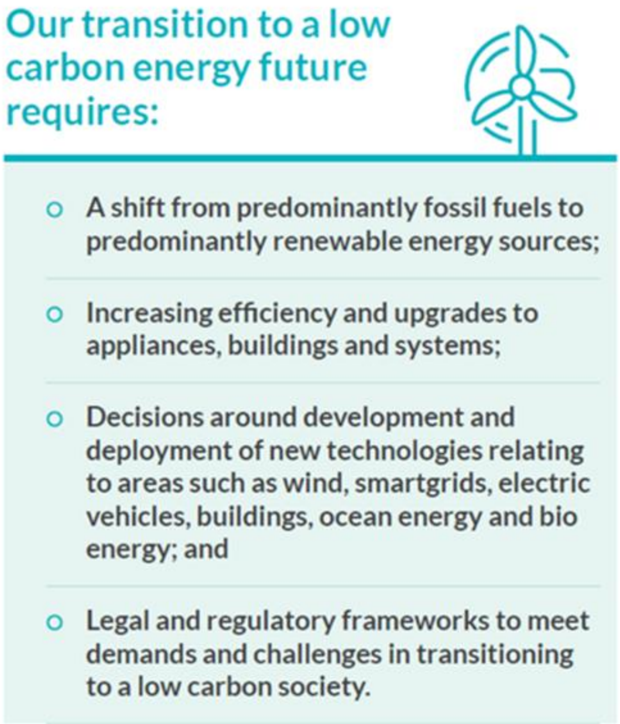


Figure 3.2: Extract from page 117 of the NPF

National Policy Objective 54

"Reduce our carbon footprint by integrating climate action into the planning system in support of national targets for climate policy mitigation and adaptation objectives, as well as targets for greenhouse gas emissions reductions."



Our transition to a low carbon energy future requires:

- A shift from predominantly fossil fuels to predominantly renewable energy sources;
- Increasing efficiency and upgrades to appliances, buildings and systems;
- Decisions around development and deployment of new technologies relating to areas such as wind, smartgrids, electric vehicles, buildings, ocean energy and bio energy; and
- Legal and regulatory frameworks to meet demands and challenges in transitioning to a low carbon society.

Figure 3.3 Extract from page 122 of the NPF

In the energy sector, transition to a low carbon economy from renewable sources of energy is an integral part of Ireland's climate change strategy and renewable energies are a means of reducing our reliance on fossil fuels. The Renewable Electricity Policy and Development Framework will aim to identify strategic areas for the sustainable development of renewable electricity projects of scale, in a sustainable manner, compatible with environmental and cultural heritage, landscape and amenity considerations.

National Policy Objective 55

"Promote renewable energy use and generation at appropriate locations within the built and natural environment to meet national objectives towards achieving a low carbon economy by 2050."

3.6 THE REGIONAL SPATIAL AND ECONOMIC STRATEGY (RSES) FOR THE SOUTHERN REGION

The Regional Spatial and Economic Strategy (RSES) for the Southern Region was adopted on the 31st January 2020. The objective of the RSES is to support the implementation of the National Planning Framework – Project Ireland 2040 and the economic policies and objectives of the Government by providing a long-term planning and economic framework, which shall be consistent with the NPF and the economic policies or objectives of the Government.

The RSES for the Southern Region provides a long-term regional level strategic planning and economic framework, to support the implementation of the National Planning Framework, for the future physical, economic and social development for the Sothern Region.

One of the key objectives of the RSES is to prioritise action on climate change across all strategic areas and in all economic sectors supported by a robust implementation of time-bound and measurable objectives on climate action for the Southern Region.

The RSES recognises and supports many opportunities for onshore wind as a major source of renewable energy. Opportunities for both commercial and community wind energy projects should be harnessed, having regard to the requirements of DoHPLG Guidelines on Wind Energy. Wind Energy, with current and future developments technology, has an important role in delivering value and clean electricity for Ireland.

Section 2.1 of the RSES sets out the strategic vision for the Southern Region. The RSES acknowledges that climate change represents the most serious threat to human life and the environment. The Southern Regional Assembly supports the implementation of the Government's Climate Action Plan 2019, and the RSES has identified three priority areas for action to address climate change and to bring about a Transition to a Low Carbon Economy and Society:

- *Decarbonisation*
- *Resource Efficiency*
- *Climate Resilience*

The targets for reduction of emissions across different sectors will be further developed, including key targets for 55% movement by sustainable transport modes. This will be supported by a robust implementation of time-bound and measurable objectives on climate action for the Southern Region. Once adopted, the implementation structures will be established to pursue the objectives identified in the RSES – including the priority areas for action.

There are a number of policies within the RSES which are relevant to the Development. The following policies are of particular relevance:

Table 3.2: Key Planning Policy Objectives from the RSES

RPO	Policy Details
RPO 95	***Sustainable Renewable Energy Generation*** *It is an objective to support implementation of the National Renewable Energy Action Plan (NREAP), and the Offshore Renewable Energy Plan and the implementation of mitigation measures outlined in their respective SEA and AA and leverage the Region as a leader and innovator in sustainable renewable energy generation.*
RPO 96	***Integrating Renewable Energy Sources*** *It is an objective to support the sustainable development, maintenance and upgrading of electricity and gas network grid infrastructure to integrate a renewable energy sources and ensure our national and regional energy system remains safe, secure, and ready to meet increased demand as the regional economy grows.*
RPO 98	***Regional Renewable Energy Strategy*** *It is an objective to support the development of a Regional Renewable Energy Strategy with relevant stakeholders*
RPO 99	***Renewable Wind Energy*** *It is an objective to support the sustainable development of renewable wind energy (on shore and off shore) at appropriate locations and related grid infrastructure in the Region in compliance with national Wind Energy Guidelines.*
RPO 100	***Indigenous Renewable Energy Production and Grid Injection*** *It is an objective to support the integration of indigenous renewable energy production and grid injection.*
RPO 101	**International Hub for Energy Innovation** *It is an objective to support continued innovation and research in the energy sector and to develop a role as an international hub for energy innovation.*

3.6.1 The Cork County Development Plan 2014-2020

It is a specific planning policy requirement under Section 28 of the Planning & Development Act 2000 (as amended) that in making development plans a planning authority has regard to national policy on renewable energy as contained in the aforementioned policy documents.

The current Cork County Development Plan is the 2014-2020 plan. The next Plan, the Cork County Development Plan 2022-2028 is in Draft format. The Cork County Development Plan (CCDP) 2014 sets out the strategic framework for land use planning in the county. Chapter 9 of the CCDP sets out the energy strategy for the County with an aim to:

"*Ensure that through sustainable development County Cork fulfils its optimum role in contributing to the diversity and security of energy supply and to harness the potential of the county to assist in meeting renewable energy targets." (ED 1-1 Energy)"*

The CCDP notes that, at the time of publishing the Plan, County Cork had the largest wind energy capacity in the Country with 283 MW from 20 no. wind farms, which was approximately 13.8% of Ireland's overall wind energy production. It is acknowledged by the CCDP that there is considerable potential for additional wind energy capacity within the County. The Plan identifies, in broad strategic terms, three categories of 'Wind Deployment Area' for large scale commercial wind energy developments, this approach facilitates commercial wind energy development in approximately 55% of Cork County with the remaining 45% unlikely to be suitable.

These categories are as follows:

'Acceptable in Principle': These areas (River Ilen basin north of Skibbereen and an area south of Macroom) are in optimal locations for wind farm development without significant environmental impacts. They have viable wind speeds (>7.5m/s) and good proximity and access to the grid. These areas exclude urban areas and town green belts, avoid Natura 2000 Sites, high value landscapes and Natural Heritage Areas.

'Open to Consideration': This area comprises almost 50% of the County area. Within these areas there are locations that may have the potential for wind farm developments but there are also some environmental issues to be considered. This area has variable wind speeds and some access to the grid.

'Normally Discouraged': These areas (coastal areas, some areas in North Cork, Cork Harbour, and the Lee Valley) are normally not suitable for commercial wind farm developments due to

their overall sensitivity arising from ecological, landscape, amenity, recreational and settlement considerations.

The consented wind farm site falls within an area identified in the Cork County Development Plan as 'Open to Consideration', for wind energy as detailed in policy ED 3-5 in the Cork County Development Plan. **Table 3.3** outlines key Planning Policy from the CCDP.

Table 3.3: Key Planning Policies from The Cork County Development Plan 2014

Chapter	Policy Details
2	**Core Strategy**
9	***ED 3-2:*** *On-shore wind energy projects should focus on areas considered 'Acceptable in Principle' and Areas 'Open to Consideration' and generally avoid "Normally Discouraged" areas in this Plan.*
9	***ED 3-3:*** *Support a plan led approach to wind energy development in County Cork and identify areas for wind energy development. The aim in identifying these areas is to ensure that there are no significant environmental constraints, which could be foreseen to arise in advance of the planning process.*
9	***ED 3-5:*** *Open to Consideration - Commercial wind energy development is open to consideration in these areas where proposals can avoid adverse impacts on:* • *Residential amenity particularly in respect of noise, shadow flicker and visual impact.* • *Urban areas and Metropolitan/Town Green Belts.* • *Natura 2000 Sites (SPA and SAC), Natural Heritage Areas (NHA's) or adjoining areas affecting their integrity.* • *Architectural and archaeological heritage.* • *Visual quality of the landscape and the degree to which impacts are highly visible over wider areas.*
9	**Transmission Lines** The County Development Plan for County Cork has two objectives relating to transmission lines, as follows: **Objective ED 6-1**: *"Electricity Network Support and facilitate the sustainable development, upgrade and expansion of the electricity transmission grid, storage and distribution network infrastructure.* *Support the sustainable development of the grid including strategic energy corridors and distribution networks in the region to international standards.*

Chapter	Policy Details
	Facilitate where practical and feasible infrastructure connections to wind farms and other renewable energy sources subject to normal proper planning considerations. *Proposals for development which would be likely to have a significant effect on nature conservation sites and/or habitats or species of high conservation value will only be approved if it can be ascertained, by means of an Appropriate Assessment or other ecological assessment, that the integrity of these sites will not be adversely affected."* **Objective ED 6-2**: *"Transmission Network Proposals for new electricity transmission networks need to consider the feasibility of undergrounding or the use of alternative routes especially in landscape character areas that have been evaluated as being of high landscape sensitivity. This is to ensure that the provision of new transmission networks can be managed in terms of their physical and visual impact on both the natural and built environment and the conservation value of European sites.* *Proposals for development which would be likely to have a significant effect on nature conservation sites and/or habitats or species of high conservation value will only be approved if it can be ascertained, by means of an Appropriate Assessment or other ecological assessment, that the integrity of these sites will not be adversely affected."*
6	***GI 6-1:*** *a) Protect the visual and scenic amenities of County Cork's built and natural environment.* *b) Landscape issues will be an important factor in all land use proposals, ensuring that a proactive view of development is undertaken while maintaining respect for the environment and heritage generally in line with the principle of sustainability.* *c) Ensure that new development meets high standards of siting and design.* *d) Protect skylines and ridgelines from development.* *e) Discourage proposals necessitating the removal of extensive amounts of trees, hedgerows and historic walls or other distinctive boundary treatments.*

Chapter	Policy Details
12	***Heritage*** ***County Development Plan Objective*** ***HE 1-1: County Biodiversity Action Plan*** *Continue to implement the County Biodiversity Action Plan (2008) in partnership with all relevant stakeholders.*
12	***County Development Plan Objective*** ***HE 1-2: County Heritage Plan*** *Continue to implement the current County Heritage Plan (2005) in partnership with relevant stakeholders and any successor to this document*
12	***County Development Plan Objective*** ***HE 2-1: Site Designated for Nature Conservation*** *Provide protection to all natural heritage sites designated or proposed for designation under National and European legislation and International Agreements, and to maintain or develop linkages between these. This includes Special Areas of Conservation, Special Protection Areas, Natural Heritage Areas, Statutory Nature Reserves, Refuges for Fauna and Ramsar Sites.*
12	***County Development Plan Objective*** ***HE 3-1: Protection of Archaeological Sites*** *a) Safeguard sites and settings, features and objects of archaeological interest generally.* *b) Secure the preservation (i.e., preservation in situ or in exceptional cases preservation by record) of all archaeological monuments including the Sites and Monuments Record (SMR) (see www.archeology.ie) and the Record or Monuments and Places as established under Section 12 of the National Monuments (Amendment) Act, 1994, as amended and of sites, features and objects of archaeological and historical interest generally.* *In securing such preservation, the planning authority will have regard to the advice and recommendations of the Department of Arts, Heritage and Gaeltacht as outlined in the Frameworks and Principles for the Protection of the Archaeological Heritage.*
13	***County Development Plan Objective*** ***GI 6-1: Landscape*** *a) Protect the visual and scenic amenities of County Cork's built and natural environment.*

Chapter	Policy Details
	b) Landscape issues will be an important factor in all landuse proposals, ensuring that a pro-active view of development is undertaken while maintaining respect for the environment and heritage generally in line with the principle of sustainability. *c) Ensure that new development meets high standards of siting and design.* *d) Protect skylines and ridgelines from development.* *e) Discourage proposals necessitating the removal of extensive amounts of trees, hedgerows and historic walls or other distinctive boundary treatments.*
13	***County Development Plan Objective*** ***GI 6-2: Draft Landscape Strategy*** *Ensure that the management of development throughout the County will have regard for the value of the landscape, its character, distinctiveness and sensitivity as recognised in the Cork County Draft Landscape Strategy and its recommendations, in order to minimize the visual and environmental impact of development, particularly in areas designated as High Value Landscapes where higher development standards (layout, design, landscaping, materials used) will be required.*
13	***County Development Plan Objective*** ***GI 7-1: General Views and Prospects*** *Preserve the character of all important views and prospects, particularly sea views, river or lake views, views of unspoilt mountains, upland or coastal landscapes, views of historical or cultural significance (including buildings and townscapes) and views of natural beauty as recognized in the Draft Landscape Strategy.*
13	***County Development Plan Objective*** ***GI 7-2: Scenic Routes*** *Protect the character of those views and prospects obtainable from scenic routes and in particular stretches of scenic routes that have very special views and prospects identified in this plan. The scenic routes identified in this plan are shown on the scenic amenity maps in the CDP Map Browser and are listed in Volume 2 Chapter 5 Scenic Routes of this plan.*
13	***County Development Plan Objective*** *GI 7-3: Development on Scenic Routes* *a) Require those seeking to carry out development in the environs of a scenic route and/or an area with important views and prospects, to demonstrate that there will be no adverse obstruction or degradation of the views towards and from vulnerable landscape features. In such areas, the appropriateness of the design, site layout, and*

Chapter	Policy Details
	landscaping of the proposed development must be demonstrated along with mitigation measures to prevent significant alterations to the appearance or character of the area. *b) Encourage appropriate landscaping and screen planting of developments along scenic routes which provides guidance in relation to landscaping. See Chapter 12 Heritage - Objective HE 4-6.*
13	***County Development Plan Objective*** ***GI 13-1: Noise Emissions*** *a) Seek the minimisation and control of noise pollution associated with activities or development, having regard to relevant standards, published guidance and the receiving environment.* *b) Support the implementation of Noise Action Plans prepared for the Cork County area.*
13	***County Development Plan Objective*** ***GI 12-1: Air Quality*** *Monitor air quality and air quality trends in accordance with EU policy directives and take appropriate action where required including the provision of additional air quality monitoring infrastructure.*

3.6.2 The Cork County Development Plan, Landscape Character Assessment 2014

The Landscape Characteristic Assessment (LCA) sets out the landscape policy for Cork County. The county is divided into several different landscape character types, each with their own level of sensitivity. The Landscape Characteristic Assessment (LCA) sets out the landscape policy for Cork County. The county is divided into several different landscape character types, each with their own level of sensitivity.

The Cork County Development Plan has categorised sensitivity under four categories:

- *Low sensitivity landscapes are robust landscapes, which are tolerant to change, and which have the ability to accommodate development pressure.*
- *Medium sensitivity landscapes can accommodate development pressure but with limitations in the scale and magnitude. In this rank of sensitivity, landscape elements can accept some changes while others are more vulnerable to change.*
- *High sensitivity landscapes are vulnerable landscapes with the ability to accommodate limited development pressure. In this rank landscape quality is at a high level, landscape*

elements are highly sensitive to certain types of change. If pressure for development exceeds the landscape's limitations the character of the landscape may change.

- *Very high sensitivity landscapes are extra vulnerable landscapes (e.g., seascape area with national importance) which are likely to be fragile and susceptible to change."*

The Importance of a landscape character type is rated as Local, County, or National. Landscape Character Types which have a very high or high landscape value and high or very high landscape sensitivity and are of county or national importance are considered to be the most valuable landscapes and are designated as High Value Landscapes (HVL).

The Cork County Development Plan 2014 identifies designated scenic routes throughout the County. Objective GI 7-1 aims to preserve the character of all-important views and prospects of river or lake views, views of unspoiled mountains, upland and coastal landscapes, views of historical or cultural significance and views of natural beauty.

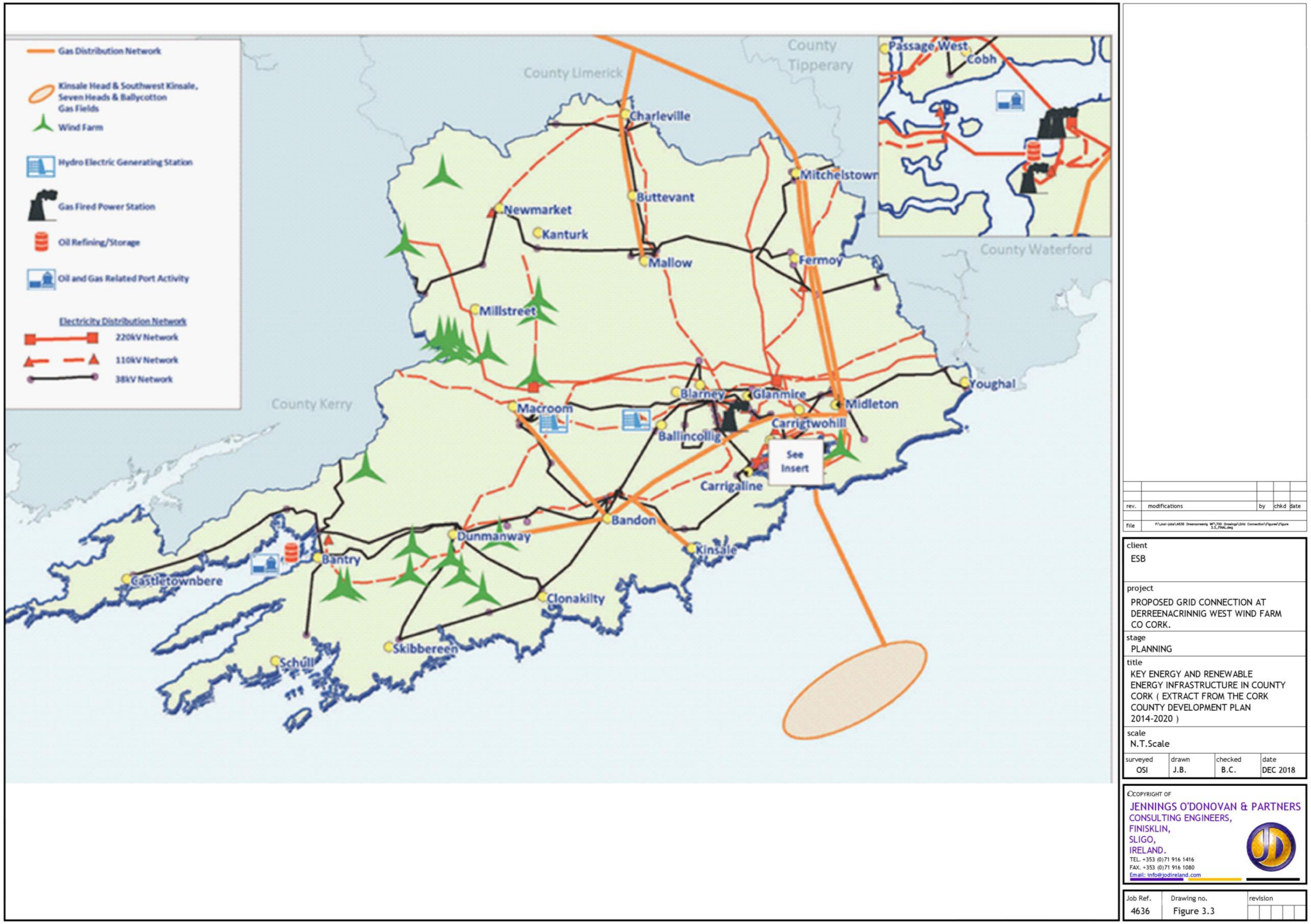


Figure 3.3 – Key Energy and Renewable Energy Infrastructure in County Cork [Extract from the Cork County Development Plan 2014-2020]

3.6.3 County Development Plan Objectives

The development including the proposed grid connection is located within an area which is open to consideration in the County Development Plan as shown in figure 3.4. The development is not located in an area of 'High Value Landscape' as shown in Figure 12.2 of the Cork County Development Plan. Further details on the surrounding landscape and the potential impact the proposed development could have on these areas, are discussed in Chapter 10 of this EIAR. Paragraph 9.3.1 of the Cork County Development Plan "sets out a plan led approach to on-shore wind energy development in County Cork and identifies suitable areas for sustainable wind energy development." Paragraph 9.3.2 of the CCDP highlights that the Wind Energy Policy for the county has been largely unchanged since its inception in 2001. Reference is made to the 2006 Wind Energy Guidelines which are the current statement of government policy on onshore wind energy.

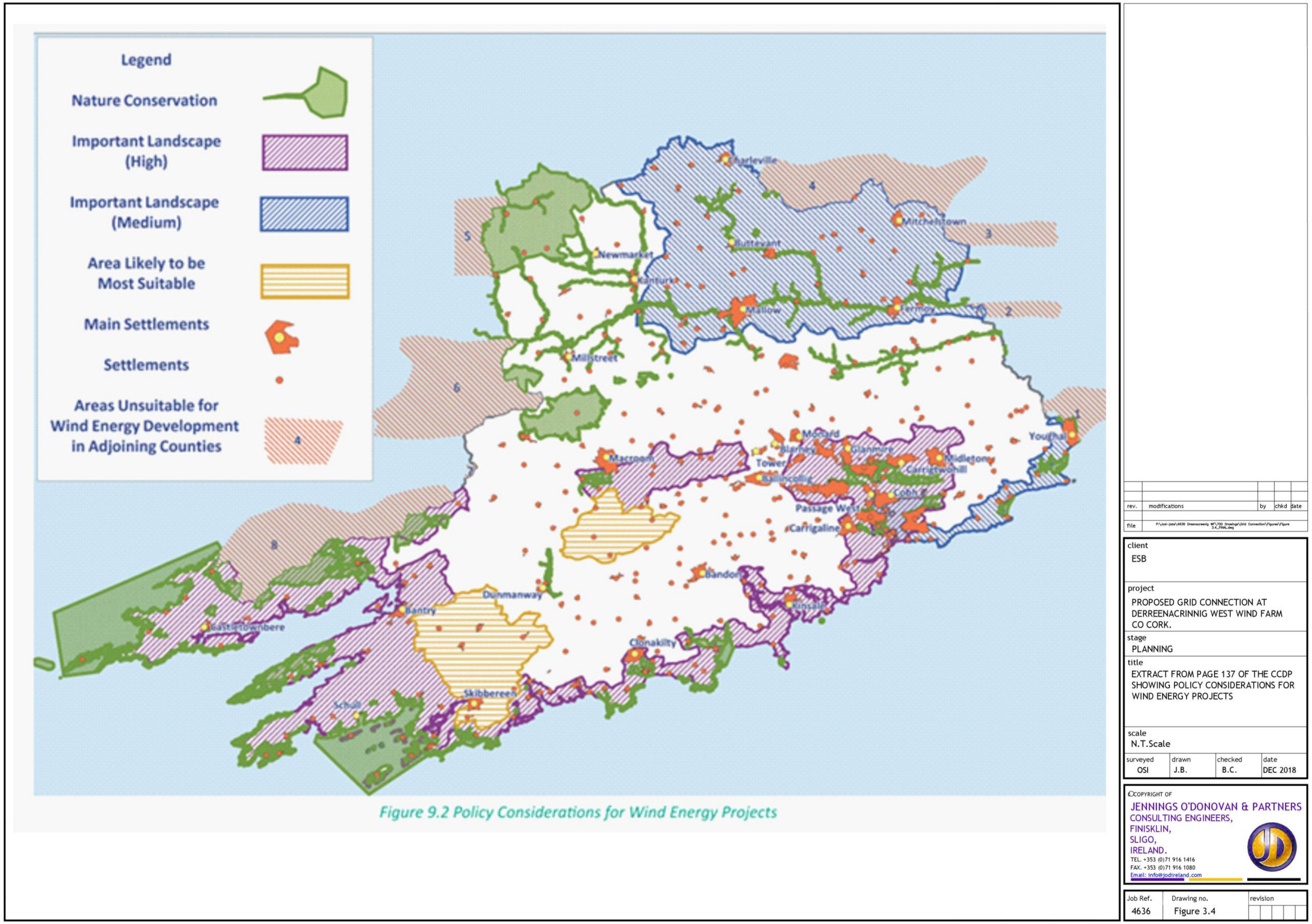


Figure 3.4 – Extract from page 137 of the CCDP showing policy considerations for wind energy projects

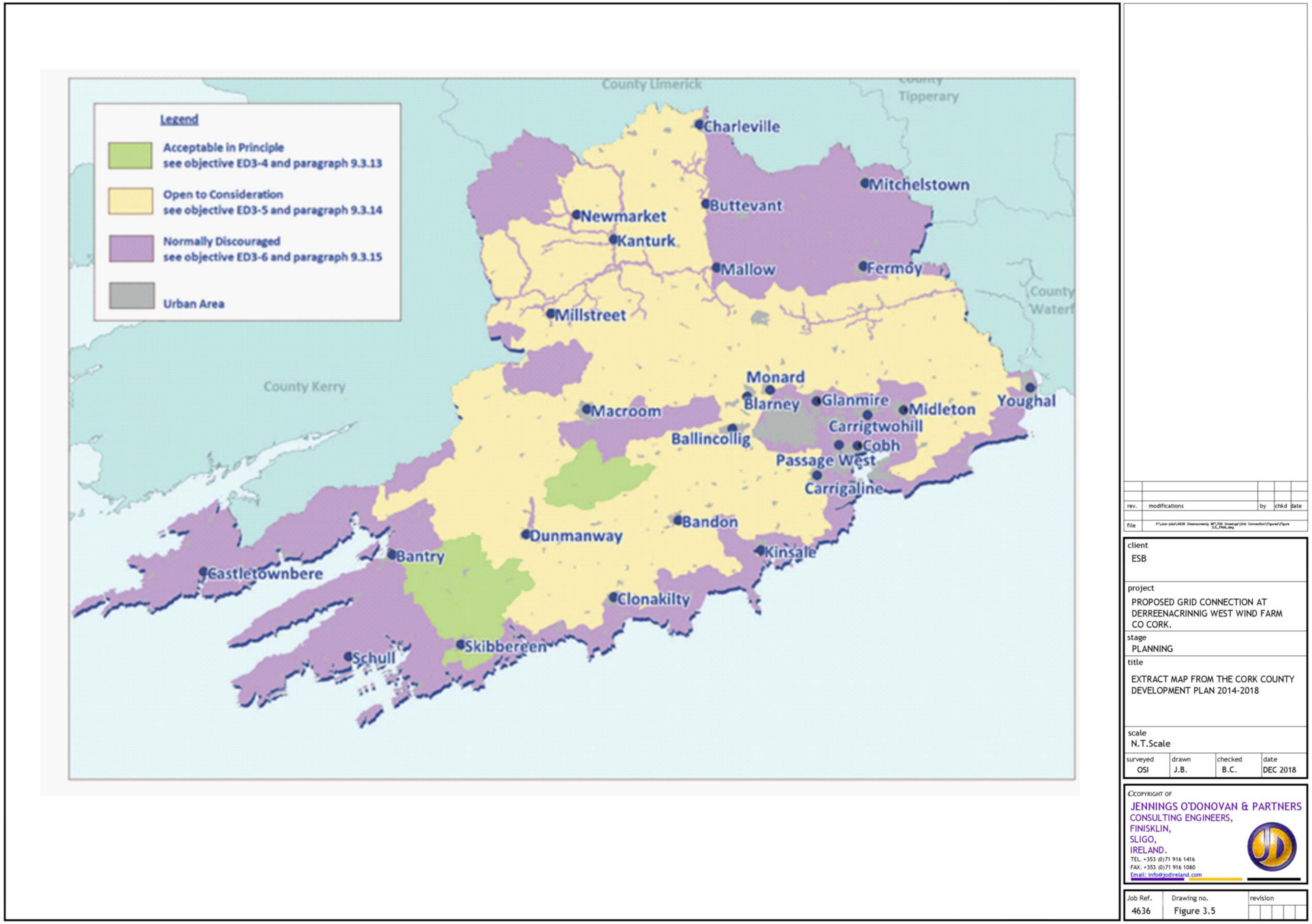


Figure 3.5 – Extract map from the Cork County Development Plan

3.6.4 Windfarm Development Guidelines (2006)

The 2006 Wind Energy Development Guidelines advise that a reasonable balance must be achieved between meeting Government Policy on renewable energy and the proper planning and sustainable development of an area, and it provides advice in relation to the information that should be submitted with planning applications. The effects on residential amenity, the environment, nature conservation, birds and the landscape should be addressed. It states that particular landscapes of very high sensitivity may not be appropriate for wind energy development.

The ‘Wind Energy Development Guidelines for Planning Authorities’ (DoEHLG, 2006) are also currently the subject of a targeted review. The proposed changes to the assessment of effects associated with onshore wind energy developments are outlined in the document ‘Proposed Revisions to Wind Energy Development Guidelines 2006 – Targeted Review’ in relation to noise, proximity and shadow flicker (December 2013).

3.6.5 The Draft Revised Wind Energy Guidelines- December 2019

The Draft Revised Wind Energy Development Guidelines were published for public consultation in February 2020. These guidelines “*offer advice to planning authorities on planning for wind energy through the development plan process and in determining applications for planning permission. The guidelines are also intended to ensure a consistency of approach throughout the country in the identification of suitable locations for wind energy development and the treatment of planning applications for wind energy developments. They should also be of assistance to developers and the wider public in considering wind energy development*.”

The Draft Guidelines identify specific national policies relating to renewable energy and wind energy to which planning authorities must have regard to in the adoption or variation of statutory development plans until they are finalised and adopted. The Draft Guidelines do not replace or amend the existing Wind Energy Development Guidelines 2006. The Draft Guidelines are proposing the following:

- the application of a more stringent noise limit, consistent with World Health Organisation noise standards, in tandem with a new robust noise monitoring regime, to ensure compliance with noise standards.
- a visual amenity setback of 4 times the turbine height between a wind turbine and the nearest residential property, subject to a mandatory minimum distance of 500 metres between a wind turbine and the nearest residential property.

- the elimination of shadow flicker, and
- the introduction of new obligations in relation to engagement with local communities by windfarm developers along with the provision of community benefit measures.

3.6.6 The National Landscape Strategy for Ireland 2015-2025

The National Landscape Strategy for Ireland 2015-2025 sets out a roadmap. The objectives of the National Landscape Strategy are to:

- *implement the European Landscape Convention by integrating landscape into our approach to sustainable development;*
- *establish and embed a public process of gathering, sharing and interpreting scientific, technical and cultural information in order to carry out evidence-based identification and description of the character, resources and processes of the landscape;*
- *provide a policy framework, which will put in place measures at national, sectoral - including agriculture, tourism, energy, transport and marine - and local level, together with civil society, to protect, manage and properly plan through high quality design for the sustainable stewardship of our landscape;*
- *ensure that we take advantage of opportunities to implement policies relating to landscape use that are complementary and mutually reinforcing and that conflicting policy objectives are avoided in as far as possible.*

The objectives of the National landscape strategy for Ireland 2015-2025 are required to be taken into consideration by Cork County Council in the landscape Character assessment of the Draft Cork County Development Plan 2022-2028.

3.7 CONCLUSION

At present, there is specific supporting international, national, regional, and local policy and/or guidance for commercial onshore wind energy development in Ireland.

Since the grant of planning permission for the consented Derreenacrinnig West Wind Farm, there has been a change in both local and national planning policy which are more proactive in terms of renewable energy. There is acknowledgment that there is a pressing need to meet renewable energy targets. he National Planning Framework, Regional Planning Guidelines, the Cork County Development Plan are considered supportive of the development of renewable energy technology, particularly in the context of reducing the carbon emissions of the country and meeting renewable energy production targets.

The given policies from the Cork County Development Plan are given for ease of reference and are thought those most relevant by the applicant to this type of development. Individual technical assessments included with the EIAR will also refer to CDP policies where relevant.

EirGrid's Shaping our Electricity Future when finalised will include measures for strengthening the transmission grid to facilitate 70% of electricity coming from renewable sources by 2030.[3]

Grid connection can be either through direct connection to the transmission network (110kV/220kV/400kV), controlled by EirGrid, or to a local distribution system (normally 38kV), controlled by ESB and depends on the amount of electricity generated.

The project proposals meet all relevant planning policy consideration in the Cork County Development Plan 2014. Although there has been a change in County Development Plan since the grant of the Wind Farm element, it is considered that the current local plan policies take a more proactive approach to renewable energy in the County. Cork accounts for 13% of Ireland's energy use and Cork accounts for 24% of Ireland's energy use requirements (the rest of Ireland produces 21% and the remaining 55% is imported).

The Development meets all the relevant planning policies identified in this Chapter. In particular the National Planning Framework and The Climate Action Plan 2019 and The Climate Action and Low Carbon Development (Amendment) Act 2021 where there is an identified and pressing need to meet the ambitious targets for 2050. The Development will make an important contribution to the ambitious targets set out in The Climate Action Plan 2019. As well as the inherent benefits of creating and expanding upon the existing mix of renewables in Ireland's electricity system, the Development will offer a number of major opportunities:

- Reduces dependency on fossil fuels resulting in lower carbon dioxide (CO2) emissions and output
- Utilise the latest turbine technology, sustaining and growing the level of renewable energy in Ireland
- Sustains existing development and construction jobs and creates opportunities for new supply chain jobs
- With a supportive planning framework, it can help create a long-term, stable investment platform
- Wider economic and social benefits

[3] https://www.eirgridgroup.com/site-files/library/EirGrid/Full-Technical-Report-on-Shaping-Our-Electricity-Future.pdf

4 POPULATION AND HUMAN HEALTH

4.1 INTRODUCTION

4.1.1 Background and Objectives

Jennings O'Donovan & Partners Ltd. ("JOD") have been commissioned by to assess the potential impacts of the EIA Development on population and human health. Full details of the EIA Development are provided in **Section 2: Project Description**.

The assessment will consider the potential effects during the following phases of the Development:

- *Construction of the Existing Development (initial phase of the Development)*
- *Operation of the Development*
- *Decommissioning of the Development (final phase)*

The Development refers to all elements of The Development. (**Chapter 2: Project Description**).

This section of the EIA examines the potential population and human health impacts of the overall development which includes the partially built existing grid connection, the consented wind farm, the proposed grid connection and the cumulative impacts of both the grid connection and wind farm and all on-site infrastructure.

4.1.2 Statement of Authority

This section has been prepared by Breena Coyle, Senior Town Planner in Jennings O'Donovan & Partners Limited (JOD). She has a Masters in Environment Planning from Queens University and has over 12 years' experience in Environmental Planning throughout Ireland and the UK She has a clear understanding of the legislative framework and has experience in the development of windfarms from the pre-planning process through to construction.

4.1.3 Relevant Legislation and Guidance

The population and human health section of this EIAR is carried out in accordance with legislation and guidance contained in **Chapter 1: Introduction and Chapter 3: Planning Policy.**

The EIA Directive states that 'Population and Human Health 'is to be assessed in an EIAR Report. The recitals to the 1985 and 2011 Directives refer to 'human health' and include 'Human Beings' as the corresponding environmental factor. The EIA Directive changes the title of this factor to 'Population and Human Health'.

No specific guidance on the assessment of Human Health within the legislative context of Directive 2014/42/EU) has been issued, as outlined in The EPA 2017 Draft Guidelines on the information to be Contained in Environmental lmpact Assessment Reports (The EPA Guidelines); although, the same term is used in the European Union (EU) Strategic Environmental Assessment (SEA) Directive (2001/42/EC). The SEA lmplementation Guidance states:

"The notion of human health should be considered in the context of the other issues mentioned in paragraph (f)".

Paragraph (f) lists environmental factors including soils, water, air, etc. This is consistent with 2002 Environmental Protection Agency (EPA)'Guidelines on the lnformation to be Contained in Environmental lmpact Statements' which provides guidance on the inclusion of these topics within the human health assessment:

"The evaluation of effects on these pathways is carried out by reference to accepted standards (usually international) of safety in dose, exposure or risk. These standards are in turn based upon medical and scientific investigation of the direct effects on health of the individual substance, effect or risk. This practice of reliance upon limits, doses and thresholds for environmental pathways, such as air, water or soil, provides robust and reliable health protectors [protection criteria] for analysis relating to the environment."

The EPA Guidelines state also that the assessment of impacts on population and human health within an EIA Report should refer to the assessments of those factors under which effects to human health might occur, e.g., environmental factors of soils, water, air etc. The EPA Advice Notes (2015) is a non-statutory document which goes beyond the requirements of the EPA Guidelines and provides further discussion of how these factors can be addressed. The EPA Guidelines recommend, in line with the amended Directive, that an EIA Report should take account of the results of such assessments without duplicating them.

The EPA Guidelines state that employment, human health, and amenity are the three overarching topics that are to be addressed within the Population and Human Health chapter. The EPA Guidelines state that the legislation does not generally require assessment of land-use planning, demographic issues, or detailed socioeconomic analysis. Coverage of these can be provided in a separate Planning Application Report to accompany an application for planning permission. This should be avoided in an EIA Report, unless issues such as economic or settlement patterns give rise directly to specific new developments and associated effects. Regard has been given to the general approach advocated in this document when compiling this Chapter.

4.1.4 Assessment Structure

In line with the revised EIA Directive and current (draft) EPA guidelines the structure of this chapter is as follows:

- Assessment Methodology and Significance Criteria – a description of the methods used in baseline surveys and in the assessment of the significance of effects.
- Baseline Description – a description of the socio-economic profile of the local area of the Development i.e., local electoral areas and County Cork and based on a desk-based study using Central Statistics Office (CSO) data
- Assessment of Potential Effects –identifying the ways in which the population and human health of the area could be affected by the Development.
- Mitigation Measures and Residual Effects – a description of measures recommended to avoid, prevent, reduce or, if necessary, offset any potential significant adverse effects and a summary of the significance of any residual effects of the Development after mitigation measures have been implemented
- Cumulative Effects – identifying the potential for effects of the Development to combine with those from other Developments to affect the population and human health.
- Summary of Significant Effects
- Statement of Significance

4.1.5 Scope of Assessment

The effect of a development on population and human health includes the following broad areas of investigation:

- Population and Settlement Patterns
- Employment
- Human Health, Tourism and Amenity
- Health and Safety
- Natural Disasters and Major Accidents

The population aspect considers the effect of the Development against the demographic profile of the receiving environment. The principal socio-economic assessment criteria relate to the employment effects with a defined Study Area. These may be both temporary employment during the construction phase and permanent positions during the operational phase.

Where a significant negative impact can be foreseen, it is prevented, reduced, avoided or, if necessary, offset by way of practical mitigation measures. This assessment considers the following criteria:

- Sensitive receptors in the area
- Existing land use in the area
- General amenities in the area
- Potential effects from water, noise, shadow flicker, air quality and traffic

These criteria are assessed for the initial decommissioning and construction phase and the operational phase of the Development.

4.2 ASSESSMENT METHODOLOGY

In line with the revised EIA Directive and current (draft) EPA guidelines this Chapter includes the following elements:

- Details of Methodologies utilised in the context of legal and planning frameworks.
- Baseline Descriptions
- Assessment of Potential Effects (construction, operational and decommissioning stages)
- Detailed Mitigation Measures
- Assessment of Cumulative Impacts
- Summary of Significant Effects and Statement of Significance

A desk study was undertaken of the Central Statistics Office (CSO) data and a review of the Cork County Development Plan (CDP), alongside a number of websites relating to the area. Consideration was also given to the 2015[4] report produced by the EPA entitled the '*Investigation into the Assessment of Health Impacts within National Environmental Regulation Processes*' that outlines how human health impacts are dealt with, throughout the European Union (EU) by environmental regulators with an emphasis on the role at the planning / environment interface.

[4] Golder Associates (2015) *Investigation into the Assessment of Health Impacts within National Environmental Regulation Processes*. Available online at: http://www.epa.ie/pubs/reports/research/health/assessmentofhealthimpactsreport.html, [Accessed on 12/09/19]

4.2.1 Definition of Study Area

Three geographical Study Areas have been outlined for this assessment. While the greater geographical Study Areas (2 and 3) provide a baseline of statistical data for this chapter, they are not considered for local impacts of this assessment. The three Study Areas are outlined below:

Study Area 1*: The Site and Environs is located in The Local Electoral Area of Bantry West Cork LEA-4. Electoral Divisions of Bantry Rural/ Whiddy, Mealagh and Dromdaleague North.*
Study Area 2: *Cork County (7,316km2).*
Study Area 3*: The Republic of Ireland (70,275km2)*

4.2.2 Receiving Environment

The study area for both the existing and proposed grid connection relating to the population and human health aspects of the EIAR is defined in terms District Electoral Division [DED]:

- Bantry Rural/ Whiddy
- Mealagh
- Dromdaleague North

The site of the wind farm and the existing and proposed grid connection is situated with the townlands of *Ardrah, Ards More (East), Ards Beg, Barnagowlane West, Ballylicky, Crossoge, Derreenacrinnig West, Dromlickacrue, Derryarkane, Dromclarig, Gortroe, Gortnacowly, Glanareagh, Laharanshermeen, Maulikeeve, Maularaha, Shandrum Beg, Shandrum More ("the Development Site.).*

4.2.3 Study Area for Consented Derreenacrinnig West Wind Farm

The study area for the consented Wind Farm is shown in **2.1**. The 2010 EIS for the permitted Derreenacrinnig West Wind Farm examined the potential impacts that the consented wind farm may have on Human Beings, during the construction and operational phase of the project. Those aspects relating to Human Health relating to the population and human health aspects of the EIAR is defined in terms District Electoral Division [DED]. The site of the wind farm and the existing and proposed grid connection is situated with the Municipal District of West Cork.

4.2.4 Consultation

Consultation with relevant organisations was initiated during the initial stage of the EIA to identify any effects that could be initiated by the Development. With respect to the Revised EIA Directive, (Section 1.2 of The EIAR) amalgamates the findings of other assessments undertaken as part of the EIA process. Limited interactions with Human Health are possible and consideration has been given to the findings of the following assessments:

- Hydrology and Hydrogeology: Chapter 7
- Noise: Chapter 9
- Material Assets: Chapter 11
- Air and Climate: Chapter 8

Where appropriate, mitigation measures were proposed to avoid, prevent, reduce or, if necessary, offset any identified significant adverse effects.

The Health and Safety Plan prepared as part of the construction of the grid connection dealt with risks of accidents and disasters and measures to prevent and avoid same. This is not dealt with further in this chapter.

4.3 BASELINE SURVEY METHODOLOGY

The baseline has been used to assess the sensitivity of receptors within the study areas. The baseline conditions set out in this chapter have been established through desk-based studies, including a review of the following relevant sources of information:

- Cork County Council
- Central Statistics Office
- The Cork County Development Plan 2014-202
- The Draft Cork County Development Plan 2021-2027

4.4 ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

4.4.1 Assessment Methodology

A desk study was undertaken to assess the potential impacts on population and human health. The desk study involved the assessment of data from the Central Statistics Office (CSO) and a review of the Cork County Development Plan 2014 – 2020 ("the CDP") was undertaken along with the West Cork Local Area Plan [August 2017] ("the Local Area Plan").

Websites of the following organisations were also consulted:

- Central Statistics Office (www.cso.ie);

- National Parks and Wildlife Services (www.npws.ie);
- Sustainable Energy Authority of Ireland (www.seai.ie);
- Environmental Protection Agency (www.epa.ie);
- Fáilte Ireland (www.faillteireland.ie);
- Discover Ireland (www.discoverireland.com);
- Irish trails (www.irishtrails.ie);
- National Roads Authority (www.nra.ie); and
- Cork County Council (www.corkcoco.ie).
- Study area Map and Planning Drawings

4.4.2 Relevant Legislation and Guidance

The population and human health section of this EIAR is carried out in accordance with guidance contained in the following documents.

4.4.3 Cork County Development Plan 2014-2020

The Cork County Development Plan 2014 – 2020 (“the CDP”) contains the following policies of relevance:

Chapter 1: Introduction

There are a number of development plan principles which are or relevance to the project proposals. Paragraph 1.2.8 sets out details relating to sustainability and climate change.

Climate Change Adaption

- *While we do not have a complete understanding of how climate change in Ireland will unfold, it is clear that human activity is influencing climate change, and that this in turn will lead to a range of current and future impacts. The climate change impacts include rising sea levels, more intense rainfall events and flooding. Adaptation to the adverse effects of climate change is vital in order to reduce the impacts of climate change that are happening now and increase resilience to future impacts. The National Climate Change Strategy 2007-2012 has set a target to cut emissions by at least 20% by 2020. The plan addresses the main areas where this can be achieved in the sections dealing with energy, land use planning, transport, waste management and biodiversity*

There is a plethora of planning policies contained in CCDP which support energy generation from renewable sources.

4.4.3.1 The Cork County Local Economic and Community Plan

The Cork LECP was prepared in 2015/ 2016 and essentially the plan identifies key social and economic assets and seeks to reflect the residents of the county value, what Cork's strengths are, what Cork's ambition is, what investors desire, and, how stakeholders might co-ordinate to protect and enhance those Key assets. The plan looks at the following key priorities:

- Employment
- R&D / Innovation
- Climate Change / Energy
- Education, and,
- Poverty / Social Inclusion

The LECP sets out a number of strategic policies for Climate Change/Energy. Those policies are set out below:

Climate Change / Energy

HLG 1: *"Provide for the alignment of County Cork with the national targets for emission reductions"*

HLG 2: *"Provide for potential climate change impacts within County Cork, including adapt-ion"*

HLG 3: "*Ensure that our activities and places, existing and proposed, are robust in terms of energy choice"*

HLG 4: *"Provide for the harnessing of County Cork's energy potential, including the protection of Cork's locational and other energy assets"*

HLG 5: "*Provide for the creation of a local circular economy model of sustainability"*

CS 5-1: Climate Change Adaptation: "*The LECP recognises the importance of climate change adaption and supports the drafting of a climate change adaption strategy for the Cork region, in order to future-proof our communities and regional economy."*

4.4.3.2 **Investigation into the Assessment of Health Impacts within National Environmental Regulation** *Processes*

The 'Investigation into the Assessment of Health Impacts within National Environmental Regulation Processes' (20155, produced by Golder Associated and commissioned by the EPA, was a study into how human health impacts are dealt with throughout the European Union

[5] Golder Associates (2015) 'Investigation into the Assessment of Health Impacts within National Environmental Regulation Processes'. Available at: http://www.epa.ie/pubs/reports/research/health/assessmentofhealthimpactsreport.html

("EU") by environmental regulators with an emphasis on the role of at the planning / environment interface.

4.5 BASELINE DESCRIPTION

The existing environment, as it relates to population and human health is outlined in the following section.

4.5.1 Study Area 1: The Development Site and Environs

Existing Population and Settlement Patterns in the vicinity of The Existing and Proposed Grid Connection

The grid connection is located within a rural area which traverses a number of townlands in Co Cork. Residential development along the grid route is low and comprises one off residential dwellings. The vegetation and land use of the study area is almost as varied as the topography but is predominantly agricultural and public roadway along the Grid Connection route. These areas tend to consist of a combination of plantation forestry, marginal farmland and peatland.

There is a small section of overhead line located within the townland of Shundrum is in an Area of High Landscape Value.

The area is defined as a peripheral rural area. These areas play an important economic role within Cork, and nationally, as centres of significant industry based on natural resources. Fisheries, agriculture, tourism, etc. are critical sectors of the economy, the importance of which will only grow.
There are no defined community settlements with a population greater than greater than 2,500 within the 10 km radius of the Development.

Study Area 2: Cork County

The total population in the 2016 CSO for County Cork was 417,211, of which Males numbered 206,953 and Females were 210,258. There has been a 4.4% increase in the population since 2011. The population density is 256 persons per km2. The total number of households was 146,442 in 2016, a 2.7% increase since 2011. Average size of households (in persons) has generally remained the same at approximately 2.8-2.9 persons per household over the past three census reports.

Cork is the largest county in Ireland with a land mass of 7,500 km2 including Cork City. The economic performance of Cork is strong and plays a critical role in both our regional and national economies. Cork contributes 19% to the national GDP. The settlement pattern of

County Cork is based on a strong network of vibrant and robust towns and villages with service centres provided at strategic locations throughout the county.

There are a number of medium sized towns and villages geographically spread throughout County Cork. These settlements number 102 and provide essential services for the local communities and the rural hinterlands. The different settlement tiers perform differing roles with the result that no area in the county is significantly peripheral or isolated. This provides a reasonable platform upon which to build an integrated Local Economic and Community Plan and strong sustainable communities.

The increase in rural population over a 5 year period from 2011 to 2016 in Cork County was 6,946. The towns of Carrigaline (15,770), Cobh (12,800), Middleton (12,496) and Mallow (12,459) are the most populated within the County.

Carrigaline the largest town in County Cork is a vibrant and thriving town, a key regional centre for health social and cultural activities. According to the Census 2016 there are 6,971 people residing in the Carrigaline settlement area who are classed as being ‘At Work’. It has the largest number of workers (3,369) commuting into Cork city and suburbs. Carrigaline is 72km distant from the Site to the south east.

Study Area 2: Republic of Ireland

The Republic of Ireland has seen a rapid population growth in recent years with improved standard of living and infrastructure growth resulting in a net inflow of the population. The Country has seen a population increase since 1911 from 3,139,688 to 4,588,252 as per the 2011 Census. The most recent census taken in 2016 noted a 3.7% increase on the 2011 statistics, bringing the total population count to 4,757,976. Recognising the national economic conditions within which population change occurred over the period 2011-2016, trends considered over a longer-term period demonstrate more measured and sustainable growth patterns

4.5.2 Economic Activity

4.5.2.1 Primary Sectors

Study Area 2: Cork County

The economy of County Cork is broadly based and diverse with strengths in the areas of agriculture/ agri -tech, marine, food production, tourism, services, energy and in technology-based manufacturing in sectors such as electronics and life sciences. The Cork Region has the largest life sciences sector in employment terms in the country with almost 10,000 permanent full-time jobs in the sector in 2016. Seven of the top ten global pharmaceutical companies have a presence in the county.

Cork also has a very significant agriculture and food sector. It has the most people employed in agriculture in the state with a number of indigenous enterprises having a significant international presence including Dairygold and Midleton Distillery. Danone and Kerry Foods are also present in Cork and together produce approximately 8% of the world infant milk formula[6] .

4.5.3 Employment

4.5.3.1 Study Area 2: Cork County

According to the CSO 2016 there were 198,177 persons over 15 years of age in the labour force in Cork County and 91% were in employment. The Professional Services, the Manufacturing Industry and Commerce and Trade industries employ 110,842 persons. Of the 123,443 persons aged 15 years and over who were outside the labour force, 29% were students, 23% were looking after the home/family and 37 per cent were retired. Table 5.2 sets out employment by Industry in Cork County in 2016.

The live register figures show Cork County has seen a 42% decrease in registered unemployment since 2016. Between 2019 and 2020, numbers on the live register have risen, likely due to the economic downturn associated with the COVID-19 pandemic and Cork County has experienced a 4.3% rise in unemployment during that time.

The National Statistics Board further requested that the CSO provide a comprehensive set of social indicators with the emphasis on disaggregation by key characteristics such as the nine equality grounds. This was the background to the production of the first report on the Regional Quality of Life in Ireland in 2008. Reports on the theme of gender, ageing and young people have since been produced. This is the second report on the Regional Quality of Life in Ireland.

Table 4.1 Cork County Employment by Industry (2016)

Principal Economic Status	No. Persons
At work	179,890
Looking for first regular job	1,827
Unemployed having lost or given up previous job	16,460
Student	35,933

[6] County Development Plan Review, Economy and Employment, Background Document No.6, Planning Policy Unit, Cork County Council (2019), https://www.corkcoco.ie/sites/default/files/2019-12/Background%20Document%20no%206%20Economy%20and%20Employment.pdf, accessed 12/05/2021

Principal Economic Status	No. Persons
Looking after home/family	27,965
Retired	45,612
Unable to work due to permanent sickness or disability	12,926
Other	1,007
Total	**321,620**

4.5.4 Land Use and Topography

4.5.4.1 Study Area 1: Development Site & Environs (10km)

County Cork is located in the Southern Region Assembly and is bordered by counties Waterford, Tipperary, Limerick and Kerry. Due to the expanse and variety of Cork County's landscape there are 16 landscape character types across the county. According to the Landscape Character Assessment (LCA) for Cork, the Site is located within three landscape character types:

- Ridged and Peaked Upland ('High' value and sensitivity / 'Local' importance) (LCT 15A)
- Broad Marginal Middleground and Lowland Basin (LCT 9)
- Rugged Ridge Peninsulas (LCT 4)

4.5.5 Tourism

4.5.5.1 Tourist Attractions within Study Area 1 Development Site and Environs (10km)

There are various amenities in the surrounding area, which would be of interest to tourists. Drimoleague is a peaceful village situated on the main Dunmanway – Bantry road. Dunmanway Town is located in the heart of West Cork and is sheltered by mountains on three sides. Every August the Ballabuidhe races and Horse Fair is held in the town. The Ballabuidhe races take place over three days and on the fourth day of the festival the Horse Fair and Horse show take place in the town. Bantry is a market town situated at the head of Bantry Bay that is surrounded by stunning countryside. There is a market in the town every Friday with stalls selling local produce such as arts, crafts and local foods. There are many walks and drives in the surrounding area. There are two scenic routes designated by the Cork County Development Plan 2009 running east to west, one c. 5.2km north of the site and the other running east to west c. 2km south of the site. According to the development plan, the main features of land cover along these routes are mountains, rivers and rugged remote rural landscape. These scenic routes are discussed in more detail in Chapter 11 Landscape.

Cork offers unspoilt scenery and a variety of outdoor activities. Tourism is an important component of Cork’s income sector. The area in which the proposed wind farm will be located is a mountainous area and covers two Landscape Character Types (LCT) as defined in the County Cork Development Plan 2009. The two LCT’s are LCT 9, a broad shallow basin serving the River Ilen, and its tributaries enclosed by rugged ridges and rocky outcrops, and LCT 15a, a ridged, peaked and forested upland landscape that flanks much of the mid-western boundary of County Cork.

The Grid Connection Route traverses a number of townlands from the consented wind farm site to Ballylicky Substation. The Grid Connection is located in West Cork. There are a number of designated scenic routes and protected views within County Cork that fall within the study area, however many of these are outside of the ZTV pattern (indicating no potential visibility).

4.5.5.2 Marine & Fisheries

The Government projects that by 2020 Ireland’s marine economy could grow from €3.4 billion to €6.4 billion turnover. Cork has the longest coastline in the Southern Region, numerous ports and related infrastructure, as well as an extensive marine environment. Cork’s assets and infrastructure have significant potential to support the development of ocean and offshore energy and facilitate new jobs in the wave and tidal industry (for example at the Castletownbere / Bere Island port facilities).

Castletownbere also remains home to one of Ireland’s most important fishing fleets and Ireland’s largest whitefish fleet. Although smaller than Agri-food, aquaculture also offers long term potential in Cork, with a thriving shellfish industry in West Cork. These assets, embedded knowledge and infrastructure, offer significant potential for local communities to benefit from engaging with maritime related industries.

4.5.5.3 Energy & Forestry

Being the County with the largest land area in the Country, Cork offers significant potential in land-based energy generation, particularly forestry, biofuels and wind. Cork has the largest installed and committed wind energy generation capacity nationally, with farms concentrated in the Derrynasaggart Mountains, the Boggeragh Mountains, and south of Dunmanway. Cork has significant additional wind resources and potential to expand its wind energy generation capabilities in ways that benefit local communities.

Cork has the highest forest cover levels in Ireland, almost 50% more than the next highest (Donegal). This key asset supports a strong private and public forestry products industry. The

Irish forestry industry makes a significant and growing contribution to the Irish economy, estimated to be €2.3billion, and includes value from recreational use and corresponding visitor numbers. Energy sources such as these offer significant potential to diversify communities' economic base and tackle energy poverty. Ownership of and involvement in sustainable energy generation is a key opportunity to support the resilience and self-sufficiency of local communities.

Nationally Cork is by far the largest economy outside of Dublin and is a leader internationally in key sectors. Ireland and the Southern Region benefit hugely from the strategic economic contribution that Cork, in particular Metropolitan Cork, makes as the primary economic driver nationally outside of Dublin.

Study Area 2: Cork County

Tourism in County Cork is an important industry based on its rich natural and built heritage. Many areas that are important to the tourist industry of County Cork owe their attraction to the exceptional quality of the landscape or particular features of the built environment[7]. There are a number of policies with the Cork CDP 2014 which seek to promote tourism in the county. Policy TO 1-2: Promotion of Sustainable Tourism in County Cork is '(a) *Promote a sustainable approach to the development of the tourism sector within Cork County* ….." and Policy TO 7-1: Walking/Cycling and Greenways is "*Promote the development of walking and cycling routes throughout the County as an activity for both international visitors and local tourists*…"

4.5.5.4 Tourism Numbers and Revenue

Study Area 2: County Cork

The South-West Region which includes the Counties of Cork and Kerry has consistently been the most popular region in Ireland outside Dublin for overseas tourist and domestic visitors. Regional Tourism performance figures for 2018 for the South-West Region show overseas tourist numbers for the South West Region totalled 2,225,000 in 2019 and tourist revenue accounted for €970,000,000 from overseas tourists. Domestic visitors from Ireland and Northern Ireland accounted for 2,354,000 visits to the region in 2019, with €536,000,000 in revenue generated from domestic visitors.

[7] County Development Plan 2014, Section 8, http://corkcocodevplan.com/wp-content/uploads/2017/10/CCDP_Volume_1.pdf, accessed 12/05/2021

Cork is also included in ‘Wild Atlantic Way” which is one of the longest defined costal routes in the world. It was devised as a new ‘experience’ and ‘destination’ by Fáilte Ireland to present the West Coast of Ireland as a compelling international tourism product. It is an over-arching brand which individual destinations and businesses can trade collectively with much greater potential visibility and clarity of message in the international marketplace.

Tourism remains an essential complement to the economy of Cork’s towns, villages, rural areas, and islands. Nationally and regionally significant attractions outside of Metropolitan Cork include Kinsale (including Charles Fort and harbour cruises); Midleton Distillery; the Blackwater Valley; Doneraile House & Park, and West Cork (including Mien Head, Bantry and Skibbereen). Alongside a rich programme of food, film, and music festivals these tourism assets contribute to Cork’s c.1.4 million visitors annually.

4.5.6 Human Health

Common concerns around wind farms and grid connections in terms of human health are generally associated with electromagnetic fields, shadow flicker and noise. These topics are considered in this assessment in addition to air quality and water contamination.

4.5.6.1 General Health of Population

Human health of communities can vary greatly owing to a number of factors including susceptibility to disease, location, income inequality, access to health care etc. In 2019 the Department of Health published “Health in Ireland – Key Trends 2019” which shows population health at the national level presents a picture of decreasing mortality rates and high self-perceived health over the past ten years. Ireland has the highest self-perceived health status in the EU, with 82.9% of people rating their health as good or very good.

The 2016 census data for the general health of the population as shown in Table 4.4 indicates the health status across all four study areas is “Very Good” to “Good”. The health status of the Site and Environs is very similar to that of County Cork. Both these areas are above the national average. The “Very Good” health status for County Kerry at 56% is slightly below the national average of 59%.

Table 4.2 Population by General Health (2016)

General Health	The Site & Environs (10km)	County Cork	Ireland
	Percentage (%)		
Very good	62	63	59
Good	28	26	28
Fair	6	7	8
Bad	1	1	1
Very bad	0	0	0
Not stated	3	2	3

4.5.6.2 Electromagnetic Interference

Electromagnetic fields ("EMF") are invisible lines of force that surround electrical equipment, power cords, wires that carry electricity and outdoor power lines. Electric and magnetic fields can occur together or separately and are a function of voltage and current. When an electrical appliance is plugged into the wall, an electric field is present (there is voltage but no current); when that appliance is turned on, electric and magnetic fields are present (there is both voltage and current). Both electric and magnetic fields decrease with distance. Electric fields are also dissipated by objects such as building materials. On a daily basis, people are exposed to extremely low frequency ("ELF") EMF as a result of using electricity. The ESB published an information booklet in 2017 called "EMF & You" which provides information about Electric & Magnetic Fields and the electricity network in Ireland

4.5.6.3 Noise

Noise may have various effects on human beings exposed to it ranging from discomfort and annoyance to various psychological and pathological conditions. How people react to the effects of noise varies widely and depends on the characteristics of the sounds and the recipient's attitude towards it. The negative effects can be to health, quality of sleep, communications, working efficiently, industrial accidents and mental stress.

An increase in noise will occur around the Proposed Development Site during the construction, operational, and decommissioning phases of the proposed EIA Development. Construction and decommissioning noise will be typical of construction activities and will be short-term. An increase in noise will occur when the wind farm is operational and generating electricity.

4.5.6.4 Air Quality

Chapter 8 provides an assessment of air quality in relation to the Development.

4.5.6.5 Water Contamination

Chapter 7 provides an assessment of hydrological impacts in relation to the Development.

4.5.6.6 Traffic

Chapter 11 provides an assessment of traffic in relation to the Development.

4.5.7 Natural Disasters and Major Accidents

A Grid Connection is not a recognised source of pollution. Should a major accident or natural disaster occur, the potential sources of pollution onsite during both the construction and operational phases are limited. The Site is not regulated under the Control of Major Accident Hazards Involving Dangerous Substances Regulations i.e., SEVESO sites and so there is no potential effects from this source.

There is limited potential for significant natural disasters to occur at the Site. Ireland is a geologically stable country with a mild temperate climate. The potential natural disasters that may occur are therefore limited to peat-slide, flooding and fire. The risk of peat-slide is addressed in **Chapter 6 – Soils and Geology**. The risk of flooding is addressed in **Chapter 7 – Hydrology and Hydrogeology**. As described earlier, there are no significant sources of pollution in the Grid Connection with the potential to cause environmental or health effects.

4.5.7.1 Settlement Patterns

County Cork has a highly rural population, with only approximately 33% living in urban areas. Of the urban based population, the largest population centre is Cork City, with a population of over 119,000. These factors make Cork relatively secure against population decline, as major industries are inclined to move to such areas.

According to the 2006 census the rural population of Bantry increased in between 2002-2006. It can be assumed that the increase in population in these areas must be from a combination of low mortality, increased births and relocation.

4.5.7.2 Health and Safety

It is not possible to quantify the health and safety of the population of County Cork or of the locality. However, any development project, in its construction phase in particular, has the potential to affect health and safety of workers and the public. During its operational phase, the development will contribute to a reduced usage of fossil fuels and the resultant positive affect on climatic conditions will ultimately benefit human beings in the locality, the region and the country.

4.5.7.3 Land Use

The Mapping from the Corine Land Cover Survey reference shows the extent of Grid Connection can be predominantly classified as existing agricultural fields and existing roadways.

4.5.8 Accidents / Disasters (incorporating health and safety).

4.5.8.1 Accidents to Personnel

Potential risks associated with the EIA Development for personnel may arise in the construction, operation and decommissioning phases, as follows:

- General construction accidents;
- Driving to and from site;
- Slips, trips, and falls;
- Climbing inside turbine towers;
- Working on live electrical equipment;
- Working on pressurised hydraulic equipment;
- Rotating machinery;
- Working at height; and
- Working in confined spaces.

4.5.8.2 Vulnerability to Climate Change

The potential causes of accidents / disasters associated with the vulnerability of the EIA Development to climate change are identified as follows. Information is drawn from 'Local Authority Adaptation Strategy Development Guidelines' (EPA 2016)[8].

[8] http://www.epa.ie/pubs/reports/research/climate/EPA_Research_Report164.pdf

4.6 ASSESSMENT OF POTENTIAL IMPACTS

This section assesses the potential effects associated with the EIA Development during the construction, operational and decommissioning phases of the project.

4.6.1 Accidents/Disasters

There are no areas mapped as being of low, medium or high probability flood areas within or directly down-gradient of the Existing Development (**Chapter 7: Wate**r).

There was limited potential for significant natural disasters to occur along the Grid Route. Ireland is a geologically stable country with a mild temperate climate. The wind farm site or the grid connection is not located along a fault line and there is no historical record of any earthquake causing serious damage in County Cork, the surrounding counties or on the island of Ireland.

Consideration was given to the interactions with various impacts assessed in other chapters of this EIAR. With mitigation measures in place, the impacts on population and human health (from a pollution perspective, environmental hazards or visual amenity) were not significant and can be ruled out and are therefore not discussed further in this chapter.

4.6.2 Potential Impacts on Population and Settlement Patterns

The Development does not contain a housing or services element and was not considered to have any direct positive or negative impact on the local or regional population levels. The overall impact was considered to be **imperceptible** in terms of population.

The predicted effect on the immediate settlement patterns and social patterns was imperceptible. There is, however, the benefits which accrue in the region in terms of the ability to provide electricity to industry and business in a high-quality supply. This has led and will lead to the region becoming more attractive to business with the subsequent benefit of increased employment opportunities in the region. A renewable, green energy supply is potentially attractive for companies looking to develop in County Cork.

While this is not likely to result in a marked increase in settlement in the area, or a change in social patterns in the area, it should reduce the population drain out of the Cork area, should the provision of a secure, renewable energy source prove attractive to industry. This is dependent on national and global economic conditions, as well as the types of industry which may locate in the region.

The overall impact during the construction of the grid connection was **positive and short-term** in nature as workers relocated to the area for the duration of these phases. The overall impact was **positive** at the local level in terms of settlement patterns where increased business is attracted to the area during the operational phase.

4.6.3 Economic Activity and Tourism

4.6.3.1 Economic Activity

During its construction phase, some jobs are likely to be created. During the circa 4-6 month construction phase of the grid connection, there will be positive economic effects resulting from the expenditure on items such as Site preparation, Access Tracks, purchase and delivery of materials, plant, equipment and components. The construction of the wind farm itself will result in a peak on site workforce of 30 workers. Some of these workers were sourced from the local labour market in Study Area 1 and 2 but professional and skilled personnel were required to be sourced from areas inclusive of Study Area 3and further afield.

During the initial construction phase, jobs were created. Local employment was provided, as well as employment on local, national and international levels both directly and indirectly. Throughout the project lifetime, employment will be both created and maintained on local, regional, national and international levels.

Labour and materials were sourced from the local area during construction. Any rock needed was sourced from a local quarry, subject to quality and quantity being available. Ready-mix concrete was also sourced from a local supplier.

Employees involved in the initial construction of the Development used local shops, restaurants and hotels/accommodation. Therefore, overall, there was a slight, positive impact on employment in the area. Employees were also involved in the subsequent operation of the Development continued to use local shops, restaurants and hotels/accommodation.

The Applicant recognises the importance of the economic benefits to Ireland from investing in onshore wind generation. The cost of the project amounted to approximately €35 million. This expenditure has resulted and will continue to provide economic benefit to both the national and local economy.

Cork County Council will benefit from payments under both the Development Contribution Scheme and from the annual rate payments. During the Operational phase of the wind farm, the land value has increased as a result of the Development, resulting in a minor beneficial effect on land use within the Site.

The overall impact was a moderate, positive, short-term impact during the construction phase of the Development and a moderate, positive and long-term during the Operational phase.

4.6.3.2 Tourism

Fáilte Ireland published guidelines in 2011 for the treatment of tourism in an EIS which describes the effects of projects on tourism. Many of the issues covered in the report are similar to those covered in this EIAR, for example, scenery is assessed in the Landscape and Visual Impact Assessment (see **Chapter 10**).

The Development will not interfere with any scenic routes Fáilte Ireland published guidelines in 2011 for the treatment of tourism in an EIA, which describes the effects of projects on tourism. Many of the issues covered in the report are similar to those covered in this EIAR, for example, scenery is assessed in **Chapter 10: Landscape and Visual Amenity.**

Chapter 10: Landscape and Visual Amenity outlines and deals specifically with Landscape and Visual Amenity.

Chapter 10: Landscape and Visual Amenity of the EIAR and the 2010 EIS had assessed the landscape effects, the visual effects and the cumulative effects of the wind farm and the Residential Visual Amenity. Based on the findings of the collective assessments, it was considered that the Development including the grid connection will not give rise to any significant effects. Overall effects of the Development with regards to tourism were considered to be imperceptible during both construction and operation with a slight positive impact during operation.

4.6.4 Employment

Direct: Employment and other economic outputs that are directly attributable to the delivery of the Development. These included the new jobs that were created to manage and supervise the initial decommissioning and construction phase and operational phases of the Development and that are filled by employees of the appointed Contractor (or sub-contracted employees).

Indirect: Employment and other outputs created in other companies and organisations that provide services to the Development (i.e., procurement and other supply chain effects). Most manufactured materials like towers, blades and subcomponents were imported (import intensity of 66%) with major infrastructure delivery through Dublin Port; fewer indirect manufacturing jobs were generated domestically in Ireland.

Induced: Additional jobs and other economic outputs were created in the wider economy, as a result of the spreading employee incomes and other ripple effects that occur as a result of the direct and indirect effects of the Development.

Sustainable Energy Authority of Ireland (SEAI) researched the flow of investment and sales revenue from onshore wind and the transmission grid through the different industrial sectors in the supply chain required for input–output macro-analysis (**Table 4.3**).

Table 4.3: Capital Investment breakdown for onshore wind supply (Source SEAI, 2015)

€192 million average annual capital investment to reach 2020 NREAP/NEEAP targets	Industrial Sectors
	Manufacturing (70%): turbines, blades, towers, gearbox, generator, electrical equipment, transformer etc.
	Construction (12%)
	Electricity Supply Services (10%)
	Transport (2.5%)
	Finance (2.5%)
	Professional Services (3%)

In terms of its capacity to capture capital investment domestically, Ireland has strong indigenous feasibility, planning, foundations and engineering expertise, with the skills and knowledge base to potentially supply niche markets in controls and instrumentation, albeit the bulk of heavy manufacturing (blades, towers) is imported at present. Similarly, the Irish supply chain is very well positioned in all of the preliminary design and operational aspects of the electricity grid, providing a significant boost to local employment. However, some manufactured materials such as cables, underground pipes, insulators and conductors were sourced from abroad. According to SEAI there are approximately 0.34 new long-term jobs per MW, which falls in line with European Wind Energy Association (EWEA) estimates for direct employment in Europe.

The Development of both the wind farm and grid connection will create the most employment during the initial construction phase. It is estimated that 16 construction workers (not at the same time) will be employed directly during this phase. An estimated breakdown of the construction employment is as follows:

Table 4.4: Estimated Employment breakdown during the initial construction phase Grid Connection Construction

Occupation/Task	No. of People (Employment Period)
Roads (truck drivers)	eight (36 weeks)
Plant drivers	four (36 weeks)
Foreman	one (36 weeks)
Engineer	one (36 weeks)
Substation Civils	ten (10 weeks)
Substation electrical	sixteen (16 weeks)
Cable Pulling	Four (16 weeks)
General operatives	three (36 weeks)

Approximately 30 persons will be employed during the peak of the construction phase of civil engineering of Access Tracks, crane hardstand, turbine foundation, and substation construction. These numbers were somewhat less for the turbine delivery, assembly and commissioning activities. A mixture of skills was required, including unskilled/semi-skilled/skilled manual (construction labour, machine operators, *etc.*), non-manual (administration roles), managerial and technical (civil, electrical, mechanical technical and engineering) and professional roles (legal, business, accounting, *et cetera*). The manual roles were site-based with the other roles being predominately office-based, with Site visits as and when required. During construction, personnel were on site over a number of months and during these times will likely use local accommodation and restaurants and other facilities.

A total of 15 persons will be employed during the peak of the grid connection.

Positive effects arising during the construction phase have compensated to any possible loss to tourism economy that may occur in the event that tourist visitors were deterred (accommodation being used by contractors) during this phase.

Whilst overall effects on the tourism economy were considered be negligible and not significant, the benefits to individual businesses were positive and may indeed be significant. However, until such time as contracts is let, it is not possible to identify the level of benefit to individual businesses.

The Development will create approximately two full-time jobs during the Operational phase. In addition to these jobs, various personnel will be required for the successful and continued operation of the windfarm. During the operation phase of the windfarm, the operation and reliability, maintenance (turbines, civil works, electrical infrastructure, etc.) finance, ongoing compliance with permissions and permits, safety, security, community relations and benefits, land-owner agreements etc. must be continually managed. These requirements are widely distributed over various employment sectors and are an integral part of the ongoing operation of The Development and will provide continuous employment for the lifetime of the windfarm.

The persons fulfilling these roles may live and work anywhere in Ireland, visiting the Site as and when required, to operate and maintain the plant and equipment. During major service operations, personnel may be at the Site over several days and during these times may use local accommodation and restaurants. Therefore, overall, there will be a ***positive short-term*** impact on employment in the area.

4.6.5 Local Supply Chain

The Applicant has a long track record of developing windfarms in Ireland and experience from previous windfarm construction projects is that expenditure in local goods and services is widely spread and makes a difference to existing businesses. The Applicant is committed to employing good practice measures with regard to maximising local procurement and would adopt measures such as those set out in the Renewables UK Good Practice 2014: 'Local Supply Chain Opportunities in Onshore Wind' (Renewables UK, 2014).

The Applicant worked with a variety of Tier 1 /Tier 2 contractors were encouraged to develop local supply chains throughout the local area, and work with subcontractors to invest in training and skills development. Local and regional suppliers of a wide range of goods and benefitted from such a Development (in this case, Cork and Ireland as a whole

4.6.6 Topography and Land Use

The grid connection will result in approximately 4ha of agricultural land being temporarily taken out of production during the construction phase. The effect will be short-term as the construction phase will last approximately 4-6 months and the land will be reinstated to its original use once the grid connection is built and cable is laid. The overall impact during initial construction, operation and final decommissioning will be slight, direct, negative, long-term and reversible.

The overall impact is predicted to be **slight, direct, negative, long-term, and reversible** during construction, operation and decommissioning with the land being able to be reinstated upon decommissioning of the Proposed Development Site.

4.7 MITIGATION MEASURES AND RESIDUAL EFFECTS

No mitigation measures will be required for the Development. However, in the interest of the health and safety of workers and the public, and pursuant to the Applicant's health and safety legal obligations, a number of best practice measures will be implemented and adhered to during the construction phase of the Development. A Preliminary Health and Safety Plan will be prepared for both the wind farm and grid connection works.

4.7.1 Embedded Mitigation

The Development, as described in **Chapter 2: Project Description** incorporates good practice measures for limiting the adverse effects of the construction works. The principal potential effects arising from works tend to relate to construction traffic affecting the use of local primary roads and Access Tracks by the general public. Measures are set out in Chapter 12: Material Assets relating to how delivery of goods and services were managed during works to minimise impacts.

4.7.2 Population and Settlement Patterns

Given that no negative impacts have been identified, no mitigation measures are proposed.

4.7.3 Economic Activity and Tourism

Allowing for the implementation of embedded mitigation, no significant effects have been identified in respect of socio-economic receptors arising from the construction of the grid connection and therefore no mitigation measures are required to reduce or remedy any adverse effect.

4.7.4 Employment

Given that no negative impacts have been identified, no mitigation measures are proposed.

4.7.5 Topography and Land Use

Given that no negative impacts have been identified, no mitigation measures are proposed (other than embedded mitigation of minimising land take).

4.7.6 Residual Risk

The residual risk on population and human health is assessed to be an imperceptible, long-term effect.

4.8 CUMULATIVE EFFECTS

The cumulative effect of the Development i.e. the Wind Farm and Grid Connection and other Irish renewables generation is considered to be a fundamental change in the climate effects of Ireland's energy supply, which is an important, positive effect that is significant under the EIA regulations and will contribute to Ireland's legally binding reduction targets. The Development will continue to contribute to the offset of burning of fossil fuels which has the potential to positively impact human health.

The Landscape and Visual Impact Assessment contained in **Chapter 10: Landscape and Visual Amenity**) confirms that the cumulative impact of the Development is deemed to be **Low**. The cumulative impact of the Development i.e., the windfarm and grid connection will have short-term negative impact on tourism and amenity during the construction. There is predicted to be a short-term, moderate positive impact in terms of employment from the Development.

4.9 SUMMARY OF SIGNIFICANT EFFECTS

The assessment has not identified any likely significant effects from the EIA Development on population and human health.

4.10 STATEMENT OF SIGNIFICANCE

This Section has assessed the significance of potential effects of the proposed EIA Development on population and human health. The EIA Development has been assessed as having the potential to result in effects of a slight positive, long-term impact overall.

No likely significant cumulative effects are predicted.

4.11 COMPARISON WITH 2010 EIA

The results of the 2010 EIS are broadly in line with the results of this assessment.

4.12 MITIGATION MEASURES FOR THE GRID CONNECTION

For the proposed grid connection, a number of mitigation measures will be employed. The developer will consult with the local community and local businesses prior to the commencement of any construction work required on the cable route. The community will be advised of construction duration and of any road or lane closures proposed so to minimise the temporary disruption to the area.

4.13 REFERENCES

1. Central Statistics Office (CSO) Census 2016 www.cso.ie
2. Central Statistics Office (CSO) 2010 Live Register www.cso.ie
3. Failté Ireland Regions South West Facts 2009 www.failteireland.ie
4. SEI "Attitude Towards the Development of Wind Farms in Ireland" 2003 www.sei.ie
5. British Wind Energy Association (BWEA) and the Scottish Renewables Forum (SRF) 2002.
6. Environmental Protection Agency (2020) Air Quality in Ireland 2019- Indicators of Air Quality. [online] Available at: http://www.epa.ie/air/quality/

5 BIODIVERSITY

5.1 INTRODUCTION

5.1.1 Background

Doherty Environmental was commissioned by Jennings O'Donovan to undertake an Ecological Impact Assessment ("EcIA") for the EIA Development"). Full details of the proposed EIA Development are provided in **Section 2: Project Description**.

The EIA Development traverses the townlands of Ardrah, Ards More (East), Ards Beg, Barnagowlane West, Ballylicky, Crossoge, Derreenacrinnig West, Dromlickacrue, Derryarkane, Dromclarig, Gortroe, Gortnacowly, Glanareagh, Laharanshermeen, Maulikeeve, Maularaha, and Shandrum More ("the Existing Development Site").

("the Proposed Development Site"). The location of the EIA Development is illustrated in **Figure 5.1: EIA Development Location Map.**

This chapter of the revised The Environmental Impact Assessment Report ("EIAR") evaluates the effects of the EIA Development on terrestrial biodiversity. The assessment details the methods used to establish the terrestrial biodiversity interest within the Development Site and hinterland area, and the process used to determine the nature conservation importance of the populations present. It then sets out the potential effects on local biodiversity during construction, operation and decommissioning and assesses the significance of these effects. Means to mitigate any significant effects are then proposed. As well as considering potential impacts on flora and fauna, this chapter also considers impacts on designated areas.

5.1.2 Statement of Authority

The biodiversity chapter has been prepared by Mr. Pat Doherty MSc, MCIEEM, of DEC Ltd. Mr. Doherty is a consultant ecologist with over 15 years' experience in completing ecological impact assessment and contributing to Environmental Impact Assessment. He has been involved in the completion of assessments of multiple wind farm developments in both the Republic of Ireland and Northern Ireland where he has completed detailed habitat and fauna surveys to inform the assessment process. He has completed focused certified professional development training in a range of ecological survey techniques and assessment processes. Training has been completed for National Vegetation Classification (NVC) and Irish Vegetation Classification (IVC) surveying, bryophyte survey for habitat assessment and identification, professional bat survey and assessment training, mammal surveying and specific training for bird surveys for Wind Farm developments. Training has been completed by approved training providers such as CIEEM, British Trust for Ornithology and the Field Studies Council.

5.1.3 Legislation, Policy and Guidance

This EcIA has been undertaken with full account of legislation, policy and guidance relating to species and habitat protection, importance and survey protocol. The guiding legislation, policy and guidance includes the following:

5.1.3.1 Legislation

5.1.3.1.1 EU Habitats Directive 92/43/EEC, European Communities (Natural Habitats) Regulations 1997, European Communities (Birds and Natural Habitats) Regulations 2011

The Habitats Directive provides the basis of protection for Natura 2000 sites, namely Special Protection Areas ("SPAs") and Special Areas of Conservation ("SACs"). Article 6 of the EU Habitats Directive requires that any proposal that may have a significant effect on a Natura 2000 site must be subject to an Appropriate Assessment. An Appropriate Assessment is required in order to ascertain the potential impact of a proposal on the reasons for which the site is designated, and thereby ascertain the potential for adverse impact on the integrity of the site. A proposal that may adversely impact the integrity of the site may not be consented except in the absence of Feasible Alternative Solutions and in the event of Overriding Public Interest. A Natura Impact Statement has been undertaken for the proposed EIA Development. This concludes that the proposed EIA Development will not, adversely affect the integrity of any European Site (Natura 2000 site), either directly, indirectly or cumulatively.

The Habitats Directive also provides for the protection of species listed under Annex IV of the Directive wherever they occur. These species include otter and all bat species.

The Habitats Directive was transposed into Irish law by the European Communities (Natural Habitats) Regulations 1997 and subsequently amended in the European Communities (Birds and Natural Habitats) Regulations 2011. Regulation 42 of the 2011 regulations requires that any proposal likely to have a significant effect on a European Site, alone or in combination with other operations or activities, needs to be assessed with respect to its potential impact in the site's conservation objectives (an Appropriate Assessment) and that the decision-making authority should be furnished with a Natura Impact Statement that incorporates a Screening Assessment and Appropriate Assessment as necessary.

5.1.3.1.2 Environmental Impact Assessment Directive (2011/92/EU)

European Union Directive 2011/92/EU ("the EIA Directive") considers the assessment of the effects of certain public and private projects on the environment. It has been transposed to Irish legislation by the Planning and Development Act 2000 (as amended), and the Planning and Development Regulations (2000 – 2015) (hereafter referred to as the “2011 EIA Regulations”).

The Planning and Development Act 2000 (as amended) Part X, Section 171A (1) requires that an EIA is carried out by the competent authority (i.e. the local planning authority or An Bord Pleanála):

“*that shall identify, describe and assess in an appropriate manner, in light of each individual case and in accordance with Articles 4 to 11 of the Environmental Impact Assessment Directive, the direct and indirect effects of a proposed development on the following:*

(a) human beings, flora and fauna….,”

5.1.3.1.3 Environmental Impact Assessment Directive (2014/52/EU)

The requirements of the revised EIA Directive (2014/52/EU) (“the Revised EIA Directive”), which will be incorporated into Irish law, are taken into account by the observance of draft *Revised Guidelines on the information to be contained in Environmental Impact Statements*[9]. Annex IV of the Revised EIA Directive provides requirements for information to be included in the EIAR (as referred to in Article 5(1)(f). Additional emphasis has been placed on ‘biodiversity’ in the 2014 EIA Directive (see **Section 1: Introduction** of this REIS / EIAR for further details).

5.1.3.1.4 EU Birds Directive 79/409/EEC

EU Birds Directive 79/409/EEC ("the Birds Directive”) establishes a system of general protection for all wild birds throughout the European Union. Annex I of the Birds Directive comprises 175 bird species that are rare, vulnerable to habitat changes or in danger of extinction within the European Union. Article 4 establishes clearly that wherever those species occur, they should be the subject of special conservation measures concerning their habitat in order to ensure their survival and reproduction in the area of distribution. Similar actions should be taken by Member States regarding migratory species, even if they are not listed in Annex I.

5.1.3.1.5 Bern and Bonn Convention

The Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention 1982) exists to conserve all species and their habitats. The Convention on the

[9] Environmental Protection Agency. *Revised Guidelines on the information to be contained in Environmental Impact Statements*. Draft, September 2015. Available at: http://www.epa.ie/pubs/consultation/reviewofdrafteisguidelinesadvicenotes/

Conservation of Migratory Species of Wild Animals (Bonn Convention 1979, enacted 1983) was instigated to protect migrant species across all European boundaries.

5.1.3.1.6 The Wildlife Act (1976) as amended (2000)

The Wildlife Act 1976 gives protection a wide variety of birds, animals and plants in the Republic of Ireland. It is unlawful to disturb, injure or damage to their breeding or resting place wherever these occur without an appropriate licence from National Parks and Wildlife Service ("NPWS"). All birds, their nests and eggs are protected under law in Ireland through the Wildlife Act 1976 (as amended in 2000). Wilful destruction of an active nest from the building stage until the chicks have fledged is an offence. The act also provides a mechanism to give statutory protection to Natural Heritage Areas ("NHAs"). The amendment in 2000 broadens the scope of the Wildlife Acts to include most species, including the majority of fish and aquatic invertebrate species which were excluded from the 1976 Act.

5.1.3.1.7 Flora (Protection) Order, 1999

The Flora (Protection) Order affords protection to 56 vascular plants, fourteen mosses, four liverworts and two stoneworts. It is illegal to cut, uproot or damage the listed species in any way, or to offer them for sale. This prohibition extends to the taking or sale of seed. In addition, it is illegal to alter, damage or interfere in any way with their habitats. This protection applies wherever the plants are found and is not confined to sites designated for nature conservation.

5.1.3.2 Policies from The Cork County Development Plan 2014-2020

Relevant objectives and policies from the Cork County Development Plan 2014-2020 ("the CDP")[10] are given below.

- HE 1-1: County Biodiversity Action Plan: *"Continue to implement the County Biodiversity Action Plan (2008) in partnership with all relevant stakeholders*."
- **HE 1-2: County Heritage Plan:** *"Continue to implement with current County Heritage Plan (2005) in partnership with relevant stakeholders and any successor to this document."*
- **HE 2-1: Site Designated for Nature Conservation** *"Provide protection to all-natural heritage sites designated or proposed for designation under National and European legislation and International Agreements, and to maintain or develop linkages between these. This includes Special Areas of Conservation, Special Protection Areas, Natural Heritage Areas, Statutory Nature Reserves, Refuges for Fauna and Ramsar Sites."*

[10]Cork County Development Plan (2014). *Cork County Development Plan 2014-2020*. Volume 1: Written Statement. April 2014. Available at: http://www.corkcocoo.ie

- **HE 2-2: Protected Plant and Animal Species: “Provide** *protection to species listed in the Flora Protection Order 1990, on Annexes of the Habitats and Birds Directives, and to animal species protected under the Wildlife Acts in accordance with relevant legal requirements. These species are listed in Volume 2, Chapter 4 of the plan. “*
- **HE 2-3: Biodiversity outside Protected Areas: “***Retain areas of local biodiversity value, ecological corridors and habitats that are features of the County’s ecological network, and to protect these from inappropriate development. This includes rivers, lakes, streams and ponds, peatland and other wetland habitats, woodlands, hedgerows, tree lines, veteran trees, natural and seminatural grasslands as well as coastal and marine habitats. It particularly includes habitats of special conservation significance in Cork as listed in Volume 2 Chapter 3 Nature Conservation Areas of the plan.”*

5.1.3.2.4Wind Energy Development Guidelines for Planning Authorities

Relevant guidance from the current 2006 Wind Energy Planning Guidelines (“the 2006 WEPG”)[11] is given below.

- Section 3.7 Natural and Built Heritage and Wind Energy Development - *“The designation of an area for protection of natural or built heritage or as an amenity area does not automatically preclude wind energy development. However, consideration of any wind energy development in or near these areas must be subject to Ireland’s obligations under the Habitats Directive (92/43/EEC), the EU (Birds) Directive (79/409/EEC) and the Environmental Impact Assessment Directive (97/11/EC). Clear guidance on policy and objectives should be available in development plans on the natural and built heritage, and the information contained therein on location and status should be accurate and up-to-date.”*

5.1.3.2.5 Appropriate Assessment of Plans and Projects in Ireland – Guidance for Local Authorities (2010)

The ‘Appropriate Assessment of Plans and Projects in Ireland – Guidance for Local Authorities’ (2010) (“the Appropriate Assessment Guidance”)[12] provides methodological and legislative guidance on Appropriate Assessment for any proposals that may impact on Natura 2000 sites in Ireland. These guidelines are highly relevant in assessing the potential impact on neighbouring Natura 2000 sites.

[11] Department of Environment, Heritage and Local Government, 2006). *Wind Energy Development Guidelines for Planning Authorities*. Available at: http://www.housing.gov.ie/sites/default/files/migrated-files/en/Publications/DevelopmentandHousing/Planning/FileDownLoad%2C1633%2Cen.pdf

[6] Department of Environment, Heritage and Local Government, 2009. Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities. Available at: https://www.npws.ie/sites/default/files/publications/pdf/NPWS_2009_AA_Guidance.pdf

5.1.3.3 Guidance

5.1.3.3.1 CIEEM Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal.

The 'CIEEM Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal' (2016)[13] (the CIEEM Guidelines"), published by the Chartered Institute of Ecology and Environmental Management ("CIEEM"), are the acknowledged reference on ecological impact assessment and reflect the current thinking on good practice in ecological impact assessment across the UK and Ireland. They are consistent with the British Standard on Biodiversity, which provides recommendations on topics such as professional practice, proportionality, pre-application discussions, ecological surveys, adequacy of ecological information, reporting and monitoring.

These CIEEM Guidelines have the endorsement of the Institute of Environmental Management and Assessment ("IEMA"), the Chartered Institute of Water and Environmental Management, Northern Ireland Department of the Environment, Scottish Natural Heritage, The Wildlife Trusts and other leading environmental organisations.

5.1.3.3.2 Guidelines on the information to be contained in Environmental Impact Statements[14]

The Environmental Protection Agency's 2002 'Guidelines on the information to be contained in Environmental Impact Statements' were prepared in response to the 1992 Environmental Protection Agency Act (Section 72), which states that those preparing and evaluating Environmental Impact Statements shall have regard to such guidelines. The aim of these Guidelines is to improve the quality of Environmental Impact Statements in Ireland, and as such they address a wide range of project types and potential environmental issues.

5.1.3.3.3 EPA Draft revised guidelines on the information to be contained in Environmental Impact Statements[15]

The EPA Draft revised guidelines on the information to be contained in Environmental Impact Statements ("the revised EPA Draft Guidelines") have been produced by the Environmental Protection Agency in response to the adoption of revised Environmental Impact Assessment Directive 2014/52/EU. The new guidelines also incorporate experience arising from EU and Irish court cases, appeals and various pieces of new legislation adopted since the publication of the previous (2002) guidelines.

[13] CIEEM (2016) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal, 2nd edition. Chartered Institute of Ecology and Environmental Management, Winchester.
[14] EPA (2002). Guidelines on the information to be contained in Environmental Impact Statements. EPA, 2002
[15] EPA (2015). Revised Guidelines on the information to be contained in Environmental Impact Statements. Draft report.

The revised EPA Draft Guidelines provide guidance on the principles and associated practice of preparing Environmental Impact Statements, with the aim of ensuring that the information that they contain is available in a format that is clear, concise and accessible to the greatest number of people.

Ecological designations/ Natural Heritage Designations

The Natura 2000 sites (SAC and SPA), the NHA and the pNHA are listed in more detail in the Cork County Development Plan. All such nature conservation areas were identified as key policy considerations and are shown in Figures 5.1-5.3.

Careful consideration has been given to the impacts of the developments on nature conservations sites and in particular Natura 2000 sites given the requirements to comply with EU Guidelines on carrying out Appropriate Assessment, which says that '*you must apply the precautionary principle and the focus of the assessment should be on objectively demonstrating, with supporting evidence, that there will be no adverse effects on the integrity of the Natura 2000 site.*' This is supported by ECJ ruling (Waddenzee Judgement) which says that the competent authority must be certain that the plan or project that they are assessing will not adversely affect the integrity of any Natura 2000 site. It also says that where this is not the case, adverse effects must be assumed. There is a checklist of questions that you must be able answer in order to conclude that there will be no adverse effects on integrity.

While the development of renewable energy can have social and economic benefits, it must be developed in an environmentally sustainable manner. In this respect, environmental benefits and constraints will be a key consideration in the preparation of the Draft County Development Plan and SEA and HDA shall be carried out in relation to the County Development Plan. The Draft County Development Plan will also be subject to flood risk assessments (FRA).

5.2 BACKGROUND

This section of the EIAR assesses the potential impacts of the proposed Derreenacrinnig West Wind Farm grid connection on the flora and fauna of the area. This assessment has been undertaken by Doherty Environmental Consultants Ltd., on behalf of Jennings O'Donovan & Partners Ltd. and examines the potential ecological impacts of the 14.km grid connection route, the consented Wind Farm and the cumulative effect on biodiversity of both the grid connection route and the Wind Farm. The purpose of this assessment is to:

- identify the habitats along the route;
- identify the existing fauna of the along the route;

- identify the potential impact of the proposed development;
- recommend measures to mitigate probable impacts; and
- identify any residual impacts to the ecology along the route.

The scope of the following assessment follows the guidance outlined in *IEEM's* Guidelines for Ecological Impact Assessment (2006). The following impact assessment is based upon a review of existing desktop information and the results of field surveys along the proposed route outlined below.

5.3 ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

5.3.1 Relevant Legislation

Flora and fauna in Ireland are protected at a national level by the Wildlife Act, 1976 and the Wildlife (Amendment) Act, 2000 and the Flora (Protection) Order, 1999 (SI 94/1999). They are also protected at a European level by the EU Habitats Directive (92/43/EEC) and the EU Birds Directive (79/409/EEC).

The transposition of the EU Habitats Directive by the European Communities (Natural Habitats) Regulations 1997 – 2013 (referred to as the Habitat Regulations) provides the legal basis for the protection of habitats and species of European importance in Ireland.

The legislative protection of habitats and species provided by the Habitats Directive has been implemented in Ireland and throughout Europe through the establishment of a network of designated conservation areas known as the Natura 2000 (N2K) network (with individual sites being referred to as Natura 2000 Sites). The N2K network includes sites designated as Special Areas of Conservation (SACs), under the EU Habitats Directive and Special Protection Areas (SPAs) designated under the EU Birds Directive. SACs are designated in areas that support habitats listed on Annex I and/or species listed on Annex II of the Habitats Directive. SPAs are designated in areas that support: 1% or more of the all-Ireland population of bird species listed on Annex I of the EU Birds Directive; 1% or more of the population of a migratory species; and more than 20,000 waterfowl. Under the National Habitat Regulations all designated Natura 2000 Sites are referred to as European Sites.

The Wildlife Act 1976 (as amended) also provides for the statutory designation of nature conservation areas. These areas are referred to under the Wildlife Acts as Natural Heritage Areas and are designated in areas that support habitats and/or species of national importance.
Other relevant national legislation concerning the protection of flora, fauna and fisheries include

the:

- Planning Act 2010;
- European Communities (Quality of Salmonid Waters) Regulations, 1988;
- The Freshwater Fish Directive 1978 (78/659/EEC); and
- The Surface Water Regulations, 2009.

5.4 SCHEUDLE OF WORKS

Doherty Environmental Consultants Ltd. was commissioned in March 2017 to undertake an Ecological Impact Assessment of the proposed Derreenacrinnig West Wind Farm Grid Connection route. A desktop review of the proposed grid connection route was completed in early March 2017. Targeted habitat surveys were undertaken by Doherty Environmental Consultants Ltd on the 6th & 7th March 2017, May 2017, 19th, 22nd and 26th October 2018.

Additional surveys were completed along the proposed grid connection route for the current proposed route. These surveys were completed on 10th September 2021. The aim of these surveys was to confirm or otherwise the validity and applicability of the results from previous field surveys completed in 2017 and 2018.

5.5 METHODOLOGY

5.5.1 Desk Study

A desktop assessment was carried out to collate available information on the ecological baseline of the proposed grid connection route. The principal aspect of the desktop assessment was a review of satellite imagery and Google Street View to identify the habitats occurring along the proposed route. Following this review, a preliminary habitat map was prepared. A 50m corridor was established either side of the proposed grid connection route and all habitats were mapped to Level 3 of Fossitt's Guide to Habitats in Ireland.

Areas of semi-natural habitat occurring along the grid connection route were identified during the desktop assessment and these areas were then targeted for habitat surveying in the field.
In addition to the preparation of a preliminary habitat map, the following research was also undertaken:

- A review of the National Biodiversity Database to identify the presence or otherwise of protected species occurring within close proximity to the proposed route;
- A review of the NPWS online database to identify the presence or otherwise of designated conservation areas (i.e. SPAs, SACs, NHAs etc.);
- Review of Bat Conservation Ireland's Batlas.

- Review of other published census data for a range of protected species.

5.6 SITE INVESTIGATIONS

Grid Route Site Investigations

Habitat Surveys

Habitat surveys were carried out on the 6th and 7th March 2017, 14th May 2017 and 19th, 22nd and 26th October 2018 to identify, describe, map and evaluate habitats and to verify information gathered at the desk study stage. The basis of the surveys undertaken on the above dates comprised ground truthing of the preliminary habitat map prepared during the desktop assessment and targeted Phase 1 Habitat surveys in areas identified as being representative of semi-natural habitats. the Phase 1 Habitat Survey of semi-natural habitats was completed with regard to the Heritage Council's publication Best Practice Guidance for Habitat Survey and Mapping (Smith et al., 2011).

Ground truthing of "improved" habitats, such as improved grassland and artificial built surfaces, was undertaken by visually assessing land cover from points along the grid connection route. Points along public roads intersecting the route and at vantage points overlooking the proposed route were used to ground truth the improved habitats mapped during the preliminary habitat mapping exercise.

Further ground-truthing surveys of the habitat surveys completed in 2017 and 2018 was undertaken in September 2021.

In this report, scientific and common names for higher plants follow those in the Botanical Society of the British Isles (BSBI) standard list, published on its website www.bsbi.org.uk. Scientific and common names for bryophytes follow Smith (2004). Scientific and common names of mammals follow Whilde (1993).

Terrestrial Mammals

A survey for protected ground dwelling mammals, particularly badgers, was completed along proposed underground sections of the grid connection route. Surveys were completed on the 14th May 2017. The survey for ground-dwelling mammals along the underground section of the proposed grid connection route were repeated during surveys on the 10th September 2021. The mammal survey involved walking either side of hedgerows and other field boundaries bisected by or parallel to the proposed underground sections of the grid connection route. These field signs, as described in Neal & Cheeseman (1996) and Bang & Dahlstrom (2006), include:

- mammal breeding and resting places, such as setts, holts, lairs;

- pathways;
- prints;
- faecal deposits;
- latrines (and dung pits used as territorial markers);
- feeding signs (snuffle holes);
- hair; and
- Scratch marks.
- Bird Surveys
- Wind Farm Site Investigations

Wind Farm Site Investigations

Habitat Survey

A site visit was carried out on 8th July 2010 to identify, describe, map and evaluate habitats and watercourses and to verify the information gathered at the desk study stage. Habitats were classified using “A Guide to Habitats in Ireland” (Fossitt, 2000). Birds, mammals, amphibians and reptiles were assessed in the course of the main habitat survey using a combination of direct sightings and observations of signs, tracks and droppings.

Bird Surveys

During the walkover survey all bird species heard or seen were recorded. Although some individual birds were visually recorded to verify the species present, the majority of registrations were based on calls alone. Evidence of breeding activity, such as singing or birds carrying food was also recorded. The area surrounding the proposed site was regularly scanned with binoculars to detect species of conservation concern in the vicinity of the site. Bird identification followed Mullarney et al. (1999).

Kerry Slug

The survey methodology for this species follows the National Roads Authority (NRA) guidelines on the Ecological surveying techniques of protected flora and fauna during the planning of national road schemes (NRA, 2008). Surveys were carried out within 20 meters of the Wind Farm development footprint and associated works. These guidelines recommend that fixed route transects should be walked at 20m intervals throughout oak woodland or bog habitat, ideally at night using torchlight, and a visual count made of the number of individuals observed within five metres of the transect. This will involve a careful search of features on which the animals are likely to be feeding, especially tree trunks, moss-covered timber close to water, and lichen covered boulders and outcrops. Transects should be covered over a fixed time period to provide indices of relative abundance and allow comparison between sites in those situations where such data would be useful.

Assuming there are no significant health and safety implications, surveys should be conducted at night, particularly during damp and humid conditions. Periods of excessive cold or drought should be avoided as survey efficiency during these periods is considerably reduced. Whilst surveys can be carried out on cloudy, damp days, the efficiency of these searches will be lower than for nocturnal surveys.

As this was in the first instance a presence/absence survey and due to health and safety concerns of surveying on upland areas with bog conditions, night surveys were not conducted, with surveys instead conducted until one hour past dusk.

The weather conditions were ideal for the day light surveys due to overcast conditions with high humidity and constant periodic rain and mist showers during both survey events. Each survey event was limited to 15 minutes per transect and involved fingertip searches through vegetation, particularly surrounding boulders or rock outcrops. Potential refuges were also inspected.

Hand searching during or after heavy rain or at dusk/dawn is also recommended as the most successful method for finding specimens by the Forestry Service (Forest Service Department of Agriculture, Fisheries and Food, 2009). The NPWS Threat Response Plan for Kerry Slug Geomalacus maculosus does not specifically refer to night surveys but notes that that survey results are likely to be meaningful only if conducted in roughly similar atmospheric conditions e.g. cloudy overcast, some rain. (NPWS, 2010).

Geyer's Whorl Snail

Surveys for this species were conducted within the wind farm site in May 2011, and though outside of the optimum survey timeframe of March to May, this is still an opportune time to survey for the species as they are more active in the summer months than the winter months. Surveys should not be undertaken during windy conditions when snails may seek shelter. Similarly, in wet conditions snails may be more difficult to release from vegetation or crawl lower down the leaves where the seeds and plant litter may coagulate (NRA 2008). The closest known location of this species is approximately 145km north in Co. Clare.

As Geyer's whorl snail tends to be found in the litter layer and amongst roots of sedges, a more appropriate method is to combine hand-searching with a technique in which a sample of the microhabitat (e.g. leaf litter or moss) is removed and taken to a laboratory where it is air-dried and sieved through a series of different mesh sizes. Molluscan shells can then be removed and identified under a microscope. This method has the advantage of including empty shells in the sample.

Fingertips searching for Geyer's whorl snail was also conducted. Vegetation samples were then taken from within, and around, the flushes found on site to be air-dried and sieved to locate any shells.

5.7 SITE EVALUATION

The nature conservation value of habitats and ecological sites occurring along the proposed route are based upon an established geographic hierarchy of importance as outlined by the National Roads Authority (NRA, 2009). The outline of this geographic hierarchy is provided below, and this has been used to determine ecological value in line with the ecological valuation examples provided by the NRA (see NRA, 2009). The geographic evaluation hierarchy is as follows:

- International Sites (Rating A);
- National Importance (Rating B);
- County Importance (Rating C);
- Local Importance (higher value) (Rating D); and
- Local Importance (lower value) (Rating E)

5.8 IMPACT ASSESSMENT METHODOLOGY

5.8.1 Impact Magnitude

Impact magnitude refers to changes in the extent and integrity of an ecological receptor. The IEEM (2006) defines integrity of designated conservation areas as "*the coherence of the ecological structure and function across the area, that enables it to sustain the complex of habitat and/or the levels of populations of the species for which it was classified*". For non-designated sites this can be amended to: "*the coherence of ecological structure and function, that enables it (the site or populations supported by the site) to be maintained in its present condition*". For the purposes of this assessment, the impact magnitude is influenced by the intensity, duration, frequency and reversibility of a potential impact and is categorised as follows:

- High magnitude impact: that which results in harmful effects to the conservation status of a site, habitat or species and is likely to threaten the long-term integrity of the system.
- Moderate magnitude impact: that which results in harmful effects to the conservation status of a site, habitat or species, but does not have an adverse impact on the integrity of the system.

- Low magnitude impact: that which has a noticeable effect but is either sufficiently small or of short duration to cause no harm to the conservation status of the site, habitat or species.
- Imperceptible: that which has no perceptible impact.
- Positive: that which has a net positive impact for the conservation status of a site, habitat or species.

5.8.2 Impact Significance

The significance of impacts is determined by evaluating the nature conservation value of the site, habitat or species concerned together with the magnitude of the impacts affecting the system. The more ecologically valuable a receptor and the greater the magnitude of the impact, the higher the significance of that impact is likely to be. *Table 5.1* outlines the levels of impact significance to be used during the assessment of impacts. The probability of an impact occurring will also be outlined when defining the significance of impacts.

Table 5.1: Impact Significance Criteria

Nature Conservation Value	Magnitude of Potential Impact			
	High	Moderate	Low	Imperceptible
International	Severe	Major	Moderate	Minor
National	Severe	Major	Moderate	Minor
County	Major	Moderate	Minor	Minor
Local (High)	Moderate	Minor	Minor	Negligible
Local (Low)	Minor	Negligible	Negligible	Negligible

5.9 CHARACTERISTICS OF THE DEVELOPMENT

The 14.8 km, 20kV electricity cable will connect the permitted 7-turbine Derreenacrinnig West Wind Farm to the existing Ballylicky 110kV substation in County Cork (see **Figure.1 1**).

5.9.1 The As Built Grid Connection

The as constructed Grid Connection is approximately 9.6 km and will be removed as part of the planning application proposal. Accordingly, “the project” comprises the permitted turbine and on-site infrastructure development (“the permitted development”) and the existing grid connection development and the proposed grid connection.

5.9.2 The Proposed Grid Connection

Following the removal of the as the built grid connection, the proposed grid will consist of a 20kV Electrical Connection of which, 10.75 km will be 20kV overhead line (OHL) mounted on single wooden pole sets and 3.4 km will be ducted underground power cable in 6 separate locations, so as to connect the consented Derreenacrinnig West Wind Farm to the existing Ballylicky Substation, Co Cork. Three electrical conductors will be supported by each structure. Stay wires, required for increased stability, will be attached to poles at locations where the line changes direction and where there are poor ground conditions.

Pole and line installation works will be standard for a 20kV OHL:

- Poles are carried from adjacent roadways to each erection site and placed into an excavated hole using a wheeled or tracked excavator fitted with a pole grab attachment. Poles are rested on the ground while the pole hole is excavated.
- The excavation for each pole is carried out using a wheeled or tracked excavator fitted with 12-inch bucket and to a depth of approximately 2m.
- Poles are lined up with excavated holes and the machine operator then drives forward while rotating the pole grab attachment until the pole is in a vertical position. The pole remains controlled by the pole grab attachment on the excavator until it is supported by the backfill material.
- The pole hole is manually backfilled and tamped down to a minimum depth of 1.0m until the backfill is capable of supporting the pole; the excavator then continues the backfilling and tamping.
- Where rock is encountered, the pole hole is formed using a hydraulic rock-breaker attachment mounted on the excavator.
- Where the line changes direction and at poleset locations with poor ground conditions, stay wires will be required. These wires are supported by means of stay blocks, which are made of wooden sleepers and are buried underground.
- Stringing of the conductor involves pulling out polypropylene rope along the route by hand, attaching the conductors and then pulling into position with a stringing machine. Conductor stringing would require a Manitou or other mobile elevated work platform (MEWP), following the same pole access routes as the excavator.

It is envisaged that access to pole locations in enclosed and improved agricultural areas will use existing farm access points. In the more upland areas along the eastern sector of the route, where open bog and heath habitats will be encountered, construction materials will be transported by means of tracked machinery along demarcated access routes, which will be defined in advance based on site-specific geotechnical and ecological surveys. Low ground pressure machinery will be used in peat areas and bog mat access routes will be installed in areas of particularly poor bearing. These bog mat routes will be removed on completion.

5.10 STUDY AREA DESCRIPTION

5.10.1 Grid Connection Route

Originating at the Derreenacrinnig West Wind Farm, the proposed OHL route travels uphill across an area of wet heath occurring on the south-facing slopes of the ridge at Derreenacrinnig West. Descending from the crest of the ridge, the route cuts through 300m of first and second rotation forestry before passing through an area dominated by rough unenclosed grazing and wet heath. The route then travels west along the Mealagh River valley, predominantly through areas of improved pasture and wet grassland. The route turns northwest at Glanareagh hill and crosses the Mealagh River 1km southeast of Ardrah Bridge, before rising up the north side of the valley to Ardrah townland. From here, the route turns southwest again and descends steadily towards Shandrum, crossing areas of improved and unimproved grassland with occasional areas of heath and mature coniferous forestry. Between Shandrum and Ballylickey substation, the route environs are dominated by improved grassland and grassy verge along the margins of the public road in which the underground section of the route will be laid.

5.10.2 Wind Farm Site

The consented wind farm site is located in the townland of Derreenacrinnig West and is situated in West Cork, approximately 5km north-west of Drimoleague. The total area of the site is 121 ha and is characterised by elevations varying from 200mOD to 400mOD. The site consists predominantly of exposed or thinly covered bedrock and upland blanket peat bog/heath. The majority of the study area is underlain by the Gun Point Formation of the Old Red Sandstone Magnafacies (Minerex 2010). Much of the site is grazed by sheep. Peat depth across the majority of the site is >0.5m deep in particular on the southern slope. Deep peat generally occurs only in pockets with the deepest measuring approx. 3m deep (Minerex 2010).

The northern part of the site drains via a tributary into the Mealagh River, which flows into the sea at Bantry. The southern part of the site is drained by a tributary of the Ilen River which flows into the sea to the west of Skibbereen. The River Ilen is an important salmonid river and contains stocks of salmon and sea trout.

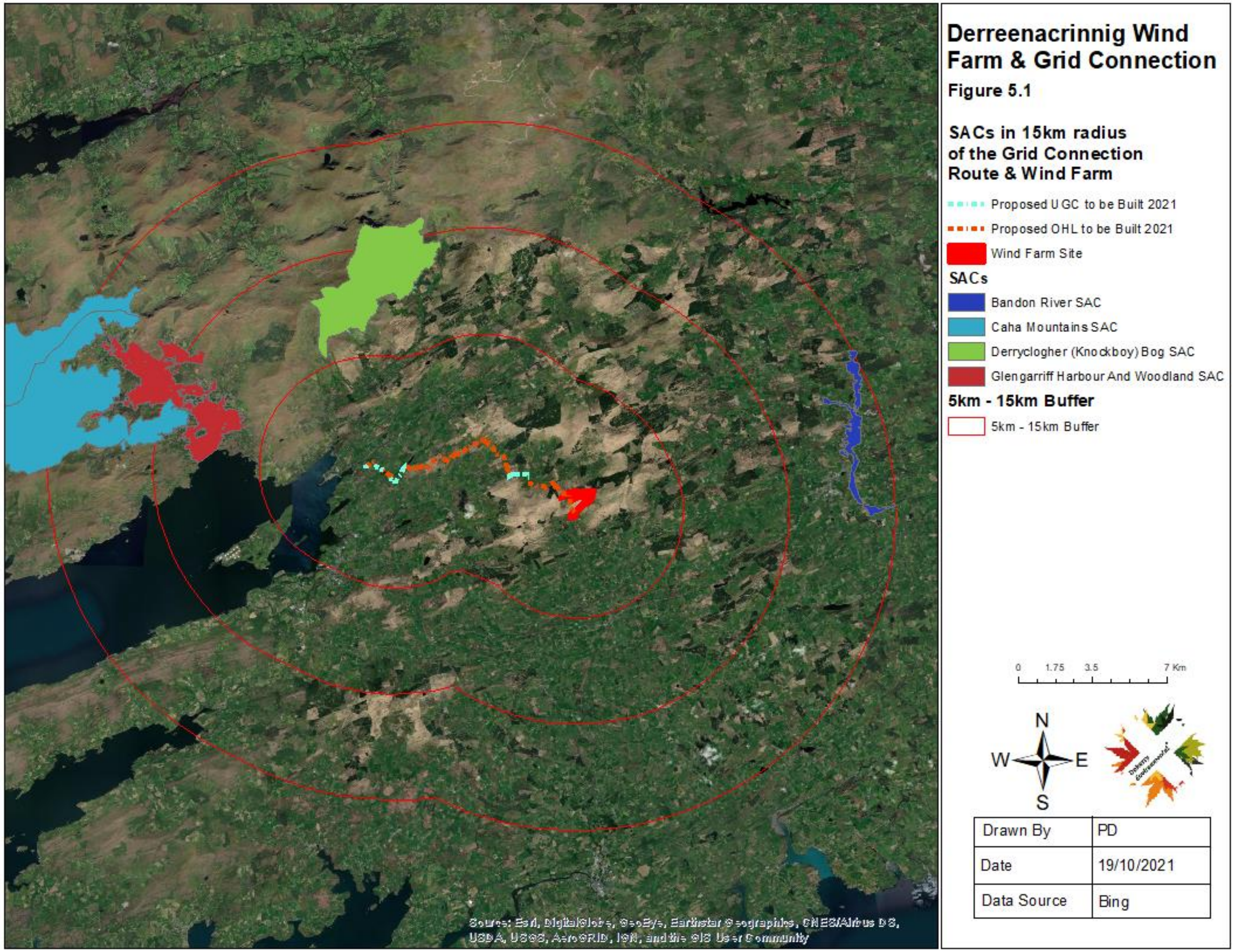
Principle habitats in the area consist of a mosaic of wet heath/blanket bog, wet grassland and conifer plantations. Land use in the surrounding area is a mix of agriculture (mainly sheep and cattle grazing) and conifer plantation forestry. A forest access track runs from the public road through the conifer plantation in the north of the site. A private access track runs along part of the southern boundary of the site.

5.11 DESIGNATED NATURE CONSERVATION AREAS

Lands along the grid connection route and within and surrounding the consented Wind Farm are not subject to any nature conservation designations under national and European legislation. *Table 5.2* lists all designated nature conservation areas occurring within a 15km radius of the grid connection route and the consented Wind Farm along with the approximate distances to each of these designated conservation areas. These designated areas are illustrated on *Figures 5.1* to *5.3*.

Table 5.2: Designated Nature Conservation Areas within 10km of the proposed site

Name and Site Code	Site Code	Designation Type	Distance from Site
Derryclogher Bog	004193	SAC & pNHA	750m to the south.
Glengarriff Harbour	004032	SAC & pNHA	6.1km to the west
Caha Mountains	000665	SAC & pNHA	10.9km to the southwest
Bandon River	002171	SAC	11.7km to the east
Conigar Bog	002324	NHA	10.1km to the west
Leahill Bog	000383	NHA	12.9km to the west
Slaheny River Bog	002417	NHA	12.9km to the north
Lough Namaddra & Lough West	001069	pNHA	9.1km to the northwest
Lough Nagarriva	001369	pNHA	9.8km to the northwest
Cusroe, Whiddy Island	000110	pNHA	6.5km to the southwest
Rossnashunsoge	001537	pNHA	8.1km to the west
Domestic Building near Glengarriff	002049	pNHA	6.4km to the west, northwest
Loughavaul	000098	pNHA	9.8km to the west
Gusroe Whiddy Island	000110	pNHA	6.5km to the southwest
Carriganass Castle	002099	pNHA	3.2km to the north
Bandon River Valley, South of Dunmanway	001035	pNHA	11.6km to the east
Lough Allua	001065	pNHA	14.9km to the north
Sheelane Island	001977	pNHA	11.4km to the west
Gougainebarra Lake	001057	pNHA	11.4km to the north
Currakeal	001826	pNHA	8.1km to the northwest
Ballagh Bog	001886	pNHA	11.1km to the north



Derreenacrinnig Wind Farm & Grid Connection
Figure 5.1
SACs in 15km radius of the Grid Connection Route & Wind Farm
Proposed UGC to be Built 2021
Proposed OHL to be Built 2021
Wind Farm Site
SACs
Bandon River SAC
Caha Mountains SAC
Derryclogher (Knockboy) Bog SAC
Glengarriff Harbour And Woodland SAC
5km - 15km Buffer
5km - 15km Buffer
0 1.75 3.5 7 Km
N
W
E
S
Drawn By
PD
Date
19/10/2021
Data Source
Bing
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Figure 5.1

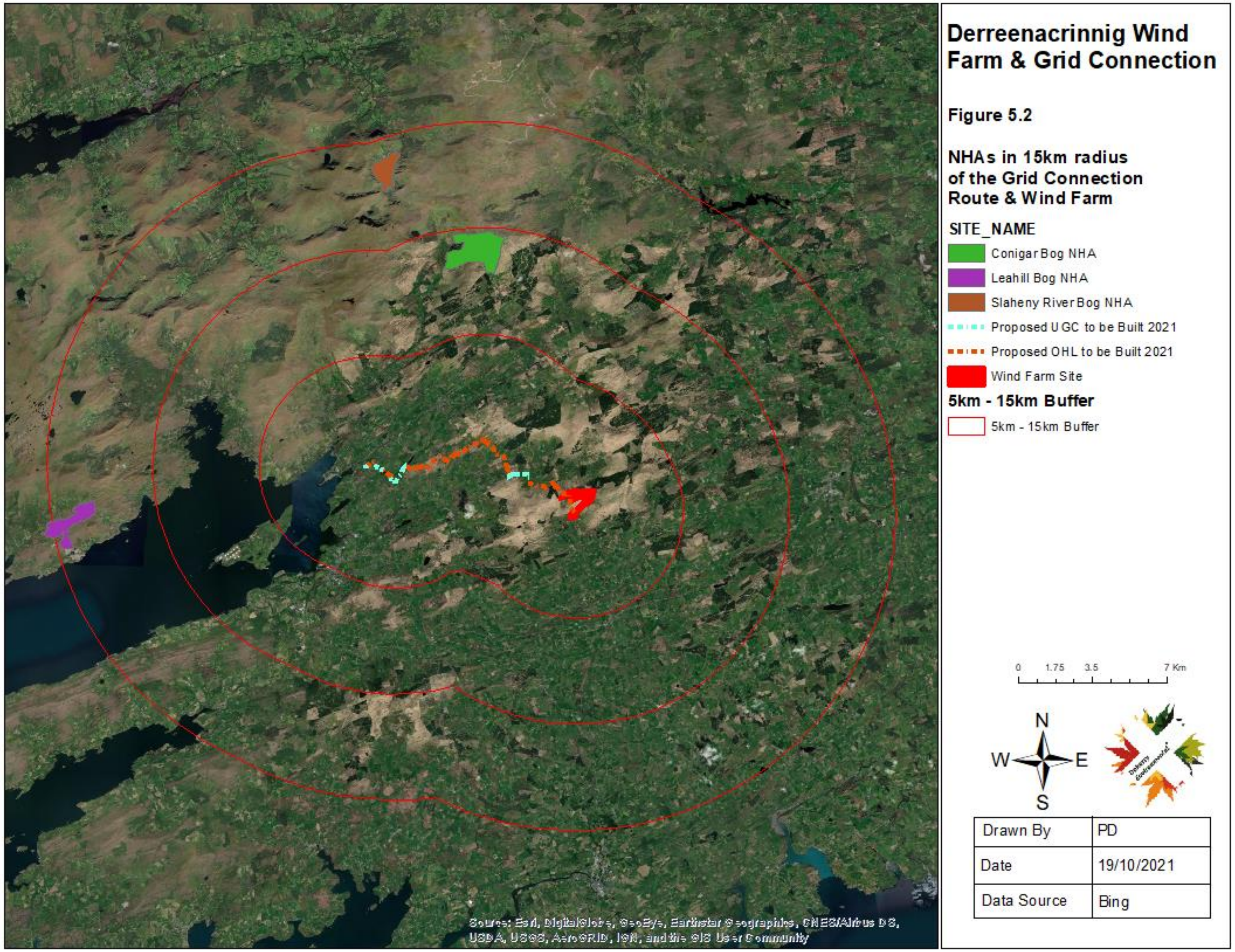

Derreenacrinnig Wind Farm & Grid Connection
Figure 5.2
NHAs in 15km radius of the Grid Connection Route & Wind Farm
SITE_NAME
Conigar Bog NHA
Leahill Bog NHA
Slaheny River Bog NHA
Proposed UGC to be Built 2021
Proposed OHL to be Built 2021
Wind Farm Site
5km - 15km Buffer
5km - 15km Buffer
0 1.75 3.5 7 Km
N
W
E
S
Drawn By PD
Date 19/10/2021
Data Source Bing
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Figure 5.2

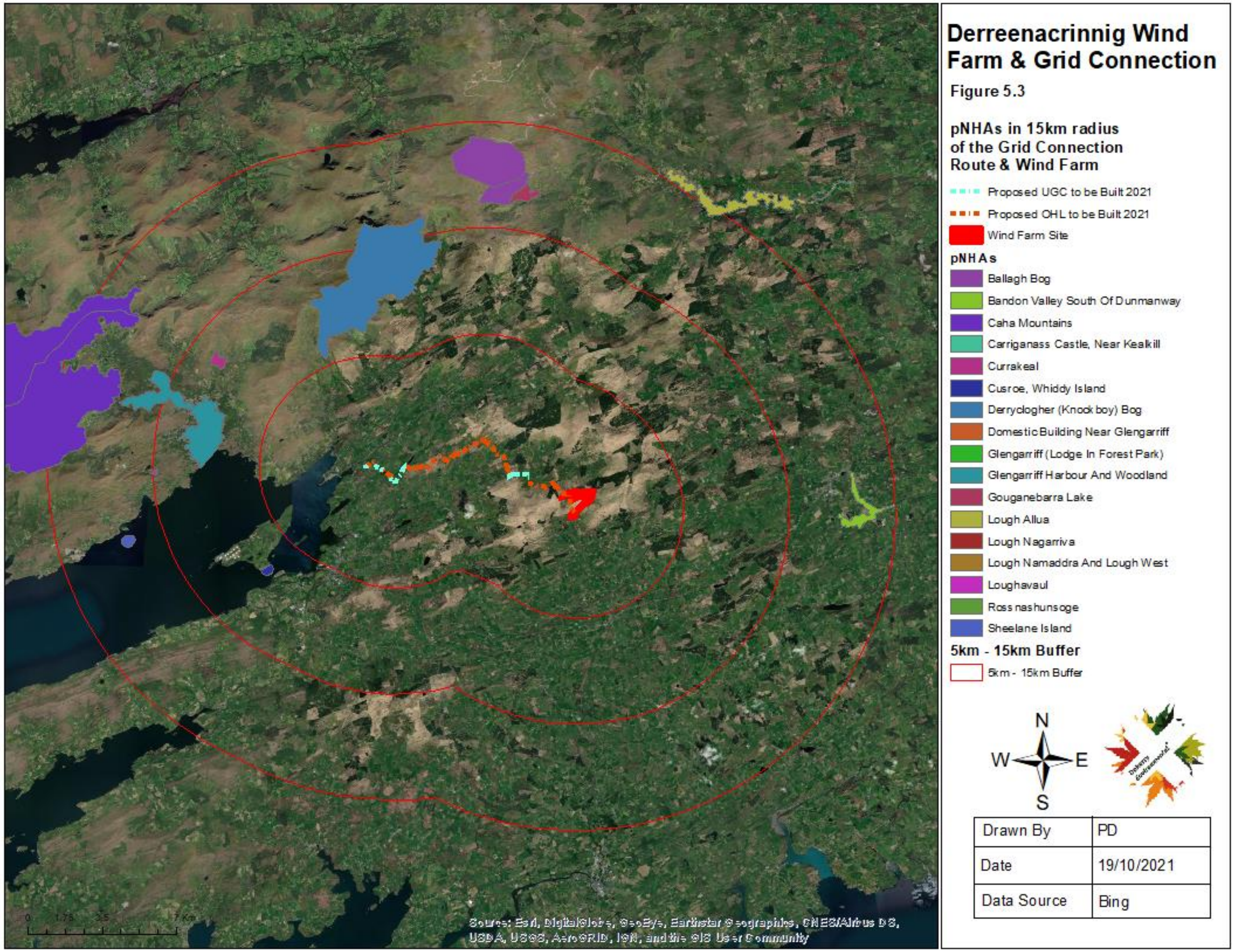

Derreenacrinnig Wind Farm & Grid Connection
Figure 5.3
pNHAs in 15km radius of the Grid Connection Route & Wind Farm
Proposed UGC to be Built 2021
Proposed OHL to be Built 2021
Wind Farm Site
pNHAs
Ballagh Bog
Bandon Valley South Of Dunmanway
Caha Mountains
Carriganass Castle, Near Kealkill
Currakeal
Cusroe, Whiddy Island
Derryclogher (Knockboy) Bog
Domestic Building Near Glengarriff
Glengarriff (Lodge In Forest Park)
Glengarriff Harbour And Woodland
Gouganebarra Lake
Lough Allua
Lough Nagarriva
Lough Namaddra And Lough West
Loughavaul
Rossnashunsoge
Sheelane Island
5km - 15km Buffer
5km - 15km Buffer
N
W
E
S
Drawn By
PD
Date
19/10/2021
Data Source
Bing
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Figure 5.3

5.11.1 Habitats Directive Assessment

Pursuant to Article 6(3) & (4) of the EU Habitats Directive and associated national legislation transposing this directive, an Appropriate Assessment is required where a plan or project has the potential to result in significant effects to the integrity of a Natura 2000 site.

Assessments under Article 6(3) of the Directive involves a number of stages that assess the likelihood of a plan or project to result in significant effects to European Sites. The initial Screening stage examines the likelihood of a project, either alone or in combination with other projects or plans, to result in significant effects to the integrity of European Sites. If the Screening concludes that significant effects are likely, an Appropriate Assessment is required. In effect, the Screening assesses the need for an Appropriate Assessment.

The Appropriate Assessment examines in detail how potential negative impacts associated with a project will affect the integrity of a European Site. Where such effects are considered likely to occur, mitigation measures are proposed so that such impacts are avoided.

A Screening Assessment of the proposed development, incorporating the electricity cable grid connection and the consented Wind Farm was carried out for the European Sites occurring within its zone of influence. It was concluded that the proposed development will not have the potential to result in likely significant effects to European Sites occurring within the wider zone of influence of the development. A copy of that Screening Report is provided under separate cover. As such, an Appropriate Assessment was not required for the proposed development.

5.12 RARE & PROTECTED FAUNA

The spans the eight tetrads (i.e. 2km x 2km grid squares) W15A, W15B, W05W, W05R, W05S, W05L, W05G, W05B. A review of protected and rare species records for each of these tetrads held by Biodiversity Ireland (www.biodiversityireland.ie accessed on the 15th October 2021) was undertaken.

The protected, rare and/or sensitive species recorded within the eight tetrads surrounding the proposed grid connection route and wind farm are outlined in *Table 5.3.* As virtually all birds are protected in Ireland, only records for wetland or raptor species are detailed in ***Table 5.3***. A comment on the likelihood of each of these species occurring along the grid connection route and at or in the vicinity of the wind farm is provided in *Table 5.3*. This commentary is based upon the habitat occurring within the vicinity of the development and its suitability for supporting the species listed in *Table 5.3*.

Table 5.3: Protected and/or Rare Species occurring in the Eight Tetrads surrounding the Development

Common Name	**Status**	**Likelihood of being supported by the project site**
Sparrowhawk	Protected Species	Likely to be foraging throughout the study area.
Kestrel	Protected Species	Likely to be foraging throughout the study area.
Barn Owl	Protected Species	Likely to be foraging throughout the study area.
White-tailed Sea Eagle	Protected Species; EU Birds Directive Annex I	Recorded only from the tetrad W05B, at the western end of the route. Restricted to coastal areas. No suitable waterbodies occurring inland along the route.
Kingfisher	Protected Species; EU Birds Directive Annex I	Likely to be restricted to the west of the study area along the mature sections of the Owvane and Mealagh Rivers.

Common Name	Status	Likelihood of being supported by the project site
Wigeon	Protected Species	Recorded only from the tetrad W05B, at the western end of the route. Restricted to coastal areas. No suitable waterbodies occurring inland along the route.
Little Egret	Protected Species; EU Birds Directive Annex I	Recorded only from the tetrad W05B, at the western end of the route. Restricted to coastal areas. No suitable waterbodies occurring inland along the route.
Mallard	Protected Species	Recorded only from the tetrad W05B, at the western end of the route. Restricted to coastal areas. No suitable waterbodies occurring inland along the route.
Red-breasted Merganser	Protected Species	Recorded only from the tetrad W05B, at the western end of the route. Restricted to coastal areas. No suitable waterbodies occurring inland along the route.
Oystercatcher	Protected Species	Recorded only from the tetrad W05B, at the western end of the route. Restricted to coastal areas. No suitable waterbodies occurring inland along the route.
Curlew	Protected Species; EU Birds Directive Annex I	Recorded only from the tetrad W05B, at the western end of the route. Restricted to coastal areas. No suitable waterbodies occurring inland along the route.
Redshank	Protected Species	Recorded only from the tetrad W05B, at the western end of the route. Restricted to coastal areas. No suitable waterbodies occurring inland along the route.
Greenshank	Protected Species	Recorded only from the tetrad W05B, at the western end of the route. Restricted to coastal areas. No suitable waterbodies occurring inland along the route.

Common Name	Status	Likelihood of being supported by the project site
Great Northern Diver	Protected Species	Recorded only from the tetrad W05B, at the western end of the route. Restricted to coastal areas. No suitable waterbodies occurring inland along the route.
Cormorant	Protected Species	Recorded only from the tetrad W05B, at the western end of the route. Restricted to coastal areas. No suitable waterbodies occurring inland along the route.
Herring Gull	Protected Species	Recorded only from the tetrad W05B, at the western end of the route. Restricted to coastal areas. No suitable waterbodies occurring inland along the route.
Black-headed Gull	Protected Species	Recorded only from the tetrad W05B, at the western end of the route. Restricted to coastal areas. No suitable waterbodies occurring inland along the route.
Icelandic Gull	Protected Species	Recorded only from the tetrad W05B, at the western end of the route. Restricted to coastal areas. No suitable waterbodies occurring inland along the route.
Great-black backed Gull	Protected Species	Recorded only from the tetrad W05B, at the western end of the route. Restricted to coastal areas. No suitable waterbodies occurring inland along the route.
Red-billed Chough	Protected Species; EU Birds Directive Annex I	Recorded only from the tetrad W05B, at the western end of the route. Restricted to coastal areas. No suitable waterbodies occurring inland along the route.
Otter	Protected Species; EU Habitats Directive Annex II	Recorded only from the tetrad W05B but likely to be foraging along the Mealagh River.

Common Name	Status	Likelihood of being supported by the project site
Badger	Protected Species; EU Habitats Directive Annex IV	Likely to occur throughout all sections of the route at elevations below 150m.
Red Squirrel	Protected Species; EU Habitats Directive Annex IV	There is limited habitat along the route corridor to support red squirrel.
Irish Stoat	Protected Species; EU Habitats Directive Annex IV	Likely to occur throughout the route corridor at lower elevations, below 150m.
Irish Hare	Protected Species; EU Habitats Directive Annex IV	Likely to occur throughout the route corridor, but more likely to be associated with the eastern elevated sections of the route.
Lesser horseshoe Bat	Protected Species; EU Habitats Directive Annex II	This species was recorded from two tetrads, W05G and W05B through which the route corridor runs. Both tetrads are located towards the western end of the route corridor. This species is less likely to occur to the east of the route corridor due to the limited extent of favoured lesser horseshoe habitat occurring in this area.
Daubenton's Bat	Protected Species; EU Habitats Directive Annex IV	Recorded from the tetrad W05B at the western end of the route corridor. Likely to be associated with mature depositing rivers and coastal lakes.
Leisler's bat	Protected Species; EU Habitats Directive Annex IV	Recorded from the tetrad W05B at the western end of the route corridor. Habitat becomes less favourable to the east.
Soprano pipistrelle	Protected Species; EU Habitats	Recorded from the tetrad W05B at the western end of the route corridor. Habitat becomes less favourable to the east.

Common Name	Status	Likelihood of being supported by the project site
	Directive Annex IV	

5.13 HABITATS

5.13.1 Habitats Along the Grid Connection Route

The following sections provide a description of the habitats occurring within and immediately adjacent to the proposed grid connection route. The habitats occurring along the grid connection route corridor are illustrated in Habitat Map Sheets 1 to 12. (Figures 5.4-5.16)

Eroding Upland Watercourses (FW1)

The grid route passes through three separate surface water catchments, the Ilen River Catchment to the east of the alignment; the Mealagh River Catchment along the majority of the alignment and the Owvane River Catchment to the west of the alignment. Eroding upland (FW1) watercourses intersect the route corridor at various locations along the route. The route crosses the Mealagh River at one location in the townland of Ards Beg towards the east of the route corridor. Aside from this, only minor watercourses are crossed by the route corridor.

Drainage Ditches (FW4)

Numerous drainage ditches occur within the route corridor study area. The ditches occurring within the site are either bare, having been cut to bedrock level below the overlying peat deposit or have become colonised by a range of grasses and rushes such as *Deschampsia flexuosa, Agrostis capillaris, Agrostis caninia* and *Juncus effusus*.

Wet Willow Woodland (WN6)

Four examples of wet willow woodland occur within the route corridor. The first is located on the bankside of a meandering section of the Mealagh River in the townland of Ards Beg. The extent of this example of wet woodland is limited, being approximately 0.8 acres in size. Historical 6-inch and 25-inch maps of this area indicate the presence of wet pasture at this location. The meander of the Mealagh River has become more pronounced since the publication of these historical maps and it is likely that this wet woodland developed on the “tongue” of land between the meander.

The two other examples of wet woodland habitat occur in the townland of Drumloughlin towards the west of the route corridor. These two patches are separated by a small block of conifer plantation. They occur on sloping ground in a low depression. The 6-inch and 25-inch historical maps labelled the footprint of both patches of wet woodland as rough pasture, suggesting that this woodland is of recent origin. The combined extent of both patches occurring within the route corridor amounts to approximately 1 hectare.

The final example of this habitat occurs in the vicinity of the Ballylicky sub-station at the western end of the grid connection route.

Coniferous Plantation (WD4)

Commercially planted Sitka spruce (*Picea stitchensis*) occurs immediately to the north and west of the grid connection route. The block of forestry to the north of the wind farm site was planted prior to 1995, while the other two blocks to the west of the grid connection route are of older origin. The patches of forestry to the north of the wind farm site is representative of a first rotation, closed-canopy thicket (age-class 2 as per Coillte's age classification system for plantation forestry). Floral diversity within the conifer plantation is low with high levels of shading and acidic conditions arising from the slow decomposition of fallen needles limiting the potential for the ground layer to support a range of herb species.

Scrub (WS1)

The examples of scrub occurring along the route corridor are dominated by spreading patches of Ulex europeaus with Rubus fruticosus agg. Minor patches of immature willow (*Salix* sp.) scrub also occur. The examples of scrub habitat occur alongside watercourses, in marginal areas dominated by heavy, poorly drained soils or in association with unimproved wet heath habitat.

Recently Felled Woodland (WS5)

Recently felled conifer plantation occurs along the proposed route to the north of the wind farm site in the townland of Derreenacrinnig West. This habitat currently supports little vegetation with mosses such as *Rhytidiadelphus loreus, Hylocomium splendens, Pleurozium scheberi, Hypnum jutlandicum* and *Thuidium tamariscinum* dominating the cover.

Hedgerows & Treelines (WL1/2)

A network of hedgerows occurs throughout the lands along the grid connection route. The principal species occurring along hedgerows and treelines are *Fraxinus excelsior, Crategus monogyna, Prunus spinosa, Acer pseudoplatanus, Rosa canina, Sambuca nigra, Rubus fruticosus agg. and Ulex europeaus*.

Herbs occurring along hedgerows and treelines include *Urtica dioica, Galiium aparine, Heracleum sphondylium, Vicia cracca, Vicia sepium, Hypericum perforatum, Viola riviana, Geranium robertianum, Phyllitis scolopendrium, Polystichum setiferum, Ranunculus repens* and *Pteridium aquilinium.*

Improved agricultural grassland (GA1)

Improved agricultural grassland dominates the land cover at lower elevations throughout the route corridor. This habitat is intensively managed for cattle grazing and silage. Species indicative of high nutrient conditions in the habitat were noted throughout the land holding. These species include an abundance of *Lolium perenne, Holcus lanatus, Alopecurus pratensis, Ranunculus repens, R. acris, Trifolium repens, Trifolium pratense, Cirsium arvense, Cirsium vulgare* and *Urtica dioica*.

Overall, the improved agricultural grassland is species-poor and widespread on a local to national scale. This habitat plays a limited function in supporting wildlife although it does provide foraging and dispersal habitat for badgers and can support a limited range of invertebrates.

Amenity Grassland (GA2)

Examples of amenity grassland occurring within the route corridor are associated with domestic garden lawns. This is a species poor habitat likely to support a range of similar grass species such as *Festuca rubra, Agrostis stolonifera, Alopecurus pratensis* and *Holcus lanatus* and a limited range of herb species such as *Ranunculus repens, Ranunculus acris, Bellis perennis, Cerastium fontanum, Trifolium pratense, Trifolium repens* and *Taraxacum officinale agg.*

Humid Acid Grassland (GS3)

This unimproved grassland habitat occurs at higher elevations, generally above the 150m contour throughout the route corridor. It occurs in association with wet heath, which it frequently grades into. The dominant species of this habitat include *Agrostis stolonifera, Agrostis capillaris, Anthoxanthum odoratum, Nardus stricta, Deschampsia flexuosa* and *Festuca ovina*. Other species frequently occurring include *Juncus squarrosus, Carex panicea, Carex binervis, Carex echinata, Pedicularis sylvatica, Succisa pratensis, Potentilla erecta* and *Galium saxatile*. The bryophyte layer is dominated by Hylocomium splendens, Rhytidiadelphus squarrosus, Rhytidiadelphus loreus and Polytrichum commune. Sphagnum recurvum and Sphagnum tenellum are frequent in wetter depressions where this habitat grades into wet heath.

Wet Grassland (GS4)

Examples of wet grassland occur on poorly drained soils throughout the route corridor. Species poor examples of this habitat dominated by Juncus effusus are frequent on heavy waterlogged soils in more improved areas to the west of the corridor. Towards the east, and along the Mealagh River valley the wet grassland is dominated by a mix of Juncus acutiflorus and Juncus effusus. This wet grassland often grades into *Molinia caerulea* dominated wet heath. Other species occurring in association with the *Juncus acutiflorus* wet grassland include *Succisa pratensis, Deschampsia flexuosa, Deschampsia cespitosa, Hydrocotyle vulgaris, Galium palustre, Ranunculus flammula* and *Cardamine pratensis.*

Wet Heath (HH1)

Wet heath is the dominant peatland habitat occurring along the route corridor. Peats are thin throughout the route corridor at less than 0.5m in depth and exposed rock, indicating the shallow nature of the peat, is associated with all examples of wet heath habitat. The wet heath habitat occurring along the route corridor is generally restricted to elevated areas, above 150m. The exception to this is along the Mealagh River valley in the townland of Ards Beg. Throughout the route corridor this habitat is dominated by *Molinia caerulea* and occurs on thin peats at less than 0.5m in depth. To the east of the site in the vicinity of the wind farm the wet heath habitat is dominated by stands of species poor *Molinia caerulea*. Other species occurring in association with these species poor examples of wet heath include *Schoenus nigrans, Erica tetralix, Erica cinerea, Potentilla erecta and Calluna vulgaris*. The sward height consists of tall, tussocky *Molinia caerulea* to a height of greater than 25cm.

Other more species-rich examples of wet heath habitat occur along the route. Examples of this are in the townland of Ards Beg along the Mealagh River valley and the townlands of Laharanshermeen and Cappanaboul. Here the wet heath is again dominated by *Molinia caerulea,* but the sward heights are lower generally at 25cm or less. Signs of grazing were evident in these areas and it is likely that the low-level grazing occurring is restricting the dominance of *Molinia caerulea* and promoting diversity. *Succisa pratensis* is abundant in these areas along with *Trichophorum germanicum, Schoenus nigrans. Pedicularis palustre, Osmunda regalis, Potentilla erecta, Eriophorum angustifolium, Carex panicea, Carex echniata, Juncus squarrosus, Rhytidiadelphus loreus, Sphagnum capillifolium, Sphagnum papillosum, Sphagnum tenellum,* and *Breutilia chrysocoma* are all frequent in these areas of wet heath. *Erica tetralix* and *Calluna vulgaris* are occasional to rare.

Dry Heath (HH3)

Examples of dry heath are restricted to more elevated and/or exposed areas associated with exposed rock and very thin peat substrate. Two examples were noted during field surveys. These occur at the wind farm site in the townland of Derreenacrinnig to the east of the route corridor and also at an exposed location with rocky outcrops and thin peat in the townland of Derryarkane to the west of the route corridor. The dry heath is dominated by *Calluna vulgaris* and *Racomitrium lanuginosum*. Other species occurring frequently to abundantly include *Rhytidiadelphus loreus, Hypnum jutlandicum, Nardus stricta, Deschampsia flexuosa, Anthoxanthum odoratum* and *Juncus squarrosus*.

Dense Bracken (HD1)

Areas of dense bracken occur in association with previously felled conifer plantation. This habitat is comprised of mono-specific stands of *Pteridium aquilinium*.

Buildings & Artificial Surface (BL3)

Residential dwelling, farm buildings and paved surfaces make up the buildings and artificial habitats within the route corridor.

Habitats within the Wind Farm Site

The site consists predominantly of exposed or thinly covered bedrock and a mosaic of wet heath/upland blanket bog. Areas of dry heath are found on elevated areas with exposed rock. A large conifer plantation occurs in the northern part of the site. An elevated ridge runs across the centre of the site in a north-east to south-west direction. Below this ridge the site slopes off steeply to the south with more shallow peat soil. Vegetation along this slope indicates that there is a calcareous influence mostly likely due to the presence of glacial deposits. Peat depth across the majority of the site is >0.5m deep in particular on the southern slope. Blanket bog only occurs where the peat is >0.5m. This mostly confined to the northern half of the site where deep peat is found in pockets.

Wet heath HH3/upland blanket bog (PB2) mosaic

The majority of the site is characterised by wet heath habitat. Purple moor-grass (*Molinia caerulea*) is the dominant species with abundant Cotton grass (*Eriophorum vaginatum.*) also present. Stands of low-growing Western gorse (*Ulex gallii*), cross-leaved heather (*Erica tetralix*) and Ling (*Calluna vulgaris*) are also abundant in places. Moss cover is high in places and includes *Polytricum commune*, *Aulacomnium palustre* and *Sphagnum* species. Sedges including *Carex nigra* and *C. flacca* are also present. Other species include marsh lousewort (*Pedicularis palustris*), milkwort (*Polygala vulagris*). Stands of rushes (*Juncus effuses*) are also abundant throughout this habitat. On the southern slope black bog rush (*schoenus nigrans)* is abundant in places, indicating a calcareous influence. At the bottom of the slopes some localised areas of flush occur in wetter areas.

In parts of the site where peat depth is greater than 0.5m, wet heath grades into small pockets of habitat more characteristic of upland blanket bog (PB2). Vegetation is dominated by hares tail cotton grass, deergrass (*Scirpus cespitosus*) and ling. Cover of sphagnum mosses including *Sphagnum papillosum* and *S. capillifolium* is high in patches, particularly in a wet area.

Dry siliceous heath (HH1)

Wet heath grades to dry siliceous heath habitat on elevated parts of the site where exposed rock is present and peat soil is more free draining. The vegetation is dominated by ling (*Calluna vulgaris)* and bell heather (*Erica cinerea*) and grasses such as mat grass (*Nardus stricta*), sweet vernal (*Anthoxanthum odoratum*), couch grass (*Elymus sp*.) and meadow foxtail (*Alopecuris pratenis*),

Conifer plantation (WD4)

A large conifer plantation occurs in the northern part of the site. It is a commercial forest consisting mostly of mature Sitka spruce (*Picea sitchensis*).

Upland rivers (FW1)

Two upland streams (FW1) drain the site to the north and south. Both streams are characteristic of an upland eroding river channel with a substrate of bedrock and very little aquatic vegetation. These are described further under the **Section 5.3.6** Aquatic Environment and Fisheries.

5.14 FAUNA

5.14.1 Fauna along the Grid Connection Route

Non-volant Mammals

Otters (*Lutra lutra*) and their holts are protected under the EU Habitats Directive as well as under the Wildlife Act (as amended) 1976. Otters' Holts are generally established along riverbanks and these mammals are rarely found far away from aquatic habitats.

There are records of otters occurring along the Mealagh River to the east of the route corridor near Ballylicky and also in the vicinity of Ards Beg. This species forages widely throughout the Mealagh and Owvane river catchments.

Badgers, Irish Hare, Red Squirrel, Irish Stoat, Hedgehog and Pygmy Shrew have all been recorded in the vicinity of the route corridor. The six sections of proposed underground ducted line were surveyed in the field for signs indicating the presence of badgers. Particular attention was given to identifying the presence or otherwise of badgers along hedgerows and other field boundaries bisected by or running parallel to the proposed sections of ducted line. No badger setts were identified along the six sections of ducted line during the field survey on the 14th May 2017 and the 19th October 2018. No other field signs indicating the presence of badgers were recorded during the field survey.

Bats

The lesser horseshoe bat, an Annex II species has been recorded in the vicinity of the route corridor. Records for four other bat species (all Annex IV species) have also been identified. All bat records are associated with the lands at the eastern end of the route corridor.
Annex 1 /Sensitive Bird Species

Birds

Surveys for the presence of hen harrier were completed in 2015 for the national Hen Harrier census survey, within the 10km square hectad W15 in which the wind farm site and the eastern section of the route corridor occurs. No record of this species was recorded within this hectad during the 2015 surveys. The hectad W05 in which the eastern section of the route corridor occurs was not considered to support suitable habitat for hen harrier during the 2015 census survey. There are no records for the presence of hen harrier at this location. A possible breeding record for merlin was recorded within the hectad W05 during the 2007 to 2011 Bird Atlas. There are no breeding or winter records listed in the 2007 – 2011 Bird Atlas for Peregrine falcon in the two hectads W05 and W15.

Raptor species recorded in the vicinity of the route corridor include white-tailed sea eagle, sparrowhawk and kestrel. The white-tailed sea eagle is not likely to occur along the route corridor as no suitable habitat occurs for this species in the vicinity of the proposed overhead line. Both sparrowhawk and kestrel are likely to forage widely throughout the route corridor.
There are records of Kingfisher along the sections of the Mealagh and Owvane Rivers crossed by the proposed route.

The route corridor, and lands to the north and south of it, do not support suitable habitat for supporting other sensitive species such as large wild fowl. There are no records of whooper swan, Bewicks swan or other geese species in the two hectads W05 and W15.

There are no recent records of curlew or golden plover breeding in the two hectads W05 and W15. Winter records of curlew are restricted to the coastal areas in the vicnity of Ballylicky. There are no winter records for golden plover within the two hecards W05 and W15.

There are no records noted in the 2007 – 2011 Bird Atlas of whooper swan, Greenland white-fronted geese, brent geese, greylag geese or other large wild fowl for the two hectads W05 and W15 through which the route passes.

Fish

The Mealagh and Owvane Rivers are both important salmon rivers providing suitable habitat for all age classes of Atlantic salmon. Tributaries of these rivers are also important for spawning and for juvenile fish. Good salmonid spawning habitat consists of a mix of cobbles, gravels and finer material, free of silt and detritus in fast flowing riffles to ensure that there is an adequate flow of water and oxygen through the substrate.

White-clawed Crayfish

There are no historical records for this species along the Ilen, Owvane or Mealagh Rivers.

Freshwater Pearl Mussel

The Ilen, and Mealagh River catchments, in which the route corridor occurs, are known to support populations of freshwater pearl mussels.

Kerry Slug

The rare and protected (Annex II and Annex IV EU Habitats Directive) Kerry slug (Geomalacus maculosus) has a distribution confined to the Old Red Sandstone geological zone of southwest Ireland. There is one historical record of this species from within the (W15) 10km square (DEHLG, 2010 and National Biodiversity Data Centre), however details on this location were not provided. Within its range in the southwest of Ireland it is found in three broad habitat types, oak dominated woodland, open situations of unimproved oligotrophic open moor or blanket bog and lake shores. The species is further restricted within these three broad habitat types and is absent unless sufficient sandstone outcrops and boulders, largely bare of vegetation except for lichens and mosses, are emergent within the area. For the majority of the grid connection route areas of suitable micro-habitat do not occur. Areas of boulder outcrops were restricted to two townland locations adjacent to the grid connection route at Cappanaboul and Laharanshermeen. However, no pole locations are situated within these micro-habitats.

Marsh Fritillary

There are records of marsh fritillary within the hectad W15. Suitable habitat for this species occurs along the route corridor (within the hectad W05). Areas of wet heath and humid acid grassland occurring along the route corridor within the hectad W05 support an abundance of Succisa pratensis in suitable short sward Molinia caerulea dominated wet heath.

Amphibians & Reptiles

The common frog (Rana temporaria) and smooth newt (Tristurus vulgaris) are both afforded protection under Annex V of the EU Habitats Directive and Wildlife Acts (as amended). No amphibians were noted during field survey. Drainage ditches and choked watercourses within the lands along the grid connection route provide suitable breeding habitat for frogs and newt.

5.14.2 Fauna within the Wind Farm Site

Non-Volant Mammals

No signs of badger (Meles meles) were recorded within the study site. Due to the exposed and wet habitats over much of the site, it is unsuitable for badger setts, however, badgers may occasionally use the area to forage. Badgers could be present within the coniferous plantation in the north of the site but due to the density of the woodland it was impossible to search for potential setts. Otter (Lutra lutra) is known to occur along both the Ilen and Mealagh Rivers and their tributaries. No Otter signs were recorded within the site, but it is possible that they use the watercourses on site. Signs of fox (Vulpes) and rabbit (Oryctolagus cuniculus) were recorded in the general area. Other small mammals likely to occur include wood mouse (Apodemus sylvaticus) and pygmy shrew (Sorex minutus).

The exposed nature of the site, combined with the paucity of mature deciduous trees and suitable buildings, makes the site unsuitable for roosting bats. It is possible that bats may use the conifer plantation to the north of the site for foraging, but it is unlikely that they are commuting or foraging across the site due to the high elevation (400m).

Birds

Two species of bird typical of upland habitats were recorded in low densities during the walkover survey, skylark (Alauda arvensis) and meadow pipit (Anthus pratensis). Skylark is a species listed on the Amber list and of medium conservation concern in Ireland (Lynas et. al., 2007). Meadow pipits and skylark are ground nesting birds and are ubiquitous in peatland and upland habitats. Both of these species occupy a wide range of open habitats ranging from saltmarsh to peatland.

It is possible that snipe also occur, but none were recorded during survey. Snipe nest in dense vegetation separated by more open ground with low tussocks or clumps of sedges, rushes or coarse grasses. Snipe nest sites are always close to wet areas such as flushes and pool systems that are essential feeding areas for their insectivorous chicks.

Annex I bird species

There are records of Kingfisher along the Ilen and Mealagh Rivers. However, there are no records of bird species listed on Annex I of the EU Birds Directive for the area of the proposed wind farm and none were recorded during the field visits.

Hen harrier (Circus cyaneus) traditionally use open moorland for breeding in Britain and Ireland (Gibbon et al., 1993). However, there are no records for this species in this general area of West Cork (Barton et al. 2006, Nagle 2006).

There is no habitat within the study site suitable for use by nesting peregrines (Falco peregrinus) but they may occasionally use the site for foraging. The site is not within the known range of Merlin (Falco columbarius).

Consultations with local members of the Irish Raptor Study Group confirmed that there have been no recent records of Annex I bird species, raptors or owls in the area of the proposed wind farm.

Amphibians

Common frog and common lizard are likely to occur within the site due to the type of habitats present. In particular common lizard is found in areas with exposed rock, as they bask in the sunshine. No evidence of either of these two species was recorded during the present survey.
Molluscs

Kerry slug (Geomalacus maculosus)

Suitable habitat for supporting the Kerry Slug was identified within the Wind Farm site during surveys in 2010. Targeted surveys for Kerry Slug were completed in May 2011. During this survey suitable habitat was searched for the presence of Kerry Slug under suitable conditions. No record of this species was recorded within the Wind Farm site.

Geyer's whorl snail (Vertigo geyeri)

Flush vegetation recorded in the southern parts of the site during habitat surveys in 2010 were identified as having the potential to support this species. A dedicated survey for the presence or otherwise of this species was completed in May 2011. The flush habitat was surveyed in detail for the presence of Geyer's whorl snail, but no record of this species was found to occur within the flush habitat in the Wind Farm site.

5.15 SITE EVALUATION OF THE GRID CONNECTION ROUTE

The proposed route corridor consists of a mosaic of peatland and grassland habitats with freshwater connections to the Mealagh, Ilen and Owvane Rivers, all of which are important salmonid rivers.

The peatland habitats are dominated by wet and dry heath. The more species rich examples of wet heath habitat such as that occurring along the Mealagh River valley at Ards Beg, at Laharansharmeen and at Cappanaboul have links to the Annex 1 habitat 'Molinia meadows on calcareous, peaty or clayey-silt-laden soils (6410)'. The examples of wet heath occurring within the route corridor are dominated throughout by *Molinia caerulea* with dwarf shrub heathers occurring only occasionally to frequently. As such they are not considered to be representative of the Annex habitat "Northern Atlantic wet heaths with *Erica tetralix* (4010)". The limited examples of dry heath, particularly those occurring on the ridgeline at Derreenacrinnig West has links to the Annex 1 habitat "European Dry heaths (4030).

The route corridor is not located within an important bird area and no Special Protection Areas occur within a 10km radius of the grid route. There are limited records of Annex 1 listed species occurring within the vicinity of the route: kingfisher is the only Annex 1 species likely to occur along the route corridor. No sensitive bird species are known to occur in the vicinity of the route corridor. All mammal species recorded within the study area are common and widespread.

The site is within the very limited geographical range of the Kerry slug, an Annex II and Annex IV species under the EU Habitats Directive.

Freshwater pearl mussel is known to occur within the Mealagh, Owvane and Ilen River. A tributary of the Ilen River runs along the southern boundary of the site. It is not known at present how high up the river system this species occurs. The presence of undesignated populations of this species in these watercourses is considered to be of national ecological value.

Overall, the lands occurring within the route corridor range from local (low value) to national ecological value. Habitats of national ecological value include the Mealagh River. Habitats of County Importance include the wet heath habitat, particularly the examples at Laharanshermeen, Cappanaboul and Ards Beg, the dry heath along the ridge line of

Derreenacrinnig West and the wet willow woodland. The humid acid grassland is considered to be of local (higher) value while other habitats such as gorse scrub, conifer plantation, recently felled woodland improved agricultural grassland, amenity grassland and built land are of local (lower) value.

5.16 WIND FARM SITE

The site of the proposed development consists of a mosaic of peatland habitats with freshwater connections to the Mealagh and Ilen Rivers, both of which are important salmonid rivers and are known to support undesignated populations of freshwater pearl mussels.

The peatland habitats consist of a mosaic of wet heath with pockets of blanket bog. These habitat types have links to habitats listed on Annex I of the EU Habitats Directive. Wet heath habitat corresponding to ‘Northern Atlantic wet heaths with *Erica tetralix* (4010)’ is listed on Annex I of the EU habitats Directive. Blanket bogs that are still capable of peat formation correspond to the priority habitat ‘blanket bogs (*if active bog) (7130)’ (Fossitt, 2000).

Bird species recorded within the site are of medium to low conservation concern. No birds listed on Annex I of the EU Birds Directive were recorded using the site during the present study. All mammal species recorded within the study area are common and widespread.

Overall the site is considered to have high ecological value.

5.17 IMPACTS OF THE REMOVAL OF THE EXISTING OVERHEAD LINE & POLE SETS

5.17.1 Designated Conservation Areas

There will be no impacts to any designated conservation areas as a result of the removal of the overhead line and polesets. No such sites occur within close proximity to the existing cable line and polesets and due to the distance of the line and pole locations from these sites it is highly unlikely that the removal operations will have the potential to result in likely significant effects to these areas.

5.17.2 Habitats

Table 5.4 below lists the poles to be removed and the habitats that they are located in and provides an evaluation of the impact of the removal operations to these habitats.

Table 5.4: Evaluation of Pole Removal to Habitats

Pole No.	Habitat	Impact of Removal Operations
1, 2, 5, 6, 36 - 39, 48 - 52, 57, 64 - 68, 76 - 79, 120 - 127, 135 - 142	Humid Acid Grassland	The removal of poles from this habitat will involve the movement of one low ground bear pressure tracked vehicle to the pole sets. The pole sets will be removed using the tracked pole-removal vehicle. Only one pass of the machinery in this habitat will be required during the removal of the poles. Once the pole is removed topsoil from the surrounding area will be reinstated at the pole location. The reinstated holes will be allowed to colonise with vegetation from the existing seed bank and will over time colonise the reinstated hole with humid acid grassland habitat. The removal of poles from this habitat will represent a short-term imperceptible disturbance to this habitat of local biodiversity value and will represent an impact of negligible significance.
3, 4, 7, 8, 9, 13 – 20, 30 – 35, 53, 54, 56, 60 – 63, 69 – 71, 82 – 97, 99 – 106, 110, 111, 114 – 119, 132 - 134	Improved agricultural grassland	The removal of poles from this habitat will involve the movement of one low ground bear pressure tracked vehicle to the pole sets. The pole sets will be removed using the tracked pole-removal vehicle. Once the pole is removed topsoil from the surrounding area will be reinstated at the pole location. The reinstated holes will be allowed to colonise with vegetation from the existing seed bank and will over time colonise the reinstated hole with improved agricultural grassland habitat. The removal of poles from this habitat will represent a short-term imperceptible disturbance to this habitat of low biodiversity value and will represent an impact of negligible significance.
9 – 12, 98	Scrub	The removal of poles from this habitat will involve the movement of one low ground bear pressure tracked vehicle to the pole sets. The pole sets will be removed

		using the tracked pole-removal vehicle. Once the pole is removed topsoil from the surrounding area will be reinstated at the pole location. The reinstated holes will be allowed to colonise with vegetation from the existing seed bank and will over time colonise the reinstated hole with scrub habitat. The removal of poles from this habitat will represent a short-term imperceptible disturbance to this habitat of low biodiversity value and will represent an impact of negligible significance.
21, 55, 58, 59, 80, 128 - 131	Wet grassland	The removal of poles from this habitat will involve the movement of one low ground bear pressure tracked vehicle to the pole sets. The pole sets will be removed using the tracked pole-removal vehicle. Once the pole is removed topsoil from the surrounding area will be reinstated at the pole location. The reinstated holes will be allowed to colonise with vegetation from the existing seed bank and will over time colonise the reinstated hole with wet grassland habitat. The removal of poles from this habitat will represent a short-term imperceptible disturbance to this habitat of low biodiversity value and will represent an impact of negligible significance.
22 – 29, 40 – 45, 72 – 75, 107 – 109, 112 – 113, 149 - 157	Wet heath	The removal of poles from this habitat will involve the movement of one low ground bear pressure tracked vehicle to the pole sets. Only one pass of the machinery in this habitat will be required during the removal of the poles. The pole sets will be removed using the tracked pole-removal vehicle. Once the pole is removed topsoil from the surrounding area will be reinstated at the pole location. The reinstated holes will be allowed to colonise with vegetation from the existing seed bank and will over time colonise the reinstated hole with wet heath habitat.

		The removal of poles from this habitat will represent a short-term imperceptible disturbance to this habitat of county biodiversity value and will represent an impact of minor significance.
46, 47, 148	Dry heath	The removal of poles from this habitat will involve the movement of one low ground bear pressure tracked vehicle to the pole sets. Only one pass of the machinery in this habitat will be required during the removal of the poles. The pole sets will be removed using the tracked pole-removal vehicle. Once the pole is removed topsoil from the surrounding area will be reinstated at the pole location. The reinstated holes will be allowed to colonise with vegetation from the existing seed bank and will over time colonise the reinstated hole with dry heath habitat. The removal of poles from this habitat will represent a short-term imperceptible disturbance to this habitat of county biodiversity value and will represent an impact of minor significance.

5.17.3 Birds

The minor nature of the works associated with the removal of polesets, along with the absence of any breeding of sensitive ground nesting bird species (such as curlew) from the wider surrounding area, and the avoidance of any loss of hedgerow and broadleaved woodland habitat during removal will minimise impacts to birds during the construction phase to an impact of negligible significance.

5.17.4 Bats

No built structures or mature trees will be affected during the removal of polesets. All linear habitats will be maintained during the removal operations and there will be no loss of potential foraging or commuting habitat for bat species. As such the removal operations will not have the potential to result in negative impacts to bats.

5.17.5 Badger

Much of the ground conditions in the vicinity of polesets to be removed is not suitable for supporting badgers. This species is more likely to be encountered to the east of the alignment. Field surveys between 2017 and 2021 have confirmed the absence of badger setts in the vicinity of polesets and as such badgers and their setts will not be impacted by the removal operations.

5.17.6 Otter

The removal operations will not involve the fording of watercourses, or works within watercourses. There will be no potential for the removal operations to result in negative impacts to otters and their breeding places and foraging habitat.

5.17.7 Freshwater pearl mussels

Freshwater pearl mussels or other aquatic invertebrates will not be affected by the removal operations, due to the avoidance of physical contact with watercourse, and the setback distance of existing pole locations from watercourses that have the potential to support this or other aquatic invertebrate species. No impacts to this species are predicted to arise during the removal of polesets.

5.18 CONSTRUCTION PHASE IMPACTS OF THE GRID CONNECTION OVERHEAD LINE

5.18.1 Designated Conservation Areas

There will be no impacts to any designated conservation areas as a result of the construction of the overhead line and the installation of the poles. No such sites occur within close proximity to the cable route and the pole locations and due to the distance of the route and pole locations from these sites it is highly unlikely that the construction operations associated with the pole installation and stringing of the electrical cable will have the potential to result in likely significant effects to these areas.

5.18.2 Habitats

As outlined in Section 3, the erection of poles will be required along the proposed overhead line. The footprint of the poles will result in a permanent land take along the route corridor. The working area required at the base of each pole will also result in temporary disturbance to habitats.

5.18.3 Watercourses

All watercourses will be oversailed by the overhead line and no poles will be places within 25m of any watercourse transected by the route. This approach will minimise the potential for negative impacts to watercourses and with its implementation no significant effects to watercourses are predicted.

5.18.4 Peatland

The excavation for poles will result in the disturbance to this habitat. A total of 35 poles are located within peatland habitats, with 33 located in wet heath and 2 located in dry heath. The excavation and installation of poles within this habitat will result in a temporary disturbance to 66m^2 of wet heath habitat occurring along the grid connection route and a permanent loss of approximately 8.5m^2 under the footprint of the poles. Over 233,000m^2 of wet heath habitat has been mapped within the 100m grid connection route corridor. The temporary disturbance to this habitat arising from the installation of the poles and the permanent loss of habitat to the poles will represent a temporary disturbance to less than 0.03% and a permanent loss of less than 0.003% of this habitat occurring within the grid connection route study corridor.

Two poles are located within dry heath habitat, amounting to a total of 14m^2 of temporary disturbance and 0.6m^2 of permanent loss to the footprint of these poles. A total dry heath area of 14,900m^2 has been mapped within the grid connection route study corridor. The installation of the poles will result in the temporary disturbance of approximately 0.025% and a permanent loss of less than 0.004% of this habitat. The areas of temporary wet heath and dry heath habitat loss are negligible and will have a low magnitude effect and an impact of minor negative significance.

The wet heath and dry heath habitats are underlain by thin peat generally at less than 0.5m in depth, with exposed rock occurring throughout the examples of wet heath crossed by the overhead line. Due to the thin peats present the excavations will not result in significant disturbance to the hydrology of the wet heath habitat and will not undermine the functioning of this habitat in areas surrounding the excavation locations. The excavations in heath habitats is predicted to have the potential to result in a low magnitude impact of minor significance.

The use of low ground bearing pressure tracked machinery to access pole locations within heath habitats will avoid any significant compaction or disruption to wet heath. The use of such machinery will represent a low magnitude effect and an impact of minor significance.

5.18.5 Humid Acid Grassland

The excavation for poles will result in the disturbance to this habitat. A total of 38 poles are located within this habitat and the excavation and installation of poles within this habitat will result in a temporary disturbance to 76m^2 and a permanent loss of approximately 11.4m^2 under the footprint of the poles. Over 270,000m^2 of humid acid grassland habitat has been mapped within the 100m grid connection route corridor. The temporary disturbance to this habitat arising from the installation of the poles and the permanent loss of habitat to the poles will represent a temporary disturbance to less than 0.03% and a permanent loss of less than 0.004% of this habitat occurring within the grid connection route study corridor.

The areas of temporary and permanent habitat disturbance and loss are negligible and will have a low magnitude effect and an impact of minor negative significance to this habitat.

The tracking of machinery to pole locations in this habitat will have a negligible disturbance impact to the grassland.

5.18.6 Improved agricultural grassland

The improved agricultural grassland occurring along the route corridor is of low nature conservation value. A total number of 62 poles will be situated in this habitat. The excavations for poles in this habitat will represent a low magnitude effect and an impact of negligible significance.

5.18.7 Scrub

The overhead line will over-sail the majority of areas supporting scrub along the route. Only one pole will be situated in this habitat. This temporary disturbance to this habitat as a result of the installation of this pole and the access of machinery to the pole location will represent a low magnitude effect to this habitat of local nature conservation value. Such an effect will represent an impact of low significance.

5.18.8 Wet Willow Woodland

The overhead line will over-sail the majority of areas supporting wet willow woodland along the route. Only one pole will be situated in this habitat. The total extent of this habitat within the grid connection route study corridor is 26,770m^2. The installation of this pole will result in the temporary loss of approximately 0.007% and a permanent loss of 0.001% of this habitat. This amount of temporary and permanent loss to this habitat represents an imperceptible effect and an impact of negligible significance. It is also noted that the pole is located at the edge of wet willow woodland habitat and the access to the pole location will not result in further temporary disturbance to this habitat.

5.18.9 Hedgerows

There will be no loss of linear hedgerows or treelines during the construction phase of the project. The overhead line will over-sail all linear habitats occurring along the route. Where taller treelines/hedgerows are intersected by the over-headline, the upper limbs will need to be pruned down below the line. There will be no loss in the extent of linear hedgerow/treeline habitat during pruning. As such this impact will represent an impact of imperceptible magnitude and negligible significance.

5.18.10 Birds

The minor nature of the works associated with the construction phase, along with the absence of any breeding of sensitive ground nesting bird species (such as curlew) from the wider surrounding area, and the avoidance of any loss of hedgerow, broadleaved woodland or scrub habitat will minimise impacts to birds during the construction phase to an impact of negligible significance.

5.18.11 Bats

No built structures or mature trees will be felled as a result of the overhead line. All linear habitats will be maintained during the construction phase and there will be no loss of potential foraging or commuting habitat for bat species. As such the construction phase will represent an impact of negligible significance to bats.

5.18.12 Badger

Much of the ground conditions along the route alignment are not suitable for supporting badgers. This species is more likely to be encountered to the east of the alignment. Badger setts are generally located along hedgerows or within woodland and scrub habitat. The avoidance of any excavation works in such habitats will further avoid is expected to minimise any potential disturbance to badgers.

5.18.13 Otter

Otters are known to be sensitive to construction activities and may abandon territories in the vicinity of such activity. The Mealagh River represents the only major watercourse to be crossed by the overhead line. It is likely that the local otter population rely mostly on this watercourse as opposed to other minor feeder streams. The buffering on any pole and associated works at minimum distance of 25m back from this and all other watercourses, coupled with the minor works associated with the individual pole and overhead line installation will minimise any potential impacts to an imperceptible level of low significance.

5.18.14 Freshwater pearl mussels

Freshwater pearl mussels or other aquatic invertebrates will not be affected by the construction of the proposed overhead line, due to the avoidance of physical contact of overhead lines with the water surface, and the distance of pole locations from watercourses that have the potential to support this or other aquatic invertebrate species. The impact significance on this species will be negligible.

5.19 CONSTRUCTION PHASE IMPACT OF THE GRID CONNECTION UNDERGROUND LINE

5.19.1 Designated Conservation Areas

There will be no impacts to any designated conservation areas as a result of the construction of the underground line and the installation of the electrical cables. No conservation areas occur within close proximity to the underground cable route locations and due to the distance of the route from these sites it is highly unlikely that the construction operations associated with the pole installation and stringing of the electrical cable will have the potential to result in likely significant effects to these areas.

5.19.2 Habitats

Six sections of underground line, amounting to approximately 3.178km are required for the grid connection route. The underground route will result in temporary disturbance to improved agricultural grassland and road verges. In addition, discrete sections of six hedgerows will be temporarily disturbed during the excavation of trenches to accommodate the underground trench.

The temporary disturbance to improved agricultural grassland and road verges during the construction of the underground line will result in an impact of imperceptible magnitude and will be of negligible significance. The temporary disturbance to hedgerows will be of a short-term nature, as all hedgerows will be reinstated following the installation and backfilling of the cable.

5.19.3 Birds

The underground line will result in the temporary disturbance to discrete areas of six hedgerows during the construction phase. The overall extent of hedgerow habitat loss will be negligible and is not predicted to have the potential to result in significant effects to the status of the local breeding bird population.

5.19.4 Bats

Bats are known to rely on hedgerows as commuting and foraging habitat. The temporary loss of discrete sections of hedgerows along the line of the underground route is not expected to result in the temporary fragmentation of any commuting or foraging routes. As such this element of the works will not result in significant effects to bats.

5.19.5 Badger

The excavations associated with the underground ducted line are not predicted to have the potential to negatively affect the badger population occurring in the surrounding area. Each section of the proposed ducted line was surveyed for the presence of badger setts and none were found during targeted field surveys. The absence of badger setts, tunnels and chambers in the vicinity of the ducted line will eliminate any risks posed by excavations associated with the grid connection route to badgers and their resting places.

5.19.6 Otter

The underline line will cross no watercourses. As such it will not result in any potential impacts to otters.

5.19.7 Freshwater pearl mussels

The underline line will cross no watercourses. As such it will not result in any potential impacts to freshwater pearl mussels or other aquatic invertebrates.

5.20 CONSTRUCTION PHASE IMPACTS OF THE WIND FARM

5.20.1 Designated Conservation Areas

There will be no impacts to any European Sites as none occur within 10km of the proposed site. The only designated site within a 10km range of the site is the pNHA Carriganass Castle, Near Kealkill, which has been designated due to a nationally important maternity colony of Daubenton’s bats. This roost is located approx. 7km from the proposed development site. Daubenton’s bats usually only forage 3km from the maternity roost (Altringham, 2003) and generally avoid watercourses devoid of overhanging vegetation (Russ and Montgomery, 2002). Due to the distance of the proposed site from the pNHA and the nature of the watercourses on site it is highly unlikely that any bats from this roost are foraging on the proposed development site. Therefore, there will be no impacts direct or indirect to this pNHA.

5.20.2 Terrestrial Habitats

A direct loss of habitat will occur as a result of the construction of 7 turbine bases including hard standing (0.46 ha), new access roads (totalling 1.66 ha) and electrical compound, sub-station and car parking (0.15 ha). Excavation of peat will be required in some locations to provide hardstanding areas for turbine bases, sub-station and some access roads. Peat extraction has the potential to indirectly impact on surrounding wet heath/blanket bog habitat as a result of disruption to the natural hydrology.

Four of the proposed turbines (T3, T5, T6 and T7) will be located on existing exposed bedrock and will not require peat excavation. The other three (T1, T2 and T4) will be located on wet heath with peat depth less than 0.5m. Peat excavation will be required at these locations.

The new access road proposed along the southern part of the site (approx. 2km) will impact wet heath, flush habitat and where the peat is greater in depth than 0.5m blanket bog.

The majority of the remaining access track is situated on either exposed bedrock or peat <0.5m deep. Site surveys indicate that it is unlikely that the remainder of the track crosses peat >3m deep but this cannot be ruled out due to the localised variability in peat depth (Minerex 2010). Anywhere peat depth exceeds 0.5m there will be impacts to blanket bog habitat.

Layout and storage of surface vegetated scraghs/turves, for resodding bare areas, has the potential to impact on surrounding intact habitats. Mitigation measures will be implemented to ensure protection of surrounding habitats.

The loss of small areas of wet heath at turbines locations T1, T2 and T4 is not expected to have a significant impact on the functioning of this habitat within the site. Similarly, the loss of areas of exposed bedrock will not have a significant impact in terms of the functioning of this habitat. The loss of a small area of coniferous plantation woodland, a habitat considered to have low ecological value, will not have a significant impact.

There is, however, potential for significant impacts where the proposed access roads are located. This is particularly pertinent where the access road is proposed to be located along the south of the site. This section of road will cross a large area of wet heath/bog. Where there is excavation of peat there is always potential for direct and indirect hydrological impacts to surrounding habitats due to potential alteration of hydrological flows, which are essential for the functioning of peatland habitats.

Aquatic Habitats & Fisheries

Peat soil is highly erodible and can give rise to sedimentation. Surface run-off also tends to occur more frequently on impermeable soils such as peat especially during heavy rainfall. There is potential for impacts on surface water quality and fisheries as a result of increased suspended solids entering watercourses within and downstream of the site during construction.

There is potential for impacts on surface water quality due to increased surface water runoff generated on impermeable surfaces (access roads, turbine bases). Construction of access roads can cause preferential flow paths for surface waters, resulting in a significant increase in the amount of water entering local watercourses. This can lead to additional pressures on watercourses and interfere with the sustained flow of water particularly during dry weather.
There is potential for impacts on surface water quality due to leaks or spills of hydrocarbons or discharge of cement or concrete wash both during and post construction.

Disposal of waste material in particular peat soil has the potential to cause serious pollution to watercourses. Leachate from disturbed or stockpiled soils also poses a significant threat to the quality of water in receiving water bodies.

Birds

Some breeding birds recorded within the site will be impacted by a loss of feeding and nesting habitat, and by increased disturbance, particularly during construction of the proposed scheme. Overall, the area of permanent habitat loss is considered to be small and will not have a significant impact on local bird populations. Disturbance due to construction activities will be temporary to short-term in nature. A study in the UK (Pearce-Higgins *et al*., 2009) found no evidence of turbine avoidance by breeding passerines.

Mammals

There will be a loss of habitat for mammals as a result of the proposed development, however this loss will be small and will not have a significant impact on mammals using the site. Any impacts as a result of disturbance from construction activities will only be temporary and will not interfere with foraging behaviour which, for most mammals, is nocturnal.

Kerry slug (Geomalacus maculosus)

Due to the absence of this species within the Wind Farm site no impact is expected to occur to it.

Geyer's whorl snail (Vertigo geyeri)

Due to the absence of this species within the Wind Farm site no impact is expected to occur to it.

Aquatic Species

The southern part of the study site drains into a tributary of the Ilen River, therefore there is potential for the proposed development to indirectly impact freshwater pearl mussel and Atlantic Salmon which occur within the Ilen catchment. The access road proposed along the southern part of the site crosses two streams, which drain into this tributary. The road also runs parallel to this tributary for approx. 1.3km, however it is located outside of the 50m buffer zone surrounding this watercourse with the exception of the two stream crossings. Any increase in sediment within this watercourse could have potentially significant negative impacts on the two Annex II species freshwater pearl mussel and Atlantic salmon.

The northern part of the site drains into a tributary of the Mealagh River, therefore there is potential for the proposed development to indirectly impact Atlantic salmon, which occur within the Mealagh catchment. The existing borrow bit, which will be extended is located along an existing track within the area of coniferous plantation in the north of the site. Trackways can act like conduits especially if located on a gradient. Run-off from excavated peat stored in the borrow pit could potentially cause siltation in the Mealgh River which could adversely impact on salmonids.

5.21 OPERATION PHASE IMPACTS OF THE OVERHEAD LINE

5.21.1 Designated Conservation Areas

The operation phase of the overhead line will not present any potential impacts to designated conservation areas occurring in the wider surrounding area.

5.21.2 Habitats

There will be no additional impacts to habitats during the operational phase of the overhead power line.

5.21.3 Birds

New power line can pose a collision risk to birds in areas where sensitive bird species are present, such as the overwintering grounds of wildfowl species or the breeding territories of raptors, waders and wildfowl.

Existing baseline information indicates that the proposed grid connection route is not located within an important (or sensitive) bird area. There are no Special Areas of Protection occurring within over 10km of the proposed route. There are no records of breeding waders occurring within the vicinity of the route alignment or the Mealagh River Valley.

There is no record of sensitive raptor species (i.e. hen harrier, merlin) within the vicinity of the route, while white-tailed sea eagles, which have been recorded near the coast at Ballylicky are not expected to interact with route due to the absence of suitable habitat in its vicinity. However, kestrel and sparrowhawk have been recorded in the vicinity of the route. While population of raptors have not been recorded in abundance in the vicinity of the route the presence of a new power line will have potential to adversely affect individual birds. This is most likely in the non-breeding season, when breeding birds and their offspring may be more widely dispersed, and transient and migrant birds may also occur. The potential impact of the operational overhead line on breeding raptors is therefore assessed to be of low significance.

A review of baseline data indicates that the Mealagh River valley at the crossing point of the proposed overhead line is not likely to function as an established commuting route by swans and other vulnerable bird species.

5.21.4 Bats

The presence of the overhead power line will not have the potential to negatively affect bat species.

5.21.5 Badgers

The presence of the overhead power line will not have the potential to negatively affect badgers.

5.21.6 Otters

The presence of the overhead power line will not have the potential to negatively affect otters.

5.21.7 Freshwater pearl mussels

The presence of the overhead power line will not have the potential to negatively affect freshwater pearl mussels or other aquatic invertebrate species.

5.22 OPERATION PHASE IMPACTS OF THE GRID CONNECTION UNDERGROUND LINE

Designated Conservation Areas

The operation phase of the overhead line will not present any potential impacts to designated conservation areas occurring in the wider surrounding area.

Habitats

The operation phase of the underground line is not predicted to have the potential to result in significant effects to habitats.

Fauna

The operation phase of the underline will not have the potential to negatively fauna.

5.23 CUMULATIVE EFFECTS OF THE GRID CONNECTION ROUTE AND THE WIND FARM SITE

The removal of the existing polesets represents a small scale land use activity that will not have the potential to combine with the works associated with the proposed grid connection route and the wind farm to result in significant adverse impacts to habitats and fauna occurring along the proposed grid connection route.

The grid connection route and the Wind Farm will not have the potential to combine to result in adverse effects to designated conservation areas. No such areas are located in close proximity to or downstream of both elements of the project and due to the distance between the development and these areas and the absence of potential impact pathways there will be no potential for both elements to combine to result in likely significant effects to these areas.

The wind farm and the pole locations of the overhead grid line will result in a cumulative loss of peatland habitats in the form of wet heath in the entire study area. However, the additional loss of this habitat arising from the grid connection route will be negligible, amounting to approximately 66m2 of temporary disturbance and 9.9m2 of permanent loss. This additional disturbance and loss of habitat will have an imperceptible cumulative effect on the effect the consent wind farm will have on wet heath habitat occurring at the wind farm site.

The construction phase of the wind farm and the grid connection route will not overlap and will not have the potential to combine to result in likely significant effects to the status of watercourse occurring downstream of both elements of the project.

The wind farm site will result in the loss of habitat for bird species but taking into consideration the small area of habitat that will be lost, in relation to the overall size of the study site, and the low density of species recorded, disturbance to breeding birds during the operation of the proposed wind farm is not expected to have a significant impact on the existing breeding bird population. Similarly, the installation of the grid connection route is not predicted to result in the perceptible loss of habitat for birds occurring along the route.

Both the wind farm turbines and the overhead electrical cable have been assessed as being of low collision risk to bird species. This is due to the location of both elements of the development in an area where sensitive bird species are not known to occur and the distance of these elements from any such sensitive bird location in the wider surrounding area. Give the absence of such species the turbines and overhead cable will not have the potential to combine to result in likely significant cumulative effects to bird as a result of collision during the operation phase of the development. Given the assessment for both elements of the development it is considered that the combined impact of the operation phase of the wind farm and the grid connection route will not have the potential to result in significant cumulative effects to birds.

In terms of impacts to birds and mammals, the proposed cable route will not necessitate the removal of hedgerows and trees and so birds will not be impacted and no protected mammals were identified during the assessment so therefore there is no potential for interaction with the wind farm with respect to birds and mammals during the construction phase. Therefore, the cumulative impact will not be over and above the impact for the permitted wind farm development.

The operation phase of the grid connection and the wind farm will not have the potential to combine to result in likely significant cumulative effects to mammals or other fauna species occurring at or in the vicinity of both elements of the development.

5.24 MITIGATION MEASURES

5.24.1 Poleset Removal Operations

The removal of polesets shall be completed using one low ground bearing pressure tracked vehicle. The vehicle shall be restricted to making a maximum of one return pass through habitats during the removal of polesets. Where a return journey to polesets is required the tracked vehicle shall restrict its movements to the same line on the inward and outward journey.

Where possible polesets occurring in scrub, tall sward humid acid grassland, wet heath and dry heath habitats shall be removed outside the breeding bird season. In the event that poleset removal is required during the breeding bird season within these habitats then the access route to polesets and the lands surrounding the poleset will be subject to a breeding bird survey. The breeding bird survey will be completed to identify the presence or otherwise of breeding ground nesting birds in these habitats along and in the immediate vicinity (i.e. within a 25m buffer) of the proposed access route and poleset. In the event that breeding birds are identified as present, the removal operations will be postponed until it is confirmed that breeding has terminated and no active nests are present along or in the immediate vicinity the access route and polesets.

5.25 CONSTRUCTION PHASE OF THE GRID CONNECTION ROUTE

Access roads should avoid crossing large areas of high value habitats such as wet heath and dry heath as these have links to Annex I habitats.

All construction works should be set back a minimum of 25m from watercourses. No poles or vehicles should be installed or operate within this buffer zone.

Construction works will be confined to the minimum area possible. Minimum removal of vegetation will take place at pole locations.

The footprints of all temporary access routes will be kept to the minimum compatible with sound engineering practice.

Construction traffic and machinery movement will be confined to specific roads and access routes. Construction vehicles to be used on peatland habitats should be of low ground bearing pressure.

Trampling and the use of machinery on saturated, quaking surfaces will be avoided. The locations of poles will be configured to minimise the number occurring within wet grassland and wet heath and the use of brash mats will be used if required.

The contractor will provide a method statement for working practices that will be designed to prevent adverse impacts on rivers and other watercourses. Working practices will include standard methods designed to minimise sedimentation and pollution.

A review of baseline data indicates that the Mealagh River valley at the crossing point of the proposed overhead line is not likely to function as an established commuting route by swans and other vulnerable bird species. However, it is possible that this river valley will be occasionally used by such species. Haas et al (2005) described general principles for protecting birds from collision with overhead lines, including routing of overhead lines as low as possible, for example behind buildings or rows of trees and attach clearly visible markers on the overhead lines posing a high collision risk.

5.26 CONSTRUCTION PHASE OF THE WIND FARM

Mitigation by Avoidance

Habitats

Access roads should avoid crossing large areas of intact peat habitats (wet heath/blanket bog) as these are Annex I habitats and in the case of blanket bog Annex I priority habitat. Where peat depths are greater than 0.5m excavations should be avoided in order to avoid impacts to blanket bog and to minimise hydrological impacts to surrounding peat habitats.

Birds

The Wildlife (Amendment) Act (2000) affords protection to breeding birds by prohibiting the clearance of vegetation during the period 1st March to the 31st of August inclusive except for the clearance of sites for development purposes. As the months of March to June are particularly important for breeding birds, where feasible best practice will be to avoid any clearance of vegetation during this period.

Watercourses

No turbines will be placed within 50m of any watercourses within the site to prevent any potential impacts on water quality during construction.

Roads on sloped ground will be positioned so as to cause minimal damage to the natural hydrology by following contours where possible (as opposed to running perpendicular to contours) and by frequent placing of drainage pipes to allow natural diffusion of water.

The use of sedimentary rocks, such as shale, in road construction should be avoided. This type of material has poor tensile strength and is liable to be crushed by heavy vehicles there by releasing fine sediment materials into the drainage system which are difficult to precipitate and may give rise to water pollution (Murphy, 2000).

The dispensing of fuel and oil tanks should be confined to one bunded location in order to minimise the risk of damage by spillage.

Mitigation by Reduction

Habitats

Construction works will be confined to the minimum area possible. Minimum removal of vegetation will take place so as to reduce the area of bare peat. When the foundations for turbines are being excavated, the surface vegetation will be removed in sods which can be stored (vegetation side up) and later replaced around the foundation platform where bare peat exists. This will ensure a more rapid re-vegetation of bare peat and will help reduce potential soil erosion which could lead to water pollution.

Excavated peat from turbine and road foundations will not be stored on areas of heath, bog or near streams or drains. The placing of soils on adjacent ground should not be permitted unless the area has been the subject of an in-depth risk assessment. Soil stockpiling operations will only be carried out in confined areas and soils should be vegetated with suitable plants in order to promote stability. If, during excavation, spoil is likely to fall on to adjacent habitats, shuttering boards or geotextile will be used to protect surface vegetation

Access track and drainage system construction will follow the Coford Forest Road Manual Guidelines 2004. Road width will be kept to the minimum compatible with sound engineering practice.

Construction traffic and machinery movement will be confined to the roads and tracks that are part of the long-term development in order to minimise unnecessary compaction and erosion of habitats and soil.

Watercourses

In the event of any watercourse crossing being in excess of 1ft in width Inland Fisheries Board (IFI) should be consulted prior to works commencing. Bridges are preferable to culverts. There will be no drainage or other physical interference with the bed or bank of any watercourse without prior consultation with IFI.

Sediment control measures will be implemented to prevent the transport of sediment (and other contaminants) into watercourses, by providing a physical barrier or by slowing down the flow rate sufficiently to encourage natural settling.

On-site attenuation ponds should allow for the settlement of fine/particulate materials. It is particularly important during the construction phase that sufficient retention time in the settlement pond is available to ensure no deleterious matter is discharged to any waters.

In constructing and designing silt traps particular attention should be paid to rainfall levels and intensity. The silt traps should be designed to minimise the movement of silt especially during intense precipitation events where the trap may be hydraulically overloaded. Silt traps should be located within easy access for monitoring and maintenance.

Leachate from stockpiles will be treated appropriately and will not drain directly into natural watercourses. Cement leachate, hydrocarbon oils and other toxic poisonous materials will require full containment and should not be permitted to discharge to any waters.

Aquatic Species

Any watercourses with connections to the Ilen River, which are to be crossed as a result of the proposed development, will be crossed via a free spanning bridge rather than culverted in order to prevent potential impacts to the freshwater pearl mussel. By bridging the watercourses no part of the stream bed or banks will be disturbed minimising the movement of suspended solids. Works in the vicinity of watercourses will be kept to a minimum and will be closely monitored.

5.27 OPERATION PHASE OF THE GRID CONNECTION ROUTE

While the results of the review of baseline data and field surveys indicates that the Mealagh River valley at the crossing point of the proposed overhead line is not likely to function as an established commuting route by swans and other vulnerable bird species, it is possible that this river valley will be occasionally used by such species. Haas et al (2005) described general principles for protecting birds from collision with overhead lines, including routing of overhead lines as low as possible, for example behind buildings or rows of trees and attaching clearly visible markers on the overhead lines posing a high collision risk. The overhead line does not represent a high collision risk to birds and has been designed to following existing hedgerow boundaries as it crosses the Meelagh Valley. As an additional precautionary measure the section of the overhead line crossing the valley between polesets 101 and 109 will be fitted with clearly visible markers. This will further reduce the low collision risk posed by the overhead line to birds.

5.28 OPERATION PHASE OF THE WIND FARM

Habitats

All vehicles accessing the site during the operational phase will be confined to the constructed roads and tracks in order to minimise unnecessary compaction and erosion of habitats and soil.

Watercourses

Settlement ponds will be maintained, where appropriate, during the operational phase to allow for the adequate settlement of suspended solids and sediments and prevent any deleterious matter from discharging into any natural waters. Periodic drain maintenance along access roads will likely be required.

5.29 MITIGATION BY REMEDIATION

Habitats

On site restoration following construction activities will include the following:

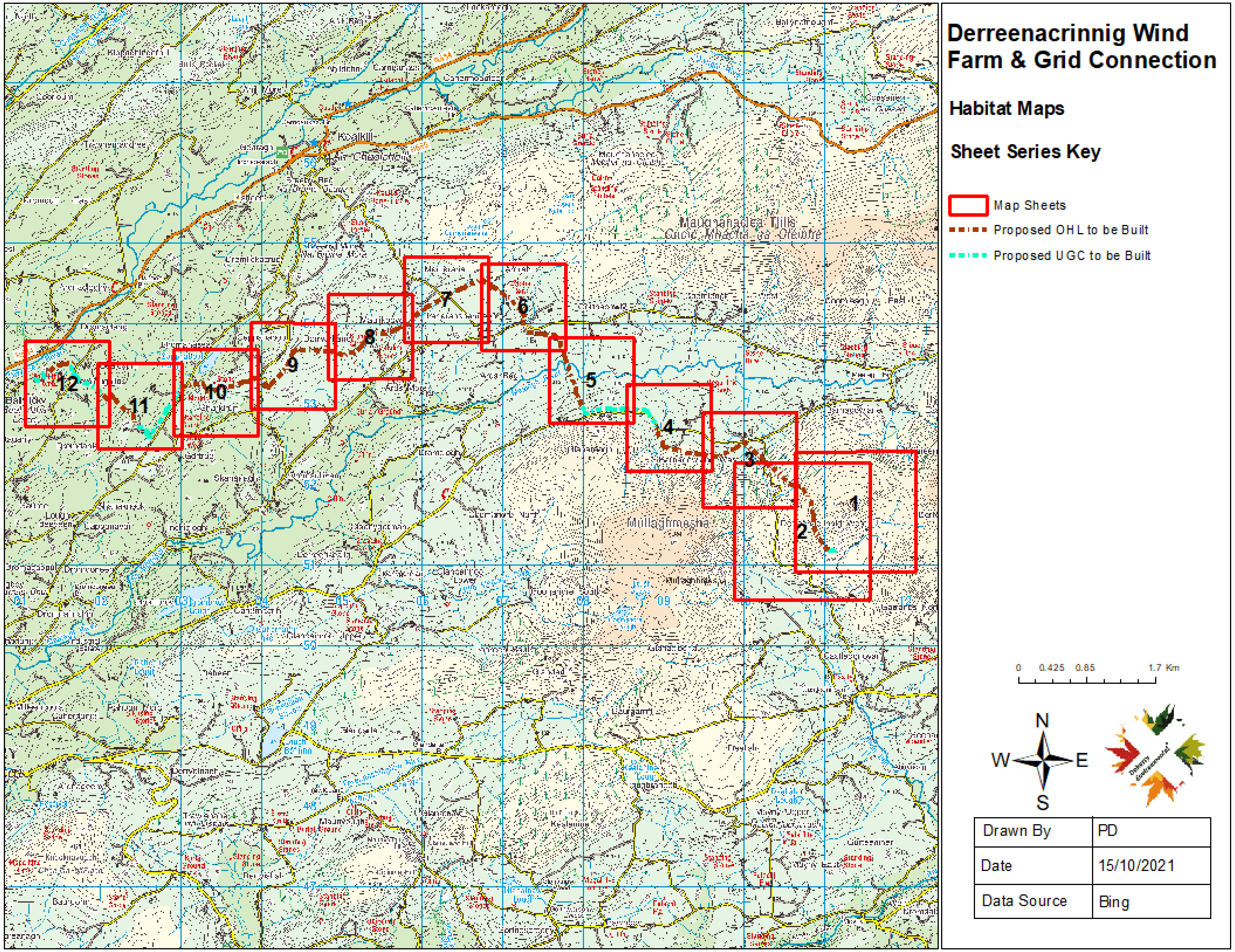
- Revegetation of areas disturbed during haulage and construction
- Re-grading access tracks and public roads (where necessary)
- Reinstatement of surface turves on areas of exposed peat.

5.30 RESIDUAL IMPACTS

The principal residual impacts of the development will be the permanent loss of approximately 1.7 ha of existing wet heath /blanket bog for roads, turbine bases, other ancillary development and poles associated with the grid connection route.

5.31 MONITORING

Monitoring of the mitigation measures will be undertaken by a qualified ecologist, to ensure that they are correctly implemented and to advise if any modifications are required.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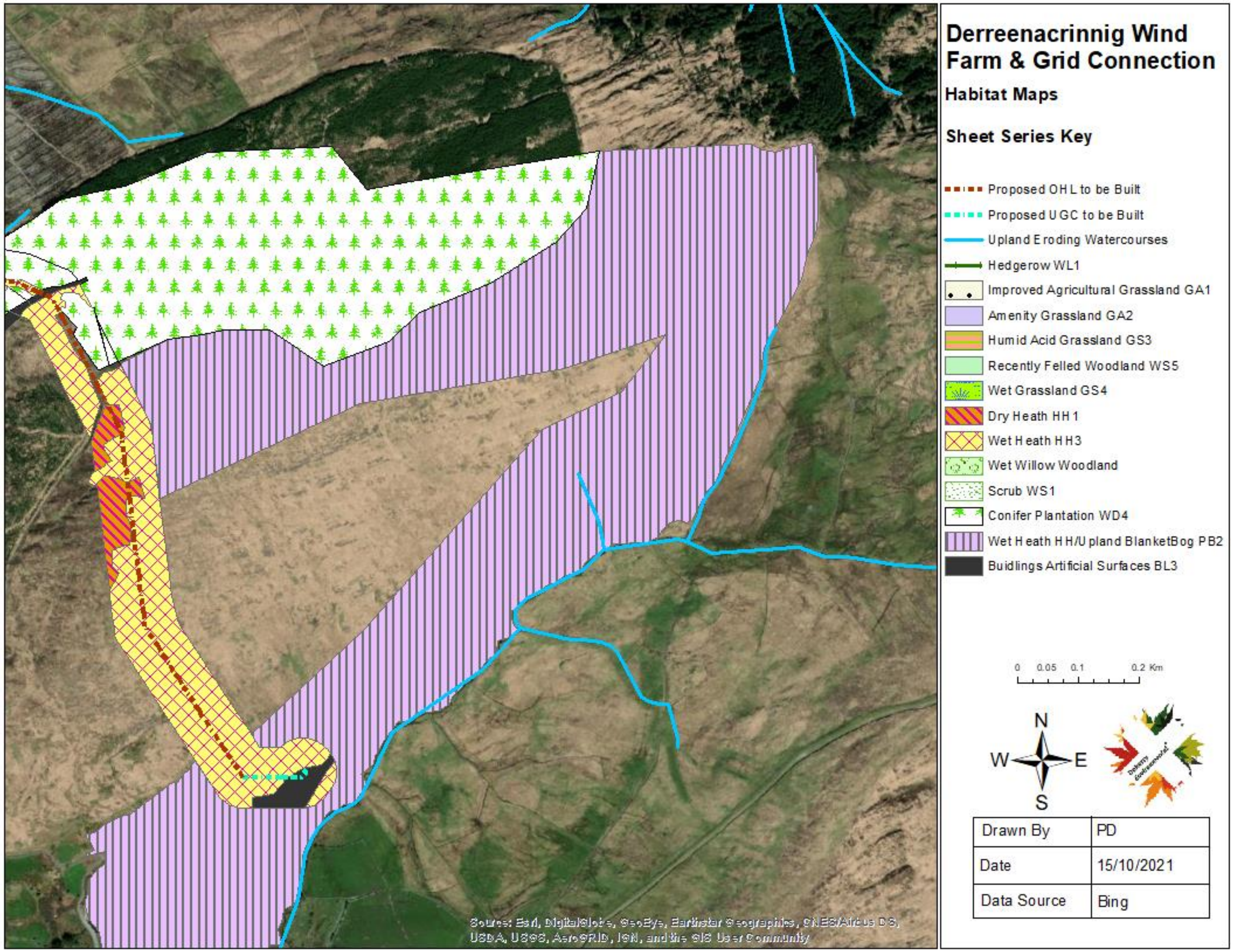
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Habitat Maps
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Proposed OHL to be Built
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Improved Agricultural Grassland GA1
Amenity Grassland GA2
Humid Acid Grassland GS3
Recently Felled Woodland WS5
Wet Grassland GS4
Dry Heath HH1
Wet Heath HH3
Wet Willow Woodland
Scrub WS1
Conifer Plantation WD4
Wet Heath HH/Upland BlanketBog PB2
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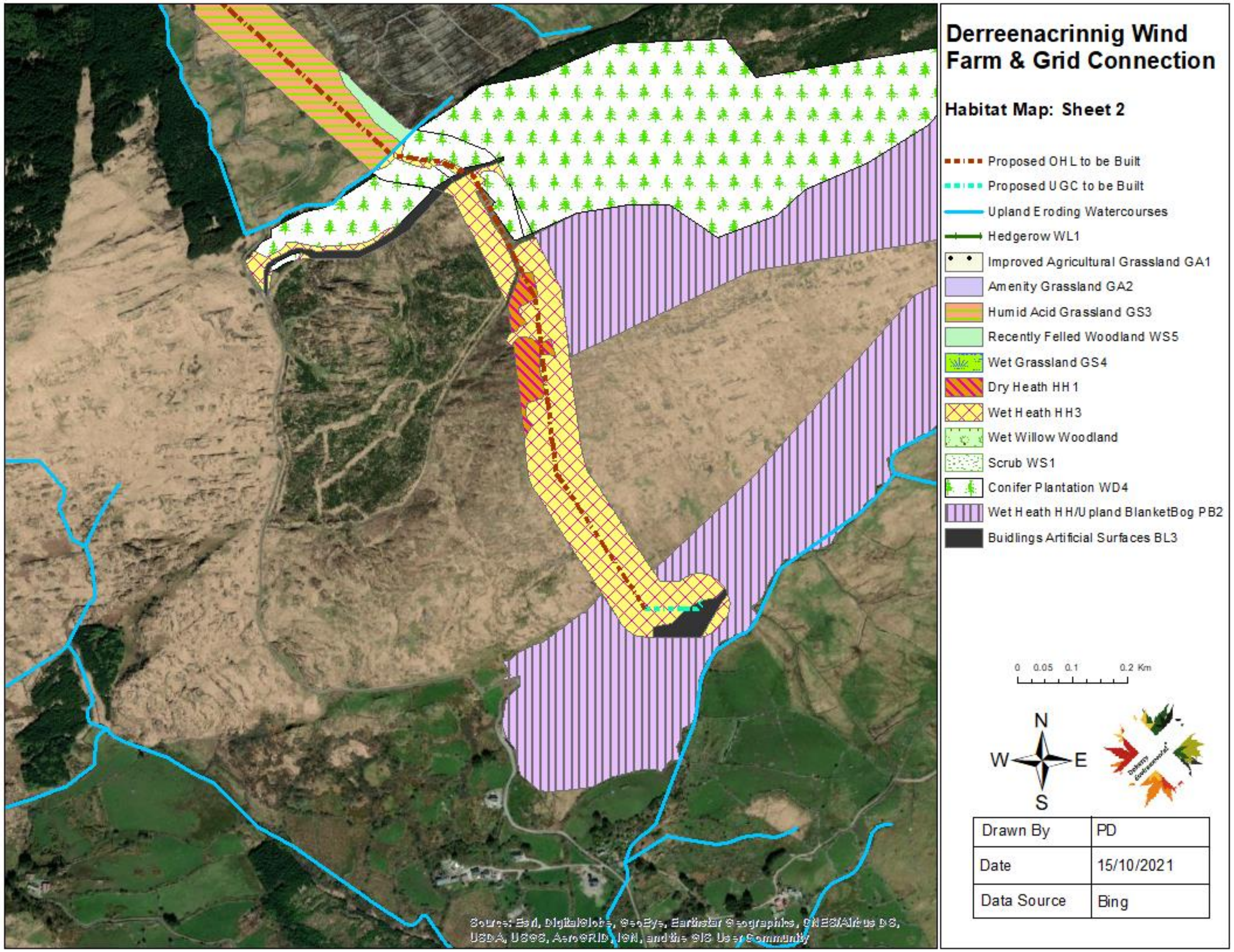
Figure 5.5


Derreenacrinnig Wind Farm & Grid Connection
Habitat Map: Sheet 2
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Proposed UGC to be Built
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Hedgerow WL1
Improved Agricultural Grassland GA1
Amenity Grassland GA2
Humid Acid Grassland GS3
Recently Felled Woodland WS5
Wet Grassland GS4
Dry Heath HH1
Wet Heath HH3
Wet Willow Woodland
Scrub WS1
Conifer Plantation WD4
Wet Heath HH/Upland BlanketBog PB2
Buidlings Artificial Surfaces BL3
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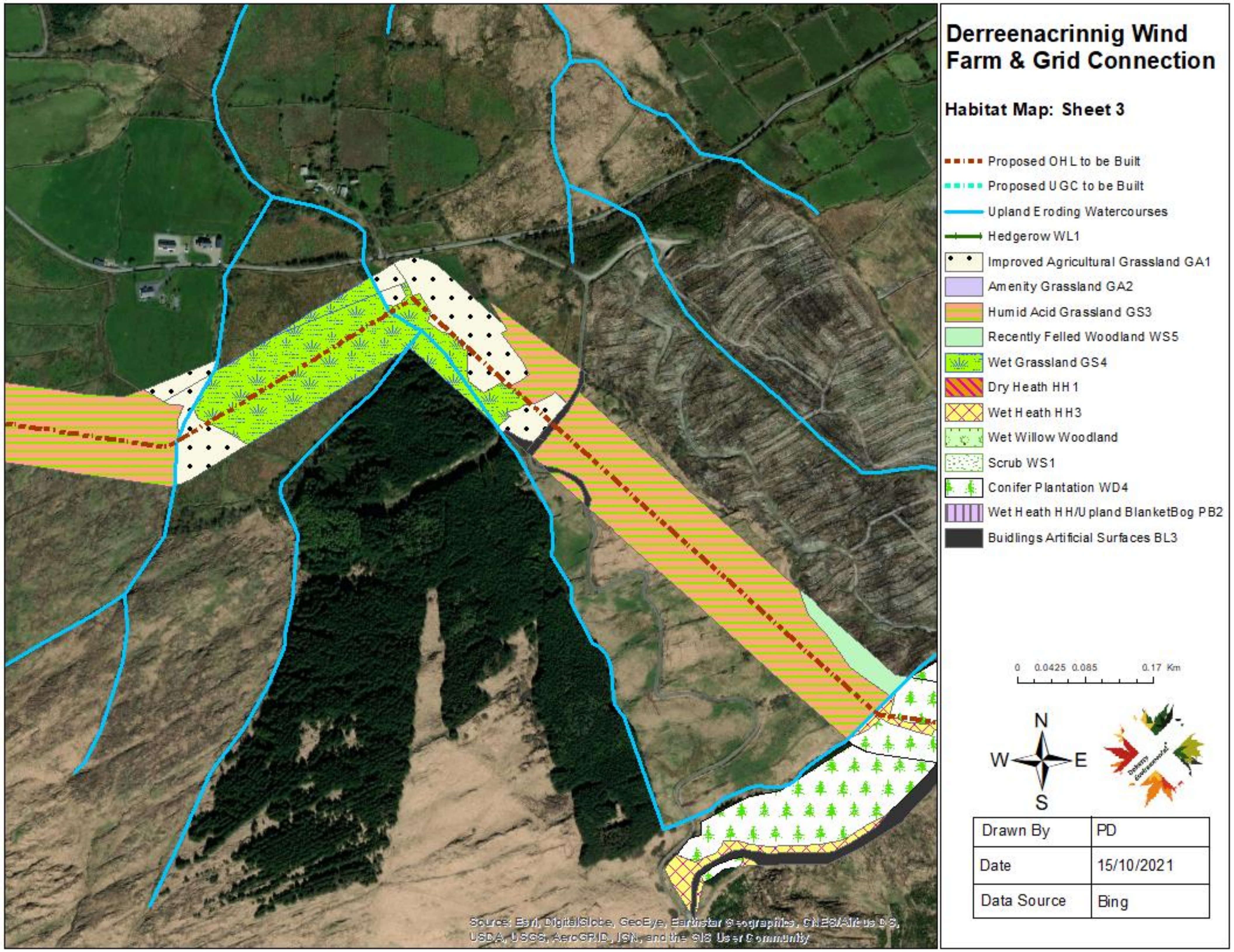
Figure 5.6



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Amenity Grassland GA2
Humid Acid Grassland GS3
Recently Felled Woodland WS5
Wet Grassland GS4
Dry Heath HH1
Wet Heath HH3
Wet Willow Woodland
Scrub WS1
Conifer Plantation WD4
Wet Heath HH/Upland BlanketBog PB2
Buidlings Artificial Surfaces BL3
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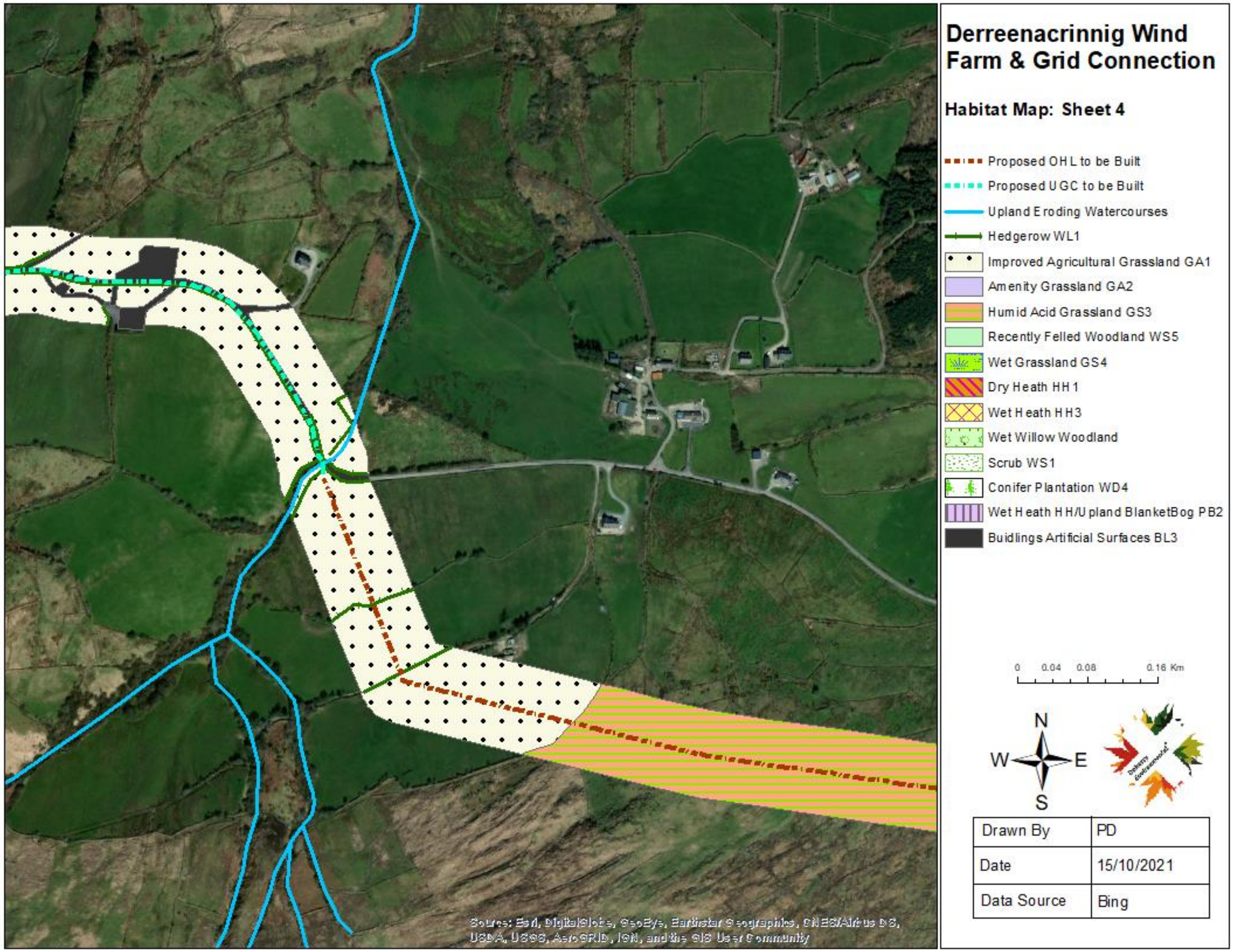
Figure 5.7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Amenity Grassland GA2
Humid Acid Grassland GS3
Recently Felled Woodland WS5
Wet Grassland GS4
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Wet Heath HH3
Wet Willow Woodland
Scrub WS1
Conifer Plantation WD4
Wet Heath HH/Upland BlanketBog PB2
Buidlings Artificial Surfaces BL3
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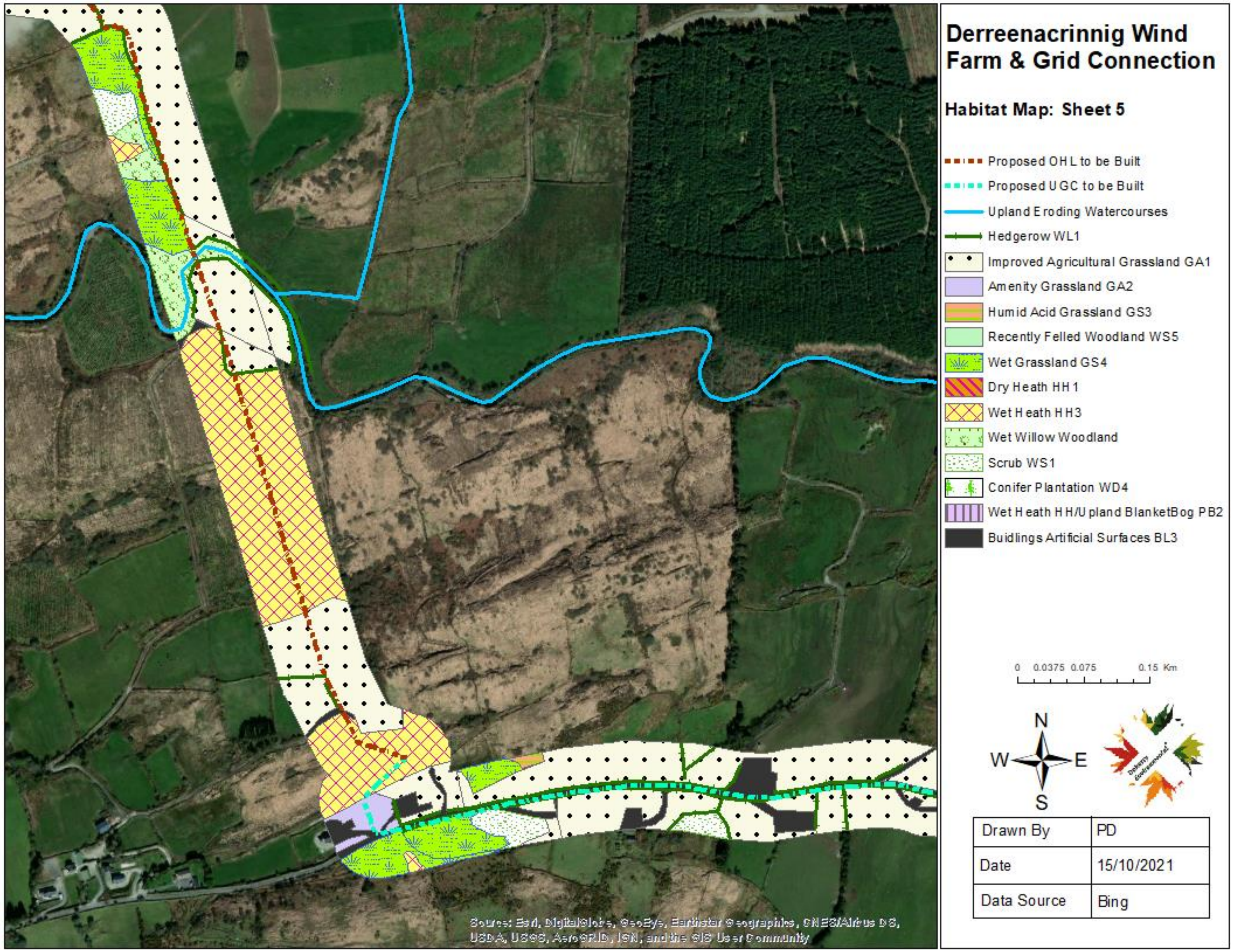
Figure 5.8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Proposed UGC to be Built
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Amenity Grassland GA2
Humid Acid Grassland GS3
Recently Felled Woodland WS5
Wet Grassland GS4
Dry Heath HH1
Wet Heath HH3
Wet Willow Woodland
Scrub WS1
Conifer Plantation WD4
Wet Heath HH/Upland BlanketBog PB2
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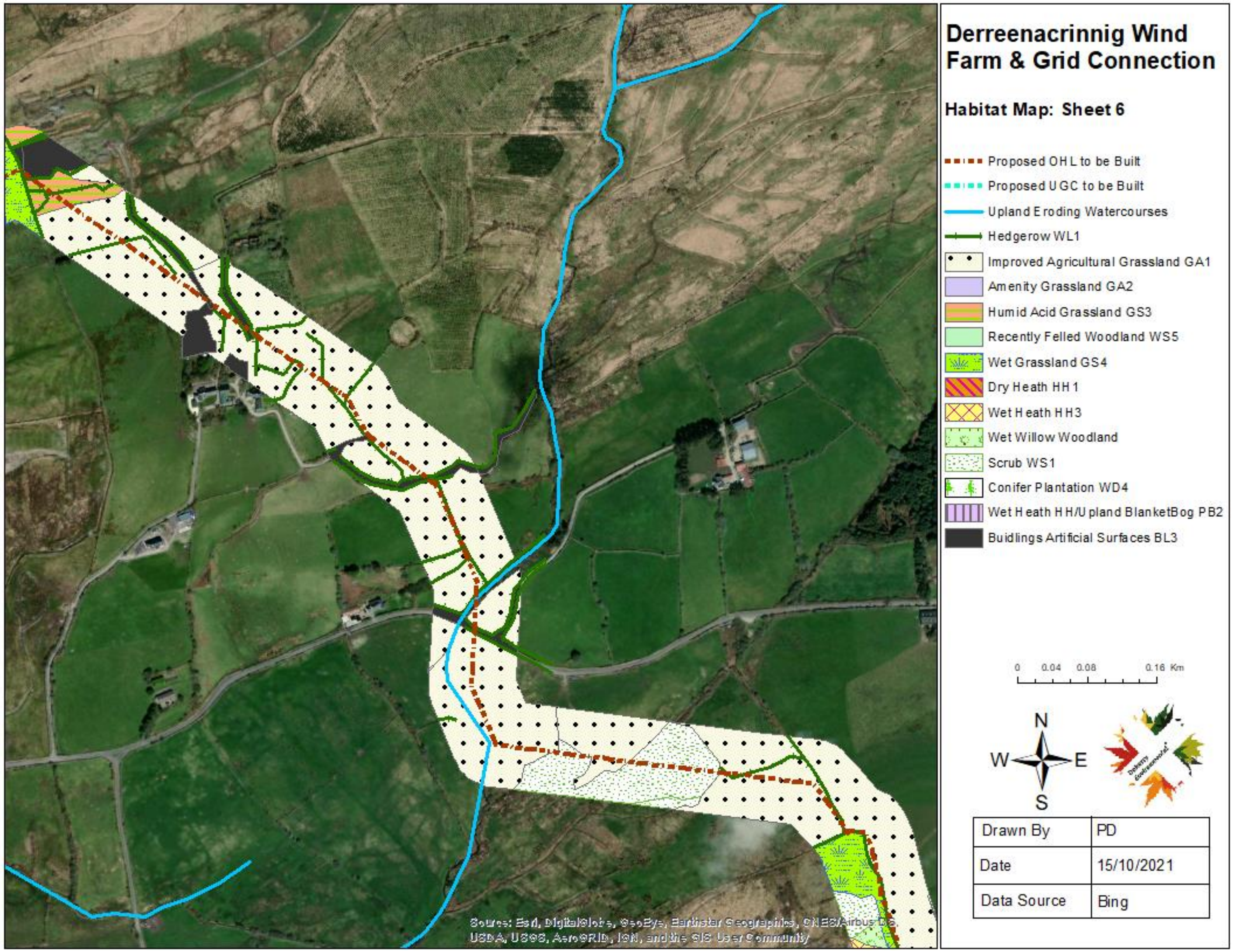
Figure 5.9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Wet Willow Woodland
Scrub WS1
Conifer Plantation WD4
Wet Heath HH/Upland BlanketBog PB2
Buidlings Artificial Surfaces BL3
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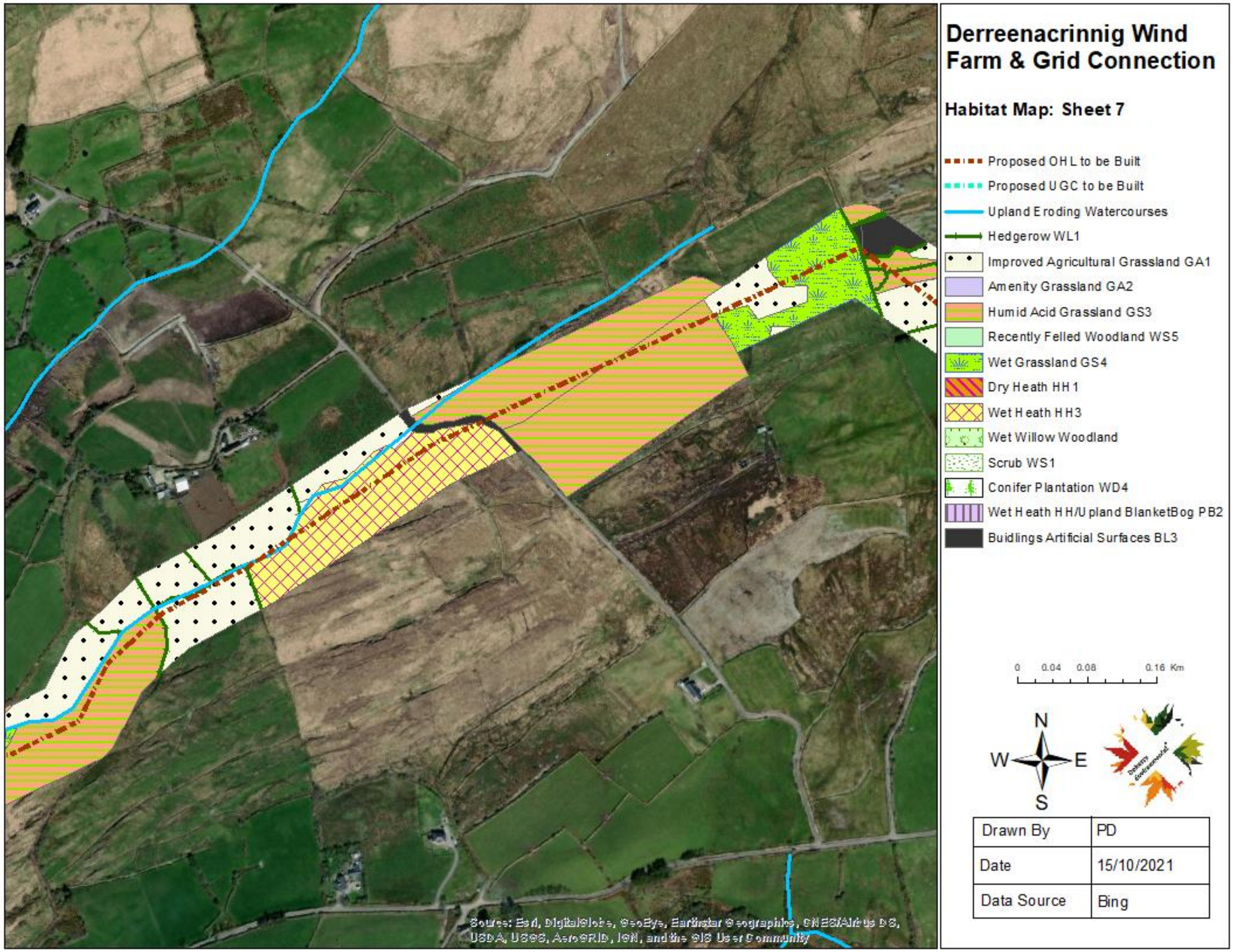
Figure 5.10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Amenity Grassland GA2
Humid Acid Grassland GS3
Recently Felled Woodland WS5
Wet Grassland GS4
Dry Heath HH1
Wet Heath HH3
Wet Willow Woodland
Scrub WS1
Conifer Plantation WD4
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Buidlings Artificial Surfaces BL3
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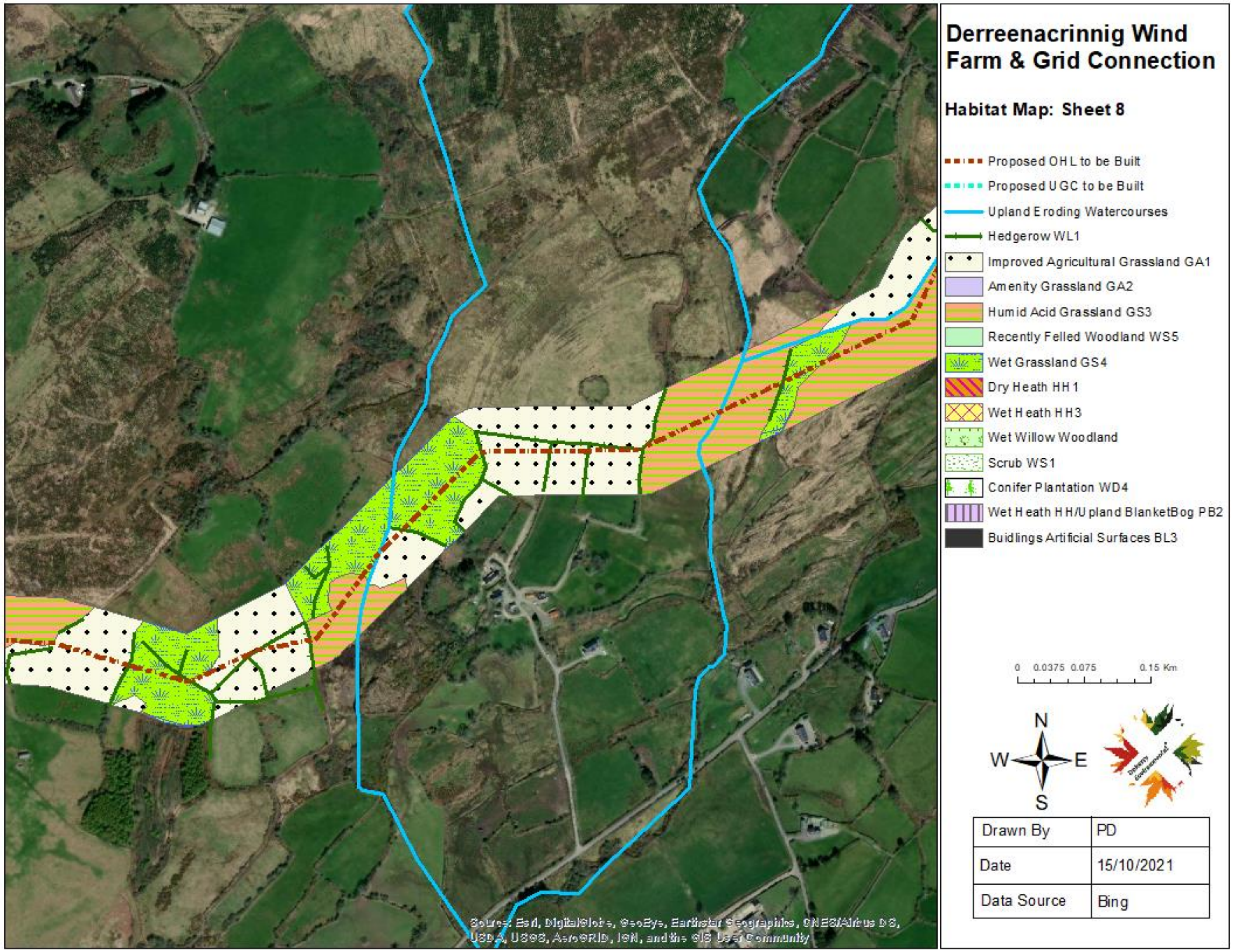
Figure 5.11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Amenity Grassland GA2
Humid Acid Grassland GS3
Recently Felled Woodland WS5
Wet Grassland GS4
Dry Heath HH1
Wet Heath HH3
Wet Willow Woodland
Scrub WS1
Conifer Plantation WD4
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Buidlings Artificial Surfaces BL3
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Date 15/10/2021
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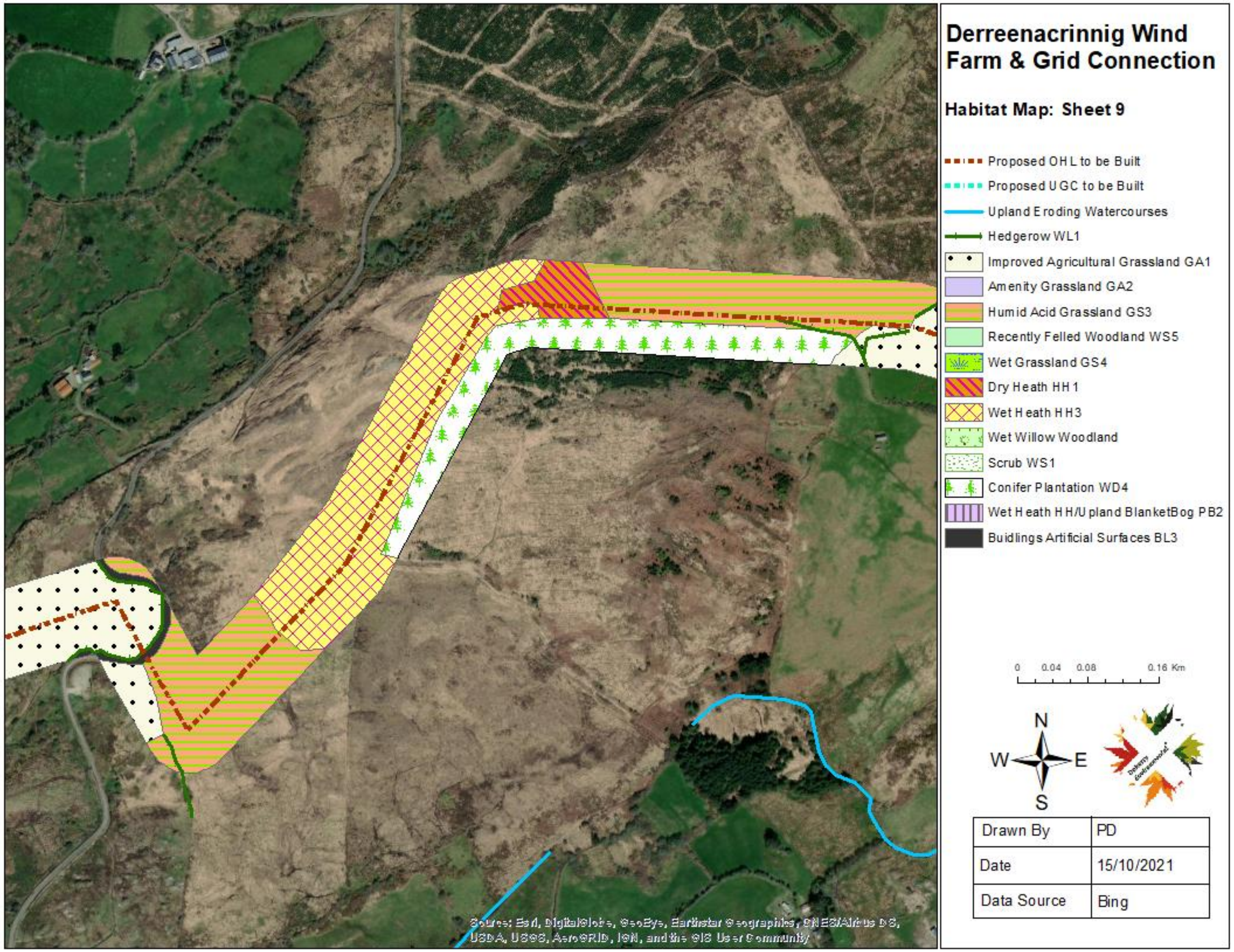
Figure 5.12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Habitat Map: Sheet 9
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Proposed UGC to be Built
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Improved Agricultural Grassland GA1
Amenity Grassland GA2
Humid Acid Grassland GS3
Recently Felled Woodland WS5
Wet Grassland GS4
Dry Heath HH1
Wet Heath HH3
Wet Willow Woodland
Scrub WS1
Conifer Plantation WD4
Wet Heath HH/Upland BlanketBog PB2
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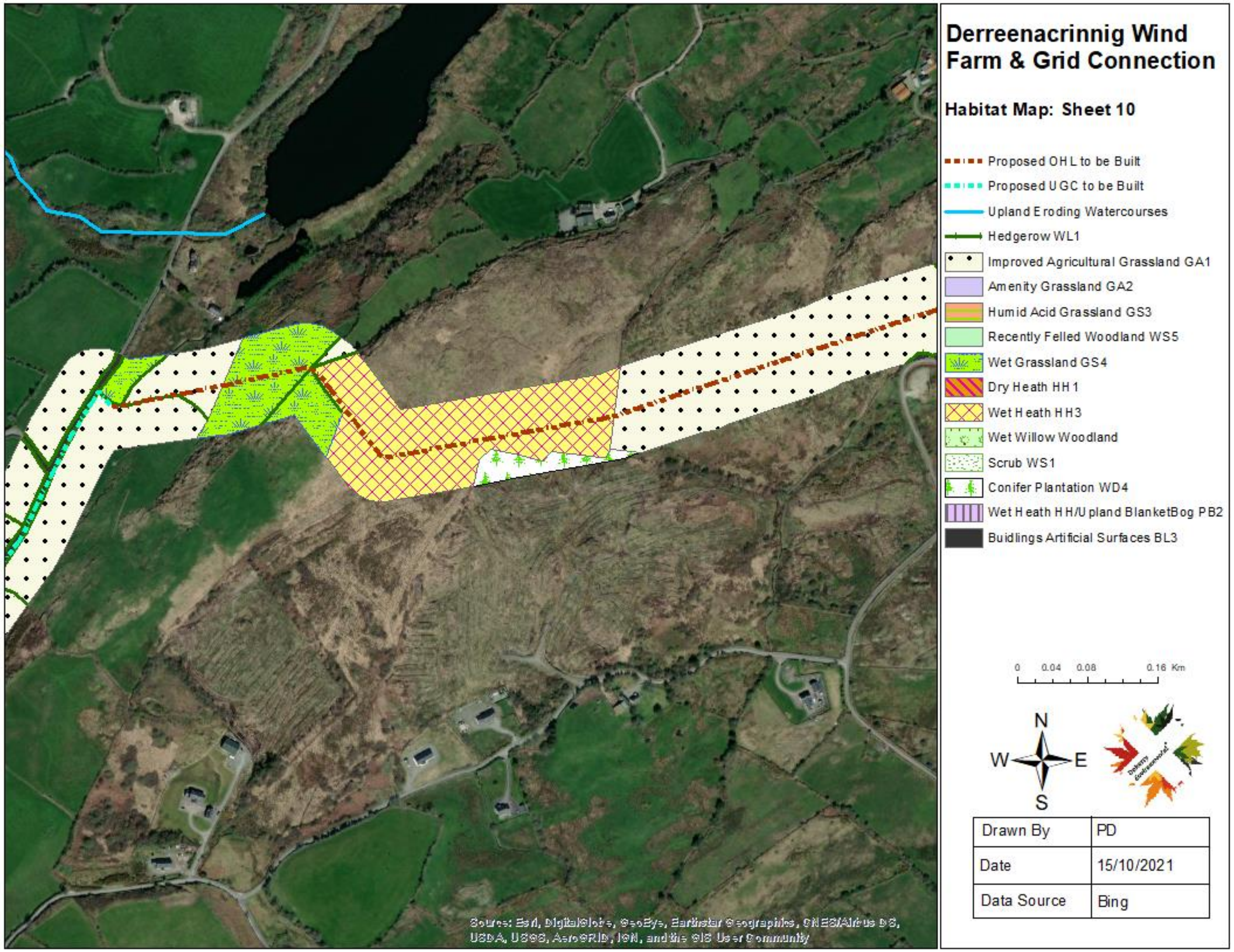
Figure 5.13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Amenity Grassland GA2
Humid Acid Grassland GS3
Recently Felled Woodland WS5
Wet Grassland GS4
Dry Heath HH1
Wet Heath HH3
Wet Willow Woodland
Scrub WS1
Conifer Plantation WD4
Wet Heath HH/Upland BlanketBog PB2
Buidlings Artificial Surfaces BL3
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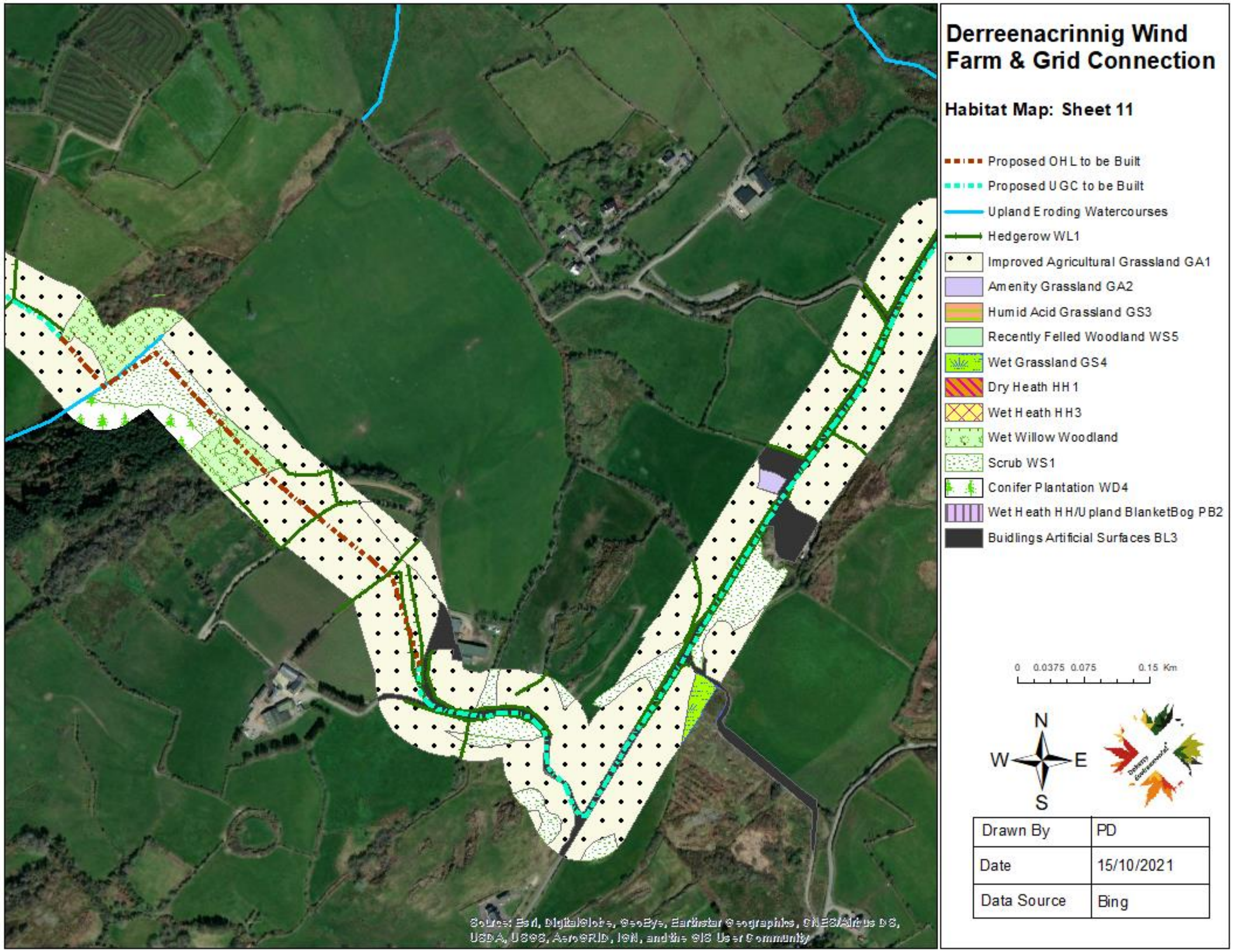
Figure 5.14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Habitat Map: Sheet 11
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Amenity Grassland GA2
Humid Acid Grassland GS3
Recently Felled Woodland WS5
Wet Grassland GS4
Dry Heath HH1
Wet Heath HH3
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Scrub WS1
Conifer Plantation WD4
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Figure 5.15

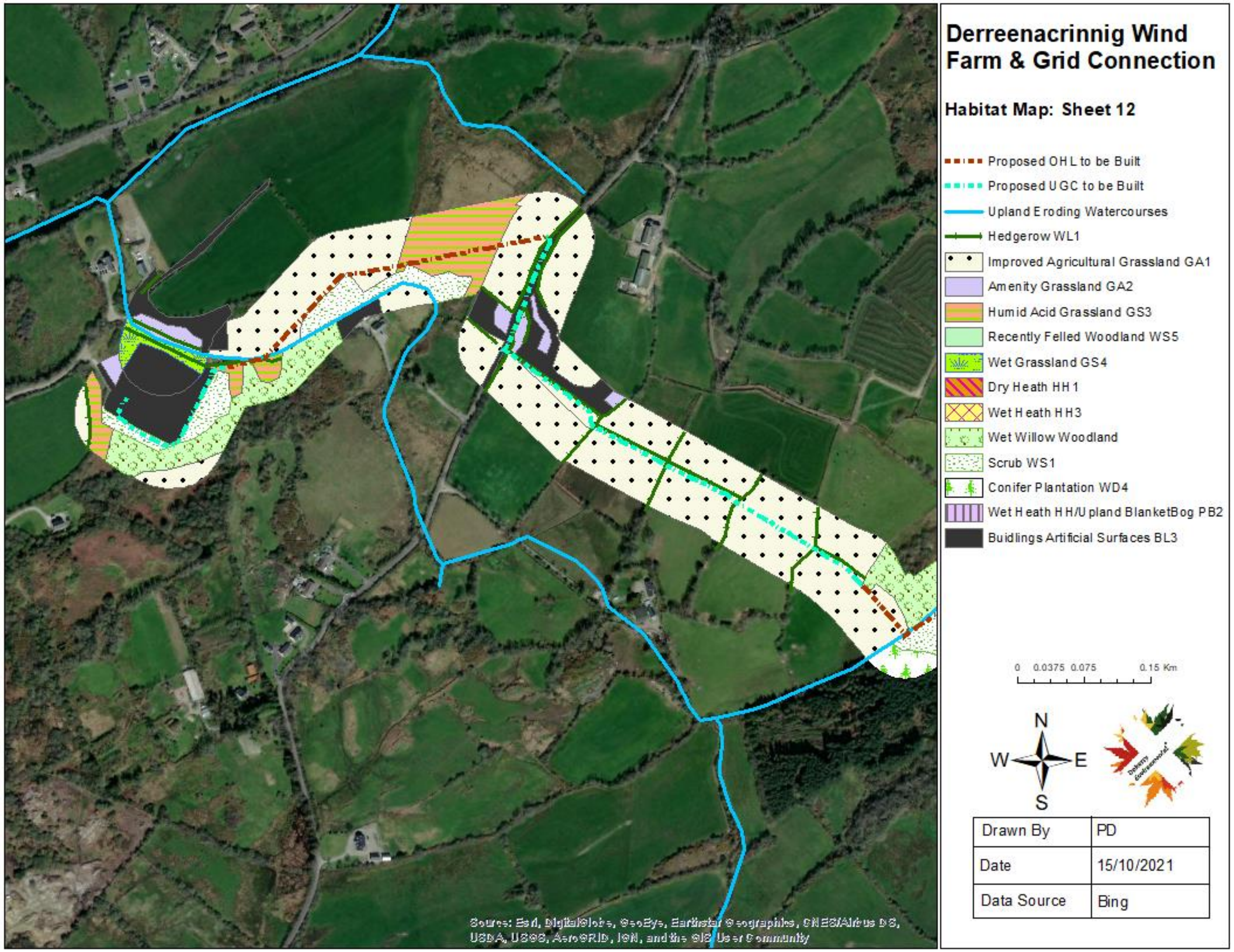
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Figure 5.16

5.32 REFERENCES

1. Haas D, Nipkow M, Fiedler G, Schneider R, Haas W, Schürenberg B. (2005). Protecting birds from powerlines. Convention on the Conservation of European Wildlife and Habitats (Bern Convention). Nature and environment, No 140. Council of Europe Publishing

2. IEEM (2006) Guidelines for Ecological Impact Assessment in the United Kingdom. Institute of Ecology and Environmental Management, Winchester.

3. NRA (2005). Guidelines for The Treatment of Badgers Prior To The Construction of National Road Schemes.

6 SOILS AND GEOLOGY

6.1 INTRODUCTION

6.1.1 Background and Objectives

Jennings O'Donovan & Partners Ltd. ("JOD"), have assessed the potential impacts of the proposed EIA Development on the soil and geological environment of the Proposed Development Site. Full details of the proposed EIA Development are provided in **Section 2: Project Description**.

This report provides a baseline assessment of the environmental setting of the Proposed Development Site in terms of soils and geology and assesses the potential impacts that the construction, operation and decommissioning phases that the proposed EIA Development will have. Where appropriate, mitigation measures to limit significant impacts to soils and geology are documented, and thereafter residual effects are identified and assessed.

The assessment also includes additional information as required by the Revised EIA Directive, where relevant to the proposed EIA Development ("*the importance of the sustainable use of soil, minimisation of land take, minimisation of erosion and organic matter loss, soil compaction, and soil sealing, subsurface and underground effects*").

6.1.2 Statement of Authority

JOD were commissioned to carry out an assessment of the soil and geology effects of EIA Development. JOD has extensive experience in the development of wind farms from planning through to construction. JOD have been active in the wind energy market in Ireland since 1998 as engineering consultants for numerous completed wind farm projects varying from single wind turbine installations to large scale development which extends to over 2,000MW of power.

The JOD inputs been prepared by Mr. David Kiely of JOD, who has undertaken numerous EIS's for wind farms throughout Ireland. Mr. David Kiely has 35 years' experience in the civil engineering and environmental sector. He has obtained a bachelor's degree in Civil Engineering and a master's in environmental Protection, has overseen the construction of over 40 wind farms and has carried out numerous soils and geology assessments for EIS's.

Minerex Environmental Limited prepared the Soils and Geology Study in the Wind Farm EIA.

Minerex Environmental Limited was established in 1994 and have carried out studies for a wide range of Clients and projects over the past 24 years. These include numerous wind farm projects.

6.1.3 Assessment Structure of Chapter 6

This Section contains the following sections:

- Assessment Methodology and Significance Criteria – a description of the methods used in baseline surveys and in the assessment of the significance of effects;
- Baseline Description - a description of the soils and geology of the Proposed Development Site based on the results of surveys, desk information and consultations, and a summary of any information required for the assessment that could not be obtained;
- Assessment of Potential Effects - identifying the ways in which soils and geological resources could be affected by the proposed EIA Development, including a summary of the measures taken during design of the EIA Development to minimise soils and geological effects;
- Mitigation Measures and Residual Effects - a description of measures recommended to off-set potential negative effects and a summary of the significance of the effects of the EIA Development after mitigation measures have been implemented;
- Cumulative Effects – identifying the potential for effects of the EIA Development to combine with those from other developments to affect soils and geological resources;
- Summary of Significant Effects;
- Statement of Significance; and
- Comparison with Derreenacrinnig West Wind Farm EIS, November 2010, prepared by Jennings O'Donovan Consulting Engineers ("the 2010 EIA") - commentary identifying any material variations in potential effects and levels of significance.

6.2 ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

6.2.1 Assessment Methodology

This assessment has involved the following elements, further details of which are provided in the following sections:

- Legislation and guidance review;
- Desk study, including review of available maps and published information;
- Site walkover;
- Evaluation of potential effects;
- Evaluation of the significance of these effects; and
- Identification of measures to avoid and mitigate potential effects.

6.2.2 Relevant Legislation

The EIAR is prepared in accordance with the requirements of European Union Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (the 'EIA Directive') as amended by Directive 2014/52/EU. The requirements of the following legislation are complied with:

- European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2001 – 2018
- Directives 2011/92/EU and 2014/52/EU on the assessment of the effects of certain public and private projects on the environment, including Circular Letter PL 1/2017: Implementation of Directive 2014/52/EU on the effects of certain public and private projects on the environment (EIA Directive);
- S.I. No. 349 of 1989: European Communities (Environmental Impact Assessment) regulations and subsequent amendments (S.I. No. 84 of 1995, S.I. No. 352 of 1998, S.I. No. 93 of 1999; S.I. No. 450 of 2000; S.I No. 538 of 2001); S.I. No. 30 of 2000 the Planning and Development Act, 2000; and S.I 600 of 2001 Planning and Development Regulations and subsequent amendments, on the assessment of the effects of certain public and private projects on the environment;
- Planning and Development Act, 2000, as amended; S.I. No 296 of 2018: S.I. No. 296 of 2018: European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 which transposes the provisions of Directive 2014/52/EU into Irish law; and,
- The Heritage Act 1995, as amended

6.2.3 Relevant Guidance

The land, soils and geology chapter of this rEIAR was prepared having regard, where relevant, to guidance contained in the following documents:

- Environmental Protection Agency (2017): Draft Guidelines on the Information to be contained in Environmental Impact Assessment Reports;
- Environmental Protection Agency (2015): Draft - Advice Notes on Current Practice (in the preparation of Environmental Impact Statements);
- Environmental Protection Agency (2015): Draft – Revised Guidelines on the Information to be contained in Environmental Impact Statements;
- Environmental Protection Agency (2003): Advice Notes on Current Practice (in the Preparation of Environmental Impact Statements);
- Environmental Protection Agency (2002): Guidelines on the information to be contained in Environmental Impact Statements);
- European Commission (2017) Guidance on Screening;
- European Commission (2017) Guidance on Scoping;

- European Commission (2017) Guidance on the preparation of the Environmental Impact Assessment Report;
- Institute of Geologists Ireland (2013): Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements; and,
- National Roads Authority (2005): Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes.

6.2.4 The Cork County Development Plan

The Cork County Development Plan (2014-2020) ("the CDP") was also consulted as part of the EIA process. The CDP is described in more detail in **Section 3: Planning Policy**. **Table 6.1** shows those policies relating to soils and geology that are considered to be relevant to this assessment.

<u>Table 6.1:</u> **Cork County Development Plan (2014-2020) Soils and Geology Policies and Objectives**

Planning Policy / Objective	**Assessed?**	**Comment**
County Development Plan Objective HE 2-6: Geological Sites Maintain the conservation value of those features or areas of geological interest that are listed in Volume 2, Chapter 3 Nature Conservation Areas, of the plan, and to protect them from inappropriate development.	Yes	Table 5.1 lists all of the Designated sites within 10km of the proposed development including grid connection. Due to the distance the proposed site from the sites, there will be no impacts, direct or indirect.
County Development Plan Objective GI 9-1: Protection of Soils		
Ensure the protection and conservation of the soils in County Cork by encouraging sustainable management practices and the reuse of brownfield lands.	Yes	All excavated soils on the wind farm site will be re-used on site. The use of poles for some 78% of the grid connection consensus the integrity of soil as poles are minimally invasive. Much of the underground cable route is over public roads which has experienced disturbance of soil through construction of the roads.

6.2.5 Appendices

The following documents, referred to in the text, are attached as appendices to this chapter;

- **Appendix 7.1** Geotechnical Site Investigation Report for Wind Farm – Priority Geotechnical Limited, March 2017

6.2.6 Desk Study

Except in exceptional circumstances, impacts on soils and geology tend to be localised and therefore a 5km study area was considered appropriate for the Proposed Development Site. A desk study of the Proposed Development Site and the surrounding study area of 5km was largely completed in advance of undertaking the walkover survey. The desk study involved collecting all the relevant geological data for the Proposed Development Site and local study area. This included consultation with the following:

- Derreenacreenig West Wind Farm EIS, November 2010, prepared by Jennings O'Donovan[16] ("the 2010 EIA");
- Site Investigations Report, March 2017, prepared by Priority Geotechnical Limited ("the Investigations Report") which involved the following fieldwork:
    - Excavation of trial holes (undertaken at each of the proposed turbine locations and along proposed access roads to confirm subsoil lithology);
    - Exploratory drill holes at turbine locations;
    - Geophysical survey; and
    - In-situ and laboratory testing;
- Environmental Protection Agency database (www.epa.ie);
- Geological Survey of Ireland - National Draft Bedrock Aquifer map;
- Geological Survey of Ireland - Groundwater Database (www.gsi.ie);
- Geological Survey of Ireland – 1:25,000 Field Mapping Sheets; and,
- General Soil Map of Ireland 2nd edition (www.epa.ie);

6.2.7 Field Work

A visual inspection of the cable route and surrounding area was undertaken by JOD in August 2021. The purpose of the site investigation was to make assessments of topography, geology and ground stability conditions for the grid connection.

Checks were also made for any surface indications of residual impacts to land, soils, and geology resulting from the construction of the c. 9.6km of overhead line Grid Connection. Particular attention was paid to identifying any potential areas of soil erosion that might be the

[16] Fieldwork was undertaken on 18th and 19th February 2009 and the final assessment was presented in Section 3.4 of the 2009 EIA.

result of incorrect backfilling of the poles. No evidence of any residual impacts to land, soils, and geology was observed.

6.2.8 Impact Assessment Methodology

Using information from the desk study and data from the site investigation, an estimation of the importance of the soil and geological environment within the study area is assessed using the criteria set out in Table 6.1 (NRA, 2008).

Table 6.1. Estimation of Importance of Soil and Geology Criteria (NRA, 2008).

Importance	Criteria	Example
Very High	Attribute has a high quality or value on an international scale. Attribute has a high quality, significance or value on a regional or national scale. Degree or extent of soil contamination is significant on a national or regional scale. Volume of peat and/or soft organic soil underlying route is significant on a national or regional scale.	Geological feature rare on a regional or national scale (NHA). Large existing quarry or pit. Proven economically extractable mineral resource
High	Attribute has a high quality, significance or value on a local scale. Degree or extent of soil contamination is significant on a local scale. Volume of peat and/or sofut organic soil underlying site is significant on a local scale.	Contaminated soil on site with previous heavy industrial usage. Large recent landfill site for mixed wastes. Geological feature of high value on a local scale (County Geological Site). Well drained and/or high fertility soils. Moderately sized existing quarry or pit. Marginally economic extractable mineral resource.
Medium	Attribute has a medium quality, significance or value on a local scale. Degree or extent of soil contamination is moderate on a local scale. Volume of peat and/or soft organic soil underlying site is moderate on a local scale.	Contaminated soil on site with previous light industrial usage. Small recent landfill site for mixed Wastes. Moderately drained and/or moderate fertility soils. Small existing quarry or pit. Sub-economic extractable mineral Resource.
Low	Attribute has a low quality, significance or value on a local scale. Degree or extent of soil contamination is minor on a local scale. Volume of peat and/or soft organic soil underlying site is small on a local scale.	Large historical and/or recent site for construction and demolition wastes. Small historical and/or recent landfill site for construction and demolition wastes. Poorly drained and/or low fertility soils. Uneconomically extractable mineral resource.

The criteria (EPA 2017) for the assessment of impacts require that likely impacts are described with respect to their extent, magnitude, type (i.e. negative, positive or neutral) probability, duration, frequency and reversibility. The descriptors used in this environmental impact assessment are those set out in EPA (2017) Glossary of Impacts as outlined in Chapter 1 of this EIAR. In addition, the two impact characteristics, namely proximity and probability, are described for each impact and these are defined in Table 6.2. In order to provide an understanding of this descriptive system in terms of the geological/hydrological environment, elements of this system of description of impacts are related to examples of potential impacts on the geology and morphology of the existing environment, as listed in Table 6.3. Considering the above categories of rating importance and associated criteria, the following table presents rated sensitivity categories (SNH, 2013).

Table 6.2: Additional Impact Characteristics

Impact Characteristic	Degree / Nature	Description
Proximity	Direct	An impact which occurs within the area of the proposed project, as a direct result of the proposed project.
	Indirect	An impact which is caused by the interaction of effects, or by off-site developments.
Probability	Low	A low likelihood of occurrence of the impact.
	Medium	A medium likelihood of occurrence of the impact.
	High	A high likelihood of occurrence of the impact.

Table 6.3: Impact descriptions related to the receiving environment.

Impact Characteristics		Potential Geological/Hydrological Impacts
Quality	Significance	
Negative Only	Profound	Widespread permanent impact on: - The extent or morphology of a designated site - Regionally important aquifers. - Extents of floodplains. -Loss of a geologically sensitive site Mitigation measures are unlikely to remove such impacts.
Positive or Negative	Very Significant/ Significant	Local or widespread time dependent impacts on: -The extent or morphology of a cSAC / ecologically important area. -A regionally important geological feature (or widespread effects to minor geological features). -Extent of floodplains. Widespread permanent impacts on the extent or morphology of a NHA/ecologically important area, Mitigation measures (to design) will reduce but not completely remove the impact – residual impacts will occur.
Positive or Negative	Moderate	Local time dependent impacts on: - The extent or morphology of a cSAC / NHA / ecologically important area. - A minor geological feature. - Extent of floodplains. Mitigation measures can mitigate the impact OR residual impacts occur, but these are consistent with existing or emerging trends
Positive or Negative	Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.

Impact Characteristics		Potential Geological/Hydrological Impacts
Quality	**Significance**	
Positive or Negative	Not Significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Neutral	Imperceptible	No impacts, or impacts which are beneath levels of perception, within normal bounds of variation, or within the bounds of measurement or forecasting error.

Table 6.4 Weighted Rating of Significant Environmental Impacts

Sensitivity (Importance of Attribute)	Magnitude of Impact			
	Negligible (c. 0%)	**Small (<15%)**	**Moderate (15-50%)**	**Large (>50%)**
Extremely High	Imperceptible	Significant	Profound	Profound
Very High	Imperceptible	Significant / Moderate	Profound / Significant	Profound
High	Imperceptible	Moderate / Slight	Significant / Moderate	Profound / Significant
Medium	Imperceptible	Slight	Moderate	Significant
Low	Imperceptible	Imperceptible	Slight	Slight / Moderate

6.2.9 Scoping Responses and Consultation

A scoping exercise was undertaken for the project and is described in full in chapter 2 of this report.

6.3 BASELINE DESCRIPTION

6.3.1 Introduction

This section provides a description of the soils and geology of the Proposed Development Site based on the results of surveys and desk information, and a summary of any information required for the assessment that could not be obtained.

6.3.2 Land Use

The vegetation and land use of the grid connection route is almost as varied as the topography but is predominantly agricultural land and public roadway.

Principle habitats in the area consist of a mosaic of wet heath/blanket bog, wet grassland and conifer plantations. Land use in the surrounding area is a mix of agriculture (mainly sheep and cattle grazing) and conifer plantation forestry.

6.3.3 Bedrock Geology

The published bedrock geology mapping for the area is illustrated in Figure 6.1 – Mapped Bedrock Geology. The majority of the wind farm area including the start of the grid connection (overhead line) is underlain by the Gun Point Formation of the Old Red Sandstone Magnafacies. This formation is dominated by green-grey sandstones and purple siltstones. During the site visit, this formation was observed to be well folded and generally steeply dipping across the site. The bedrock troughs created by differential erosion in the Gun Point Formation sandstone at Derreenacrinnig West function as basins for the accumulation of peat. As the overhead line continues northwards, it crosses Toe Head Formation which is dominated by cross-bedded sandstones and purple siltstones with some mudstones.

It then crosses Old Head Sandstone Formation comprising Flaser-bedded sandstone and minor mudstone.

The overhead line crosses into Ardaturrish Member which is black mudstone and silt-lensed mudstone. It changes to underground cable and then proceeds into Toe Head Formation and transitions back to overhead line before crossing into Castlehaven Formation which is dominated by purple mudstone and siltstone.

A short section of underground cable will be constructed within Toe Head Formation just north of the Castlehaven Formation. The overhead line will then continue north-westwards across the Toe Head Formation, then into Old Head Sandstone Formation and then into Ardaturrish Member where it will change direction to go south-westwards through the Ardaturrish Member and crosses Old Head Formation before coming back into Ardaturrish Member. It then crosses Reenagough Member which has massive and flaser-bedded sandstone before entering Reenydongan Formation which is characterised by calcareous mudstone and thin limestone. While crossing this formation, the grid connection will go from overhead line to underground cable. It then crosses into Ardnamanagh Member (dark grey laminated limestone) before turning north-westwards back into Reenydongan Formation where it will transition back to overhead line. It will then cross into Ardnamanagh Member initially as overhead line, then underground cable, then overhead line and then underground cable to Ballylickey Sub-station.

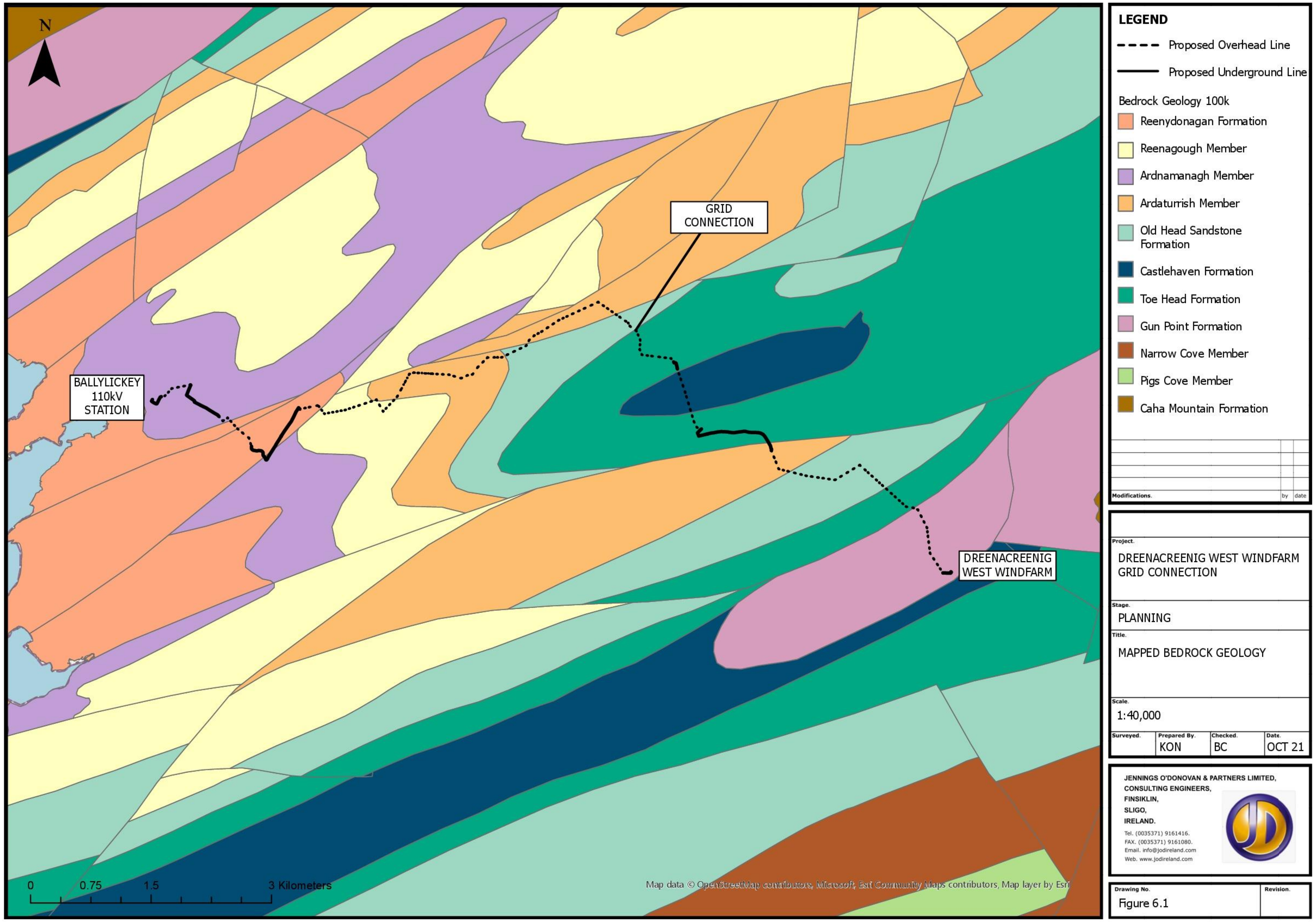

Figure 6.1 - Mapped Bedrock Geology

Exposed bedrock was visible close to the wind farm site consistent with published information. However, much of the route was either grassland or forestry or roads with no rock visible.

Exposed bedrock was observed across the Wind Farm Site during the field investigations and during construction work to date. This bedrock was observed to be consistent with the published information for the area.

As part of the Site Investigation carried out in 2016/2017, 4 rotary cored boreholes were executed (turbine locations T01, T02, T03 and T04). Rock was encountered at the following depths:

Table 6.5: Rock Depths

Turbine Location	Depth to Rock	Type of Rock
T01	1.65m	Weak Grey Siltstone
T02	1.55m	Fine grained Sandstone
T03	1.55m	Purple red Siltstone overlying Sandstone at 4.55m
T04	1.60m	Weak purple grey Siltstone overlying Sandstone at 5.05m

From the above, it is evident that rock is typically encountered at 1.55-1.65 (average 1-60m) below ground level.

6.3.4 Soils and Subsoil Geology

Peat is the dominant soil in the general area of the wind farm sub-station and going north-westwards for the first c.1km of the route.

The next main soil classification is Drimindy coarse loaming draft with Siliceous stones which then runs into Schull coarse loamy drift with siliceous stones near Ballylicky.

Thus, apart from the first c.1km which is in peat overlying siltstone/sandstone, the remining c.13km of route is expected to be within loamy soils with stones with occasional peat.

These are illustrated in Figures 6.2 and 6.3.

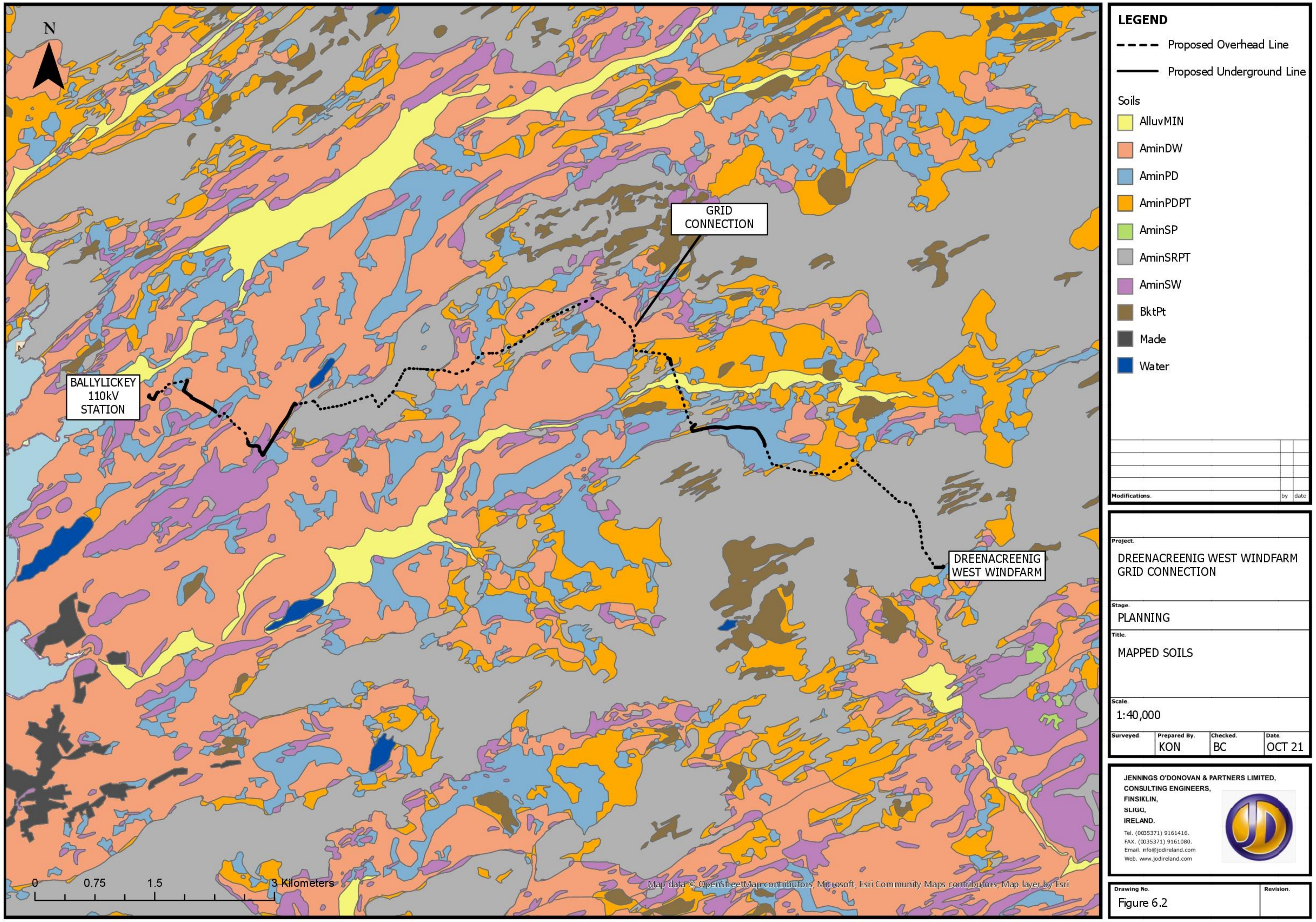

Figure 6.2 – Mapped Soils

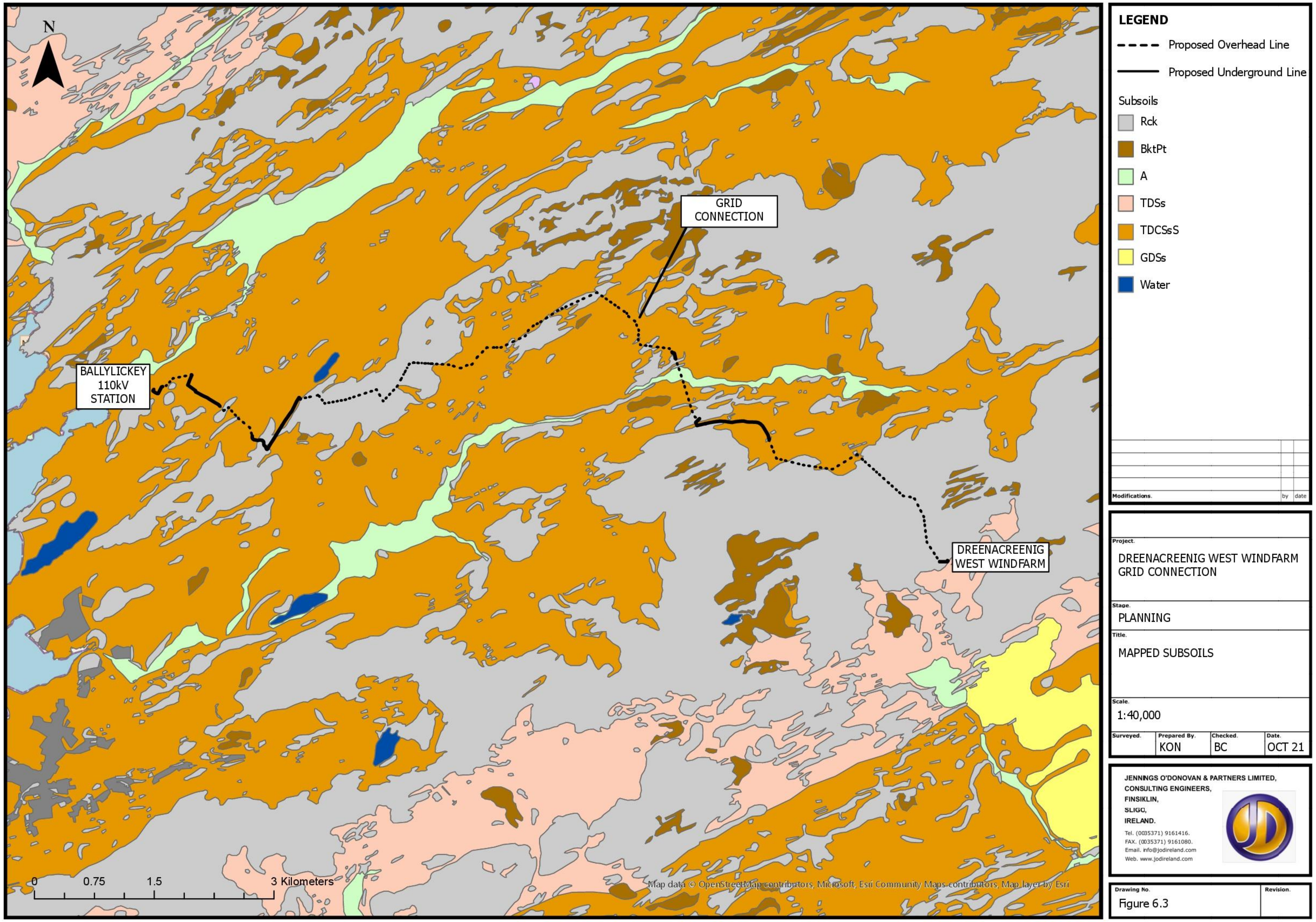

Figure 6.3 - Mapped Subsoils

Consultation with recent EPA and Teagasc mapping of soils and subsoil (Ref. 5) indicates that the majority of the wind farm site is characterised by exposed bedrock where overlying unconsolidated deposits are either thin or absent. The remaining ~ 10% of the site is overlain by upland blanket peat contained in east-west trending basins within bedrock depressions on the northern slopes of the.

Gouge coring was undertaken by MEL at 76 locations across the wind farm site at which preliminary geotechnical tests were undertaken on the soil and subsoil geology for the purpose of determining baseline slope potential for mass movement, peat substrate shear strength and overall stability of the ground under baseline conditions.

6.3.5 Composition and Character of PEAT

The peat with the wind farm can be described as 'Brown to Dark Brown, soft, moist to wet, fibrous to amorphous PEAT'. Results from the field investigation indicate low to mid to high humification values, ranging generally from H3 to H7, at peat depths between 0.15 and 3.1m. High humification values, ranging around H9 occur at peat depths greater than approximately 2m or in areas containing wet amorphous PEAT. Overall therefore, the wind farm site is characterised by moderate humification rates at shallow peat depths and higher humification values at peat depths greater than approximately 2m.

6.3.6 Composition and Character of Mineral Subsoils

The mineral subsoil examined from exposures and from core samples taken at the wind farm site was identified as beige to grey, firm to stiff, sandy, CLAY/SILT with some angular gravel and occasional cobbles which was interpreted as glacial till. An iron pan was observed in the mineral subsoil approximately 0.25m on average below the peat – mineral subsoil interface across the wind farm site.

6.3.7 Spatial and Depth Distribution of Mineral Subsoils

The glacial tills identified along the development are likely to be of sedimentary parent bedrock origin. The glacial tills are located under the peat across most of the site except where exposed bedrock is present.

6.3.8 Slope Stability

Consultation with the GSI landslide database indicates that there is historic recorded evidence of two bog or landslide occurrences within 20km of the proposed development. One is located 17 km to the north at GRID REF. 101591, 67019 at Gortacreenteen in County Kerry where a landslide from an embankment was recorded in 2004. The second is located 19.5 km to the north at GRID REF 113730, 72070 at Fuhiry in County Cork where a peat landslide from a mountain valley was recorded in 1997. There are no landslide events recorded within 17 km of the Derreenacrinnig West site.

Slopes in the Derreenacrinnig West Wind Farm site range from 0º-80º. The steeper slopes (>20 º) are largely confined to the southern side of the site uphill of the proposed access road with the northern side of the site (where the grid connection starts) exhibiting a series of steps or terraces, the location of which is controlled by local geological structure with steeper slopes found between flatter terraces.

During the site visits. No ground disturbance or stress indicators were observed throughout the grid connection route or the wind farm site, i.e. no fencing or trees showed any signs of ground movement, no fault scarps (a scarp is a steep slope created by a mass movement), tension cracks or steep slopes prone to slope stability problems were observed.

Existing cuttings and ditches showed no signs of slipping or potentially significant instability.

6.3.9 Wells

There are no published wells in the vicinity of the grid connection route with the nearest well being some 8km to the south-east of the wind farm/start of grid connection (**see Figure 6.4**).

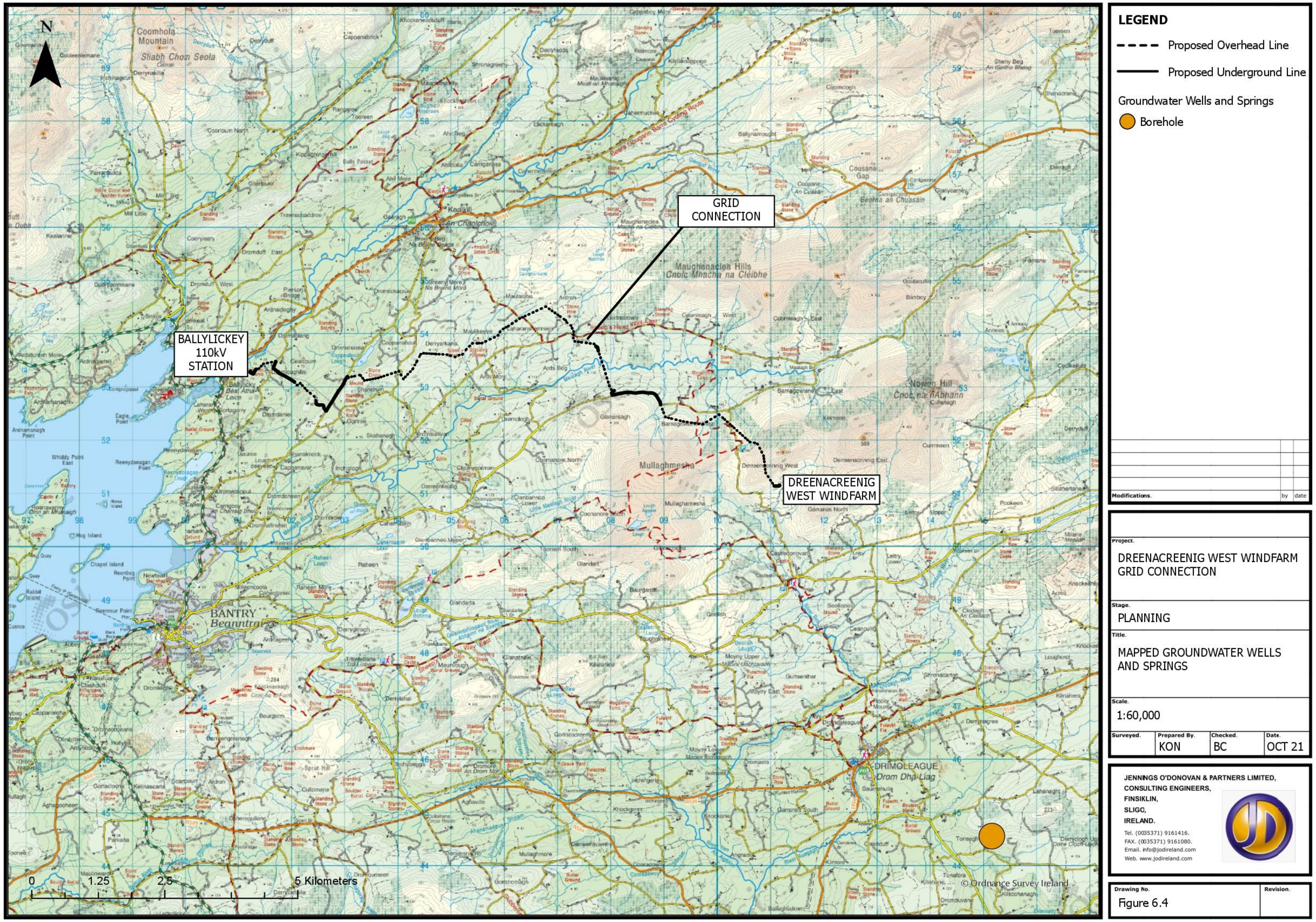

Figure 6.4 – Mapped Groundwater Wells and Springs

6.4 CHARACTERISTICS OF THE DEVELOPMENT

The grid connection will connect the Derreenacrinnig Wind Farm Site to the existing Ballylickey Substation.

The Proposed Development is described in full in Section 2: Project Description.

The Subject Development consists of a 20 kV grid connection to facilitate the connection of the existing permitted Derreenacrinnig West windfarm to the national electricity grid at the 110kV Ballylickey Substation, as described in Chapter 2. The electricity is transmitted as a three-phase power supply with three individual conductors. For the overhead line sections, these are the three separate wires at the top of the poles. For the underground cable, all three phases are contained within a single duct. The design complies with appropriate technical and operational requirements including mechanical and operational requirements as set out in the relevant ESB Specifications for 20kV lines. The underground cable route will require the excavation of soil and subsoil to facilitate trenching for the cable ducts. Significant excavations will not be required, and all disturbed areas will be returned to their pre-construction condition.

The proposed development comprises the removal of c.9.6km of overhead line already constructed as well as the construction of c.14.05km of new grid connection of the 14.05km of new grid connection, 10.75km will be overhead line and 3.3km will be underground buried cable, largely in public roads.

For the underground sections, the trench will be 0.325m wide by 0.95m deep. For each pole, a hole c.2m long x 0.6m wide x 2.3m deep will be excavated with all but 0.08m^3 of the excavated material reinstated.

6.5 DO NOTHING IMPACT

Much of the site development/earth works for the wind farm have already been carried out which indicate that parts of the site have already experienced impacts to baseline conditions. There is also commercial afforestation along the route as well as the development of public roads.

Should the proposed development not proceed, the existing land-use practice of agriculture and commercial forestry will continue, unaffected.

6.6 POTENTIAL IMPACTS OF THE DEVELOPMENT

6.6.1 Construction Phase

6.6.1.1 Peat, Subsoil and Bedrock Removal

The removal of peat or mineral subsoil or rock is a direct, permanent impact on the soils and geology aspect of the environment.

The removal of bedrock for trench/joint bay construction or for poling is a direct, permanent and potentially significant negative impact for this development. Table 6.6 below presents a summary of the soil impacts in terms of volumes of excavation.

Table 6.6

Table 6.6 - Soils Impact Analysis											
Element of Grid Connection	Underground Cable Length (m)	Number of Poles	Soil Type/ Surface Description	Volume of Peat to be Excavated (m3)	Volume of Topsoil to be Excavated (m3)	Volume of Soil / Subsoil to be excavated (m3)	Volume of Rock to be Excavated (m3)	Volume of Road Surfacing to be Excavated (m3)	Volume to be Backfilled (m3)	Volume for Disposal / Reuse Elsewhere (m3)	Material for Disposal / Reuse
Wind Farm Substation to Pole P157	113	0	Exposed Bedrock which may be overlain by peat up to 0.5m deep	9.2	0.0	0.0	25.7	0.0	24.8	10.1	Rock
Pole P157 to Pole P145	0	12	Peat Overlying Bedrock	7.2	0.0	0.0	23.0	0.0	29.3	0.9	Rock
Pole P145 to Pole P143	0	2	Conifers - Peat overlying subsoil	1.2	0.0	3.8	0.0	0.0	4.9	0.2	Subsoil
Pole P143 to Pole P127	0	16	Grassland overlying subsoil	0.0	5.8	36.5	0.0	0.0	41.0	1.2	Subsoil
Pole P127 to Pole P114	0	13	Grassland overlying subsoil	0.0	4.7	29.6	0.0	0.0	33.3	1.0	Subsoil
Pole P114 to Pole P113	1046	0	Roadway (936m) + Lands (110m)	0.0	10.7	281.8	0.0	49.1	24.1	317.5	Road Surfacing and Subsoil
Pole P113 to Pole P102	0	12	Grassland overlying subsoil	0.0	4.3	27.4	0.0	0.0	30.8	0.9	Subsoil
Pole P102 to Pole P101	113	0	Grassland overlying subsoil	0.0	11.0	23.9	0.0	0.0	23.0	11.9	Subsoil
Pole P101 to Pole P81	0	21	Grassland overlying subsoil	0.0	7.6	47.9	0.0	0.0	53.8	1.6	Subsoil
Pole P81 to Pole P75	0	6	Grassland overlying subsoil	0.0	2.2	13.7	0.0	0.0	15.4	0.5	Subsoil
Pole P75 to Pole P71	0	4	Peat Overlying Bedrock	2.4	0.0	0.0	7.7	0.0	9.8	0.3	Rock
Pole P71 to Pole P46		25	Grassland overlying subsoil	0.0	9.0	57.0	0.0	0.0	64.1	1.9	Subsoil
Pole P46 to Pole P39	0	7	Peat Overlying Bedrock	4.2	0.0	0.0	13.4	0.0	17.1	0.5	Rock
Pole P39 to Pole P25	0	14	Grassland overlying subsoil	0.0	5.0	31.9	0.0	0.0	35.9	1.1	Subsoil
Pole P25 to Pole P21	0	4	Peat Overlying Bedrock	2.4	0.0	0.0	7.7	0.0	9.8	0.3	Rock
Pole P21 to Pole P18	0	3	Grassland overlying subsoil	0.0	1.1	6.8	0.0	0.0	7.7	0.2	Subsoil
Pole P18 to Pole P17	1081	0	Verge of Roadway	0.0	105.4	228.4	0.0	0.0	237.1	96.6	Subsoil
Pole P17 to Pole P8	0	10	Grassland overlying subsoil	0.0	3.6	22.8	0.0	0.0	25.6	0.8	Subsoil

Table 6.6 - Soils Impact Analysis											
Element of Grid Connection	**Underground Cable Length (m)**	**Number of Poles**	**Soil Type/ Surface Description**	**Volume of Peat to be Excavated (m3)**	**Volume of Topsoil to be Excavated (m3)**	**Volume of Soil / Subsoil to be excavated (m3)**	**Volume of Rock to be Excavated (m3)**	**Volume of Road Surfacing to be Excavated (m3)**	**Volume to be Backfilled (m3)**	**Volume for Disposal / Reuse Elsewhere (m3)**	**Material for Disposal / Reuse**
Pole P8 to Pole P7	625	0	Roadway (140m) + Lands (485m)	0.0	47.3	141.1	0.0	7.4	106.4	89.4	Road Surfacing and Subsoil
Pole P7 to Pole P1	0	8	Grassland overlying subsoil	0.0	2.9	18.2	0.0	0.0	20.5	0.6	Subsoil
Pole P1 to Ballylickey Substation	202	0	Grassland overlying subsoil	0.0	19.7	42.7	0.0	0.0	44.3	18.1	Subsoil
Joint Bay in Lands			Grassland overlying subsoil	0.0	1.4	5.9	0.0	0.0	1.4	5.9	
5 no. Joint Bays in Roads			Roadway overlying subsoil	0.0	0.0	34.0	0.0	2.0	0.0	36.1	
Sub-totals	**3180**	**157**		**26.6**	**241.6**	**1053.5**	**77.5**	**58.5**	**860.2**	**597.5**	
Removal of Existing Poles				17.4	65.8	377.3	0	0	460.5		
Totals				**44.0**	**307.3**	**1430.7**	**77.5**	**58.5**	**1320.6**	**597.5**	

The quantities are based on the typical trench details shown on Drawing 4636-P-GCR-200-1 with a trench width of 325mm and a depth of 925mm. However, to account for local areas of over excavation, a depth of 950mm is assumed.

For joint bays, the required plan area is 2.5m x 1.63m and an average depth of 1.6m is assumed to include the floor. However, for working space, a width of 1.815 is assumed.

For pole construction, it is assumed that a hole c.2.2m deep, 2m long and 0.6m wide is excavated. This is a worst case scenario as it may be possible to push some poles into the ground after 1m of excavation. However, much of the excavated material is backfilled into the hole. Assuming an average diameter per pole of 0.21m and that each pole is 2.3m into the ground, then the volume of displaced soil or rock will be 0.08m^3 per pole.

Some 26.6, say 30m^3 of peat will be excavated all of which will be re-used for reinstatement of pole holes on trenching.

Some 241.4, say 250m^3 of topsoil will be excavated all of which will be re-used for reinstatement of pole holes or trenching.

Approximately 1,049, say 1,100m^3 of soil/subsoil will be excavated – however much of it can be reused for reinstatement/backfilling of pole holes or trenching with c.487m^3 to be disposed of to a licenced facility. However, some material could be used should there be shortfall in nearby filling holes where the existing grid connection is to be removed.

Approximately 58.5m^3 of road surfacing will be excavated. This will be handled separately and disposed of separately to licenced facility.

Some 77.5m^3 of rock will be excavated, of the 25.7m^3 excavated within the wind farm site, some 24.8m^3 can be re-used in trench backfilling/reinstatement with the balance (c10m^3) used in the construction of wind farm roads/hardstands. Surplus rock excavated elsewhere (estimated at 2m^3) can be disposed of to a licenced facility.

Mitigation and reductive measures with regard to materials budget handling and potential indirect impact on water quality from subsoil and bedrock excavation activities are outlined in the mitigation section of this report.

For pole removal, it is envisaged that similar sized holes will be required as for construction. Thus, for the removal of the existing poles, it is estimated that 17.4m^3 of peat, 65.8m^3 of topsoil and 377.3m^3 of subsoil will be excavated and that all such material will be used for backfilling /reinstatement. It is likely that much of this material was previously disturbed.

6.6.1.2 Vehicular Movement

During the construction phase of the proposed development, vehicles will cross over or excavate into areas of bog in order to construct the access roads and gain access to the proposed development areas. This is considered to be a short-term, direct impact on the peat and in-situ earth materials, but it is not considered to be a potentially significant negative impact of the proposed development, especially as this type of vehicular impact has already occurred on the site during afforestation works.

6.6.1.3 Excavation Works

The approach and methodology in which excavation of in-situ peat and earth materials is undertaken is very important for ground stability in blanket bog environments. Peat is 80-90% water and if it is not sufficiently supported during excavation works (where high slope exists), excavation has the potential to cause potential slippage or mass failure.

6.6.1.4 Storage and Stockpiles

Of significance during the construction phase of the project is the excavated materials handling, storage and re-use. There is potential for direct and indirect negative impacts on ground stability and water quality, for example slope failure due to excessive loading (surcharge) and the release of peat washings and suspended solids to the surface water system. This potential impact by construction works activity on water quality impact is discussed in the Chapter 7 - Water.

6.6.1.5 Ground / Peat Stability

Mass movements in peat can take the form of either bog burst or bog slide. Historical evidence suggests that raised bogs are more prone to bog bursts while bog slides are more common on blanket bogs. Bog slides are prone to occur in certain upland locations due to their peculiar topography, ground composition and hydrology. When a slide occurs, it acts as a safety valve to restore equilibrium. Peat slides generally occur either during or immediately after periods of heavy rainfall. Failures are especially likely to occur where there is a break of slope at the edge of an upland plateau of peat. Records indicate that bog bursts naturally occur on shallow slope angles varying between 3° and 6° while bog slides appear to occur on slopes that are steeper than 6o. The most destructive bog slides involve the combination of slide materials with floodwaters, diluting the peat and mud in waterways and accelerating the velocity of the debris flow.

Following well documented bog slides on the slopes of Dooncarton and Barnachuille mountains, Co. Mayo in September 2003 and more significantly at Derrybrien, Co. Galway in October 2003, the potential for bog failure has come to the fore in consideration of planning for wind farm developments on blanket and raised bogs. The following causal factors for bog failure are identified following research and assessment of recent slides and from historical evidence over the last 200 years in Ireland.

Research into the history of bog slide occurrence indicates that the majority of bog slides have occurred on the blanket bogs in the west of Ireland where rainfall is highest. Here, bog slides tend to be more frequent during the autumn and winter months.

The following criteria are considered to be the main causal or contributory factors to bog slide occurrence:

Slope is the single most important factor for blanket and raised bogs. Bog slides are especially likely to occur where there is a break in slope at the edge of an upland plateau of blanket peat, providing a line of weakness. While initial failure is likely to be slippage (translational or rotational faults), semi-fluid to fully fluid behaviour is the main movement mechanism downslope. Slope gradient imparts kinetic energy to the sliding material.

The depth of peat and its relationship to humification (the degree to which the fibre structure of the peat has decayed), pore water pressure, shear vane strength and other parameters generally indicates that the deeper the peat profile the more unstable it is, if external controls such as slope, drainage, removal of adjoining earth materials are changed. Exact depth threshold of stability is not applicable due to the variability of peat environments (raised bog, blanket bog or fen habitats) and their site-specific conditions. However, as a rule of thumb peat of depths greater than >2m is significantly more vulnerable to instability than shallower peat at <1m depth, and in particular the top-layer of acrotelm (living) peat at <0.2m.

The bedrock relief can play an important role in both the location of deeper peat zones within an upland blanket bog complex, as well as the stability of the overlying peat unit. Upland bedrock geology is usually ancient and has experienced a long history of tectonic folding, faulting and weathering. This usually means that the “rockhead” or surface of the bedrock is irregular and contains depressions or localised “basins” into which peat accumulates over time.

In cross section, these deep peat pockets are characterised by an ellipsoidal shape, with the surface of the peat doming upwards illustrating characteristics of a "raised bog" microcosm. These peat pockets are usually highly saturated with water with no outlet for 'basin' drainage; hence they are characterised by high pore water pressure. They usually coincide with "quaking bog" ecological zonations. In terms of ground stability, the deep peat is supported by the underlying geology and relief morphology (basin walls) for slope stability, and if these walls are undermined by interference there is a high risk of causing a peat slide at these locations.
The pattern of recent precipitation such as intense localised rainfall (or melting snow) is an important trigger mechanism.

Antecedent weather conditions such as drought conditions are identified as a contributing factor. In the case of the landslides at Dooncarton and Barnachuille in September 2003 and at Derrybrien October 2003, short intense periods of heavy rainfall followed an exceptionally dry late summer. Historically, the Owenmore bog slide in Erris, Co. Mayo (1819) was also preceded by two months of drought. Sustained dry conditions leads to high soil moisture deficit (SMD). This dries the blanket peat, causing shrinkage and desiccation cracks which in turn can provide pathways for lubrication of solid mass when precipitation subsequently occurs.

The presence of impermeable material at the base of the peat causes water to accumulate at the base of the peat after recent rainfall and may lubricate a slip layer of humified peat near the base. Elevated pore pressure provides buoyancy forces, which accompanied by gravitational force can cause the bog slide. In many cases an iron or mineral pan is identified within the upper mineral subsoil or weathered bedrock. This pan impedes downward migration of groundwater and a plane of seepage forms above the pan.

Some bog slides are caused by excessive interference e.g. opening of turf banks, opening deep drains on a bog. All drains should be perpendicular or oblique to slope contour not parallel to it.

Site specific assessment of the potential for bog failure at the Derreenacrinnig West Wind Farm site indicates the following:

Much of the site is underlain by peat between 0.5 and 2-3 metres deep. Turbines 3, 5, 6, and 7 are underlain by exposed bedrock while turbines 1, 2, and 4 are underlain by peat <0.5m deep. A hard pan was identified from available substrate exposures and from site investigation results at the site. This hardpan was usually located in the mineral subsoil approximately 0.25m beneath the peat – mineral subsoil interface.

Site investigations reveal that either bedrock or a firm to stiff, beige to grey, sandy CLAY/SILT material interpreted as glacial till underlies most of the Derreenacrinnig West site. This material is probably a lodgement till of Quaternary age.

Slopes at the Derreenacrinnig West site range from 0º-80º with all the planned turbines on slopes of <15º.

Shear vane test results indicate a relatively weak to moderately strong peat at the Derreenacrinnig West site. Geotechnical assessment of the proposed turbine locations indicates stable baseline peat / ground conditions at these locations.

In constructing the access road through the proposed site of development, if peat depths exceed 1.0m in depth, specific geotechnical ground testing and preparation (where necessary), excavation supervision and management is required.

There are historical records of two land / peat-slide events within 20km of the study area. There are no visual indicators of significant slope instability at the site, such as concentric cuts, healed tension cracks or leaning fence lines.

At the Derreenacrinnig West Wind Farm site, while published records and field investigations indicate baseline geotechnical stability, there is still a risk of peat instability and a resultant peat slide occurring, particularly during the construction phase of the development. This low risk or probability is a function of the introduced variables involved in the construction phase of the project (e.g. excavation type and methodology, drainage during earthworks, inappropriate stockpiling) and to a lesser degree during the operational phase of the project (poor constructed drainage design).

Much of the large scale earthworks have been completed on the wind farm site without incident. However, for the grid connection, the extent of trenching required has been minimised to a shallow peat area overlying rock within the wind farm site. Only localised intrusion is to be carried out elsewhere to that required for poling. During the previous poling activity, no peat stability issues were encountered.

6.6.1.6 Subsurface and Underground Effects

While the geology does not indicate the presence of limestone on any aquifers, it is possible that cementitious products from trench backfill could penetrate beyond the trench into rock (particularly if wetland) until they harden. While these effects are localised, they have the potential to change the nature the rock in the immediate vicinity of the trench.

6.6.1.7 Waste Generation / Management

Construction generates waste as a by-product of development. In the case of this site, solid waste will be generated by the excavation of surplus earth materials. The excavated materials have the potential to have significant, direct impacts on ground stability and the baseline geochemical environment and indirectly on the site's hydrology.

Waste can also be generated as a function of introduced construction materials (e.g. cementitious materials) that are subsequently not used or not exhausted during the construction phase. Depending on how inert these different materials are compared to the existing environment, they can cause local change in geochemical chemistry which in turn can impact hydrochemistry and thus ecology.

6.7 OPERATIONAL PHASE

No new impacts are anticipated to arise during the operation phase of the project on the geological, geomorphological and geotechnical environment.

6.8 MITIGATION MEASURES

A constraints map identifying geotechnical exclusion zones can be viewed in Figure 6.3 Geotechnical and hydrological constraints map. Recommended mitigation measures for each of the impacts are outlined below.

6.8.1 Mitigation by Avoidance

A process of "mitigation by avoidance" was undertaken by the EIA team during the design of the grid connection and associated infrastructure layout. A substantial portion of the grid connection will be by overhead line with minimal intrusion into soils and subsoils. Where underground cabling is proposed, much of this is in public roads or verges where stability issues do not arise.

- The soil and subsoil which will be excavated during the construction phase will be mounded local to the trench. Where the trench is in an untrafficed area, selected excavated material will be reinstated into the trench. Within fields, grass/topsoil will be restored;

- No trenches will be constructed in any designated sites such as NHAs or SACs or Features of Geological Significance and such areas have been avoided in the selection of the grid route;

6.8.1.1 Mitigation by Reduction

- The excavation of materials should be minimised as far as possible on-site during the construction phase;
- Topsoil/grass sods will be stored for the shortest time possible (1-5 days). Where possible, the upper vegetative layer will be stored with the vegetation part of the sod facing the right way up to encourage growth of plants and vegetation.
- Any excess temporary mounded spoil in storage for longer periods (e.g., at joint bays) will be covered by a polyethylene sheet or seeded at the earliest opportunity. This will prevent erosion of soil. Silt fences will be installed around stockpiles to limit movement of entrained sediment in surface water runoff.
- In order to minimise erosion of mineral subsoils and loss of organic matter, stripping of topsoil will not take place during extremely wet periods (to prevent increased silt rich runoff). Temporary drainage systems will be required to limit runoff impacts during the construction phase.
- Bog mats will be used to support vehicles on soft ground, reducing soil erosion and avoiding the formation of rutted areas, in which surface water ponding can occur; and

6.8.1.2 Storage and Stockpiles – Mitigation Measures

Mitigation by Avoidance

- There will be no permanent stockpiles of excavated materials left on-site following completion of the grid connection. Surplus excavated material will be removed off site to a licenced landfill as the work progresses.

Mitigation by Reduction

- Any excess temporary mounded spoil in storage for long periods will be covered by a polyethylene sheet or seeded at the earliest opportunity. This will prevent erosion of soil. Silt fences will be installed around stockpiles to limit movement of entrained sediment in surface water runoff. The use of bunds around earthworks and mounds will prevent egress of water from the works; and

- In order to minimise erosion of mineral subsoils, stripping of topsoil will not take place during extremely wet periods (to prevent increased silt rich runoff). Temporary drainage systems will be required to limit runoff impacts during the construction phase.

6.8.1.3 Vehicular Movements – Mitigation Measures

Mitigation by Avoidance

- Plant and machinery should be restricted to movements within the delineated development footprint.
- In order to minimise erosion of mineral subsoils stripping of topsoil will not take place during extremely wet periods (to prevent increased silt rich runoff). Temporary drainage systems will be required to limit runoff impacts during the construction phase.

Mitigation by Reduction

- Only plant and machinery selected specifically for construction of the works will be used. Once tasks are completed, plant will be removed from site.

6.8.1.4 Ground Stability – Mitigation Measures

Mitigation by Avoidance

- Mitigation measures proposed for the trenching and excavation works will involve an experienced engineer visiting the sites of works to supervise all excavations and who will also review and approve the specific methodologies in use at specific locations.

Mitigation by Reduction

- Any excavations on identified unstable subsoils (very low likelihood) which could weaken the upslope area of the soil should be supported by a structure such as a trench sheeting or trench boxes to prevent lateral slippage;
- In any excavations on unstable soil, the pore water pressure should be low at all times. Excessive ponding of water should not be permitted in newly excavated areas and following rainfall events, sumps should be drained to carry water away, thus preventing a build-up of pore water pressure which could potentially lead to instability of the soils; and
- Heavy rainfall events are a catalyst for landslips/trench collapses. The emergency response system will be developed for the construction phase. This will involve 24-hour meteorological forecasting. Where the likelihood of an extreme rainfall event such as a 1:100-year rainfall event is predicted, responses such as cessation of construction activity on site until such a time as the runoff has flowed away from the excavations will be implemented.

6.8.1.5 Soil Contamination – Mitigation Measures

Mitigation by Avoidance

- All construction materials imported to site during the construction period, for example, rock, cement, ducting, cables or cable drums etc., will be removed from site following completion.
- As far as possible, a balance should be maintained between materials excavated and those brought to site for construction to reduce the need for storage and disposal of waste, particularly foreign materials which may have a different geochemistry or hydrochemistry. Recycling and reuse of materials on-site will be carried out as much as possible. It is envisaged that rock will be sourced from the adjacent quarries to be compatible with the local geochemistry.

Mitigation by Reduction

- Minimal refuelling or maintenance of construction vehicles or plant will take place on site.
- Where On-site re-fuelling is essential, it will be undertaken using a double skinned bowser with spill kits on the ready for accidental leakages or spillages.
- No fuels will be stored on site.
- The plant used during construction will be regularly inspected for leaks and fitness for purpose; and,
- Spill kits will be available to deal with and accidental spillage in and outside the re-fuelling area.
- Excavated road surfacing material will be removed off site to a Licenced Facility.

6.8.1.6 Subsurface and Underground Effects – Mitigation Measures

- Subsoil and bedrock will be lined with a geosynthetic clay liner where infrastructure is to be laid directly on top of bedrock and where the thickness of sub-formation overburden is less than 0.6m.

6.9 RESDUAL IMPACTS OF THE DEVELOPMENT

6.9.1 Construction Phase

The residual impact on the soils and geology environment during the construction phase of the development is that there will be a change in ground conditions at the site with the replacement of natural materials such as peat, subsoil and bedrock by concrete, subgrade and surfacing materials. This is a negative, slight, direct permanent change to the materials composition at the site.

6.9.2 Operational Phase

The residual impact on the soils and geological environment during the operation phase of the development is that there will be a slight permanent change in ground where poles joint bays and trenches are present. The residual impacts of the grid connection will be negative and permanent but slight in terms of their overall effect on the local environment.

No new impacts are envisaged (i.e. beyond those identified during the construction phase) during the operational phase. The road trenching works will have been reinstated to the requirements of the Road Opening Licence.

6.10 MONITORING

In relation to the geological and geotechnical impacts identified the following recommendations are made in terms of site monitoring:

An independent, qualified geotechnical engineer/engineering geologist should be retained throughout the construction phase, so as to monitor and supervise construction activities on a regular frequency.

6.11 CONCLUSIONS

If the mitigation measures outlined for the geological and geotechnical aspects of the site are implemented as described in this report, the resultant predicted impact of the development is that there will be a change in ground conditions with the replacement of a small area of natural materials with concrete, timber and road construction materials. To ensure that the mitigation and control structures operate to stated purpose monitoring of ground conditions at an agreed frequency during the operation phase is recommended. If the guidelines outlined in this report are adhered to during construction and operation of the proposed wind farm the predicted overall impact of the development on the soils and geology of the site is slight, negative, and permanent.

6.11.1 Decommissioning Phase

No new impacts are predicted during the decommissioning phase of the EIA Development on the geological, geomorphological and geotechnical environment; therefore, no mitigation is required beyond normal best practice construction methods such as water, silt and hydrocarbon management.

6.11.2 Cumulative Effects

Cumulative effects from the EIA Development and other developments in the area will only occur during the construction and decommissioning phases of the Development as grid connections wind farms do not have an effect on soils and geology during operation.

While much of the earthworks for site roads and some hardstands have been carried out for the windfarm, there remains the excavation for foundations as well as the completion of hardstands. Site trenching and cabling is required as well as the excavation of the foundations for the sub-station building. These works are likely to be undertaken concurrent or in advance of the construction of the grid connection.

Provided the mitigation measures in the EIAR for the wind farm are implemented by the wind farm developer, no significant impacts on land, soils and geology are anticipated during the construction or operation phases of the grid connection.

6.12 SUMMARY OF SIGNIFICANT EFFECTS

This assessment has identified no potentially significant residual effects on either the Proposed Grid Connection Development or the Wind Farm Site.

6.13 STATEMENT OF SIGNIFICANCE

This Section has assessed the significance of potential effects of the proposed EIA Development on the soil and geology resource of the proposed grid connection route. The proposed EIA Development has generally been assessed as having the potential to result in effects of a negative, slight direct, high probability, permanent impact or lower.

Given that only effects of significant impact or greater are considered "significant" in terms of the EIA Regulations, the potential effects of the EIA Development on the soils and geology resources are considered to be not significant.

7 WATER

7.1 INTRODUCTION

7.1.1 Background and Objectives

An application for Planning Permission is sought for the removal of a partially built grid connection and for the construction of a new Grid Connection to connect the previously consented Derreenacrinnig West Wind Farm to the National Grid at the existing 110kV Ballylicky ESB substation. A detailed description of the project proposals is set out in Chapter 2.

Study Area

The objectives of this assessment are threefold viz. to produce a baseline study of the existing water environment (surface and groundwater) in the area of the Development, to identify the likely impacts of the development on surface waters and groundwater during construction and operational phases of the development, and to identify and highlight mitigation measures that need to be implemented to avoid, reduce, or offset significant negative impacts.

7.1.2 Statement of Authority

JOD have extensive experience in all aspects of wind farm development, from design and planning stages through to construction. JOD have been active as engineering consultants in the wind energy market in Ireland since 1998 and have completed numerous wind farm projects, varying from single wind turbine installations to large-scale, multi-turbine developments with over 2,000MW generation capacity.

This section has been prepared by Mr. Brian Doyle of Jennings O'Donovan & Partners Ltd. Mr. Doyle has a diploma in Geosciences, Bachelors' degrees in Environmental Protection and Environmental Science (First class) and a Master's degree in Environmental Science (by research). He has over 25 years' experience working in the construction and environmental sectors and has carried out numerous hydrology and hydrogeology assessments for EIAR's.

The chapter has been reviewed by Mr. David Kiely of Jennings O'Donovan & Partners Ltd. Mr. Kiely has 38 years' experience in the civil engineering and environmental sector. He has obtained a Bachelor's Degree in Civil Engineering and a Masters in Environmental Protection, has overseen the construction of over 40 wind farms and has carried out numerous hydrology and hydrogeology assessments for EIAR's.

7.1.3 Relevant Legislation

This EIAR has been composed to accord with the requirements of European Union Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (the 'EIA Directive') as amended by Directive 2014/52/EU.

Regard has also been taken of the requirements of the following legislation (where relevant):

- S.I. No. 349 of 1989: European Communities (Environmental Impact Assessment) Regulations, and subsequent Amendments (S.I. No. 84 of 1994, S.I. No. 101 of 1996, S.I. No. 351 of 1998, S.I. No. 93 of 1999, S.I. No. 450 of 2000 and S.I. No. 538 of 2001, S.I. 134 of 2013 and the Minerals Development Act 2017), the Planning and Development Act 2000 (as amended), and S.I. 600 of 2001 Planning and Development Regulations and subsequent Amendments. These instruments implement EU Directive 85/337/EEC and subsequent amendments, on the assessment of the effects of certain public and private projects on the environment.
- Directives 2011/92/EU and 2014/52/EU on the assessment of the effects of certain public and private projects on the environment, including Circular Letter PL 1/2017: Implementation of Directive 2014/52/EU on the effects of certain public and private projects on the environment (EIA Directive);
- Planning and Development Act, 2000, as amended;
- S.I. No 296 of 2018: European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 which transposes the provisions of Directive 2014/52/EU into Irish law;
- S.I. No. 293 of 1988: European Communities (Quality of Salmonid Waters) Regulations, resulting from EU Directive 78/659/EEC on the Quality of Fresh Waters Needing Protection or Improvement in order to Support Fish Life;
- S.I. No. 272 of 2009: European Communities Environmental Objectives (Surface Waters) Regulations 2009 (as amended by S.I. No. 296/2009; S.I. No. 386/2015; S.I. No. 327/2012; and S.I. No. 77/2019 and giving effect to Directive 2008/105/EC on environmental quality standards in the field of water policy and Directive 2000/60/EC establishing a framework for Community action in the field of water policy) and S.I. No. 722 of 2003 European Communities (Water Policy) Regulations which implement EU Water Framework Directive (2000/60/EC) establishing a framework for the Community action in the field of water policy and provide for implementation of ‘daughter’ Groundwater Directive (2006/118/EC) on the protection of groundwater against pollution and deterioration. Since 2000 water management in the EU has been directed by the Water Framework Directive (2000/60/EC) (as amended by Decision No. 2455/2011/EC; Directive 2008/32/EC; Directive 2008/105/EC; Directive 2009/31/EC; Directive 2013/39/EU; Council Directive 2013/64/EU; and Commission Directive 2014/101/EU (“WFD”). The WFD was given legal effect in Ireland by the European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003.

- S.I. No. 684 of 2007: Waste Water Discharge (Authorisation) Regulations 2017, resulting from EU Directive 80/68/EEC on the protection of groundwater against pollution caused by certain dangerous substances (the Groundwater Directive);S.I. No. 106 of 2007: European Communities (Drinking Water) Regulations 2007and S.I. No. 122 of 2014: European Communities (Drinking Water) Regulations 2014, arising from EU Directive 98/83/EC on the quality of water intended for human consumption (the "Drinking Water Directive") and EU Directive 2000/60/EC;
- S.I. No. 9 of 2010: European Communities Environmental Objectives (Groundwater) Regulations 2010 (as amended by S.I. No. 389/2011; S.I. No. 149/2012; S.I. No. 366/2016; the Radiological Protection (Miscellaneous Provisions) Act 2014; and S.I. No. 366/2016); and,
- S.I. No. 296 of 2009: The European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009 (as amended by S.I. No. 355 of 2018)

7.1.4 Guidance Documents

This chapter was prepared following the guidance contained in the following documents:

- Environmental Protection Agency (September 2015): Draft – Revised Guidelines on the Information to be Contained in Environmental Impact Statements.
- Environmental Protection Agency September 2015): Draft - Advice Notes on Current Practice (in the preparation of Environmental Impact Statements.
- Environmental Protection Agency (2017): Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports.
- Institute of Geologists Ireland (2013): Guidelines for Preparation of Soils, Geology & Hydrogeology Chapters in Environmental Impact Statements;
- National Roads Authority (2005): Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes; Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (Inland Fisheries Ireland, 2016);
- Guidance on 'Control of Water Pollution from Linear Construction Projects' (CIRIA Report No. C648, 2006); and,
- CIRIA 2006: Control of Water Pollution from Construction Sites - Guidance for Consultants and Contractors. CIRIA C532. London, 2006.
- The Cork County Development Plan 2014-2020 prepared by Cork County Council includes a Strategic Environmental Assessment (SEA) as a requirement under EU Directive 2001/42/EC, and includes details on environmental status and pressures, and also sets Strategic Environmental Objectives including for Water Quality i.e. W1 (Protect

the quality of surface and ground waters as sources of drinking water and as valuable assets for amenity and recreation.) and W2 (Achieve and maintain required water quality standards and reduce discharges of pollutants or contaminants to waters), and also identifies how such objectives are interlinked with other Strategic Goals such as supporting energy generation from renewable resources, and ensuring adequate supply of energy, including renewable energy.

7.2 ASSESSMENT METHODOLOGY

7.2.1 Desk-Top Study

A desk-top study which included a preliminary hydrological assessment of the grid connection route and its environs was conducted. The study involved collection and collation of relevant hydrological, hydrogeological, geological and meteorological data for the site. Consultation with the following sources was carried out:

- Met Eireann Meteorological Databases (www.met.ie);
- Geological Survey of Ireland - Groundwater Database (www.gsi.ie);
- Environmental Protection Agency database (www.epa.ie);
- EPA/Water Framework Directive Map Viewer (www.catchments.ie);
- OPW Flood Hazard Mapping (www.floodinfo.ie);
- Environmental Protection Agency – "Hydrotool" Map Viewer (www.epa.ie);
- CFRAM Preliminary Flood Risk Assessment (PFRA) maps (www.cfram.ie);
- National Parks & Wildlife Services Public Map Viewer (www.npws.ie);
- Water Framework Directive Ireland Water Maps

7.2.2 Previously Consented Derreenacrinnig West Planning Application

Minerex Environmental Limited (MEL) were commissioned by Jennings O'Donovan & Partners (JOD) on behalf of George O'Mahony and Associates in May 2010 to undertake an impact assessment on the water aspects of the environment by the proposed Wind Farm at Derreenacrinnig West, County Cork. The purpose of this work was to:

1. Undertake a baseline study of water (groundwater and surface water) conditions at the Derreenacrinnig West Wind Farm site.
2. Identify the likely impacts of the proposed development upon these aspects of the environment.
3. Identify mitigation measures to avoid, remediate or reduce the impacts identified.
4. Identify any residual impacts of the development after implementation of mitigation measures recommended.

7.2.3 Geotechnical Investigations for Wind Farm Site

Geotechnical Investigations of the wind farm site were carried out by Priority Geotechnical Ltd. – see report dated March 2017 in Appendix 6.1.

7.3 METHODOLOGY

7.3.1 Desk Study

This involved the following components:

1. Acquire and compile all maps of the proposed development.

2. Study and assess the proposed locations of poles, trenches and joint bays relative to available data on site hydrology and hydrogeology.

3. Overlay Ordnance Survey of Ireland (OSI) 1:250,000, 1:50,000 and 1:10,560 (6") maps with AutoCAD plan drawings.

4. Overlay Geological Survey of Ireland (GSI) Geology maps (1:100,000) to determine site bedrock geology and the presence of any major faults or other anomalies.

5. Overlay Environmental Protection Agency (EPA) mapping in relation to water resources and surface features for the study area.

6. Consultation with the GSI databases, publications and website in relation to well database records and hydrogeological resources of Co. Cork.

7. Consultation with National Parks and Wildlife Service in relation to designated sites of Co. Cork.

8. Consultation with Met Éireann for meteorological service records for the period 1961 to 1990 of the closest pertaining synoptic and rain gauge sites.

7.3.2 Site Walk Over Survey

A walkover survey was undertaken by staff from JOD staff in August 2021. The survey involved: ¬ drainage mapping of the route and the surrounding area whereby water flow directions and drainage patterns were recorded.

7.3.3 Site Investigations

MEL carried out field investigations at the wind farm site on the 29th June and 4th November 2010. These works consisted of the following:

1. Drainage distribution and catchment mapping.

2. Field hydrochemistry of the drainage network (electrical conductivity, pH and temperature).

3. Recording of GPS co-ordinates for all investigation and monitoring points in the study.

4. Digital photography of significant features.

7.3.4 Impact Assessment Methodology

The sensitivity of the water environment receptors was assessed on completion of the desk study and walkover survey. Levels of sensitivity which are defined in Table 7.1 were used to provide a sensitivity rating for the receptors in close proximity or hydrologically linked to the site.

Table 7.1: Criteria for Rating Site Sensitivity

Sensitivity of Receptor	
Not Sensitive	Receptor is of low environmental importance (e.g. surface water quality classified by EPA as A3 waters or seriously polluted), fish sporadically present or restricted. Heavily engineered or artificially modified and may dry up during summer months. Environmental equilibrium is stable and is resilient to changes which are considerably greater than natural fluctuations, without detriment to its present character. No abstractions for public or private water supplies. GSI groundwater vulnerability "Low" – "Medium" classification and "Poor" aquifer importance.
Sensitive	Receptor is of medium environmental importance or of regional value. Surface water quality classified by EPA as A2. Salmonid species may be present and may be locally important for fisheries. Abstractions for private water supplies. Environmental equilibrium copes well with all natural fluctuations but cannot absorb some changes greater than this without altering part of its present character. GSI groundwater vulnerability "High" classification and "Locally" important aquifer.
Very Sensitive	Receptor is of high environmental importance or of national or international value i.e. NHA or SAC. Surface water quality classified by EPA as A1 and salmonid spawning grounds present. Abstractions for public drinking water supply. GSI groundwater vulnerability "Extreme" classification and "Regionally" important aquifer

7.4 RECEIVING ENVIRONMENT

7.4.1 Surface Water

7.4.1.1 Grid Connection

The proposed grid route passes through three separate water catchments, the Ilen River Catchment to the south-east of the alignment; the Mealagh River Catchment along the majority of the alignment and the Owvane River Catchment to the west of the alignment. These are illustrated in Figures 7.1 and 7.2. Eroding upland watercourses intersect the route corridor at various locations along the route. The route crosses the Mealagh River at one location in the townland of Ards Beg towards the east of the route corridor. Aside from this, only minor watercourses are crossed by the route corridor. As is evident from Figure 7.2, the majority of crossings are via overhead line while there is one crossing of a tributary of the Mealagh River within a bridge structure. No in-stream works are proposed.

Numerous drainage ditches occur within the route corridor study area. The ditches occurring within the site are either bare, having been cut to bedrock level below the overlying peat deposit or have become colonised by a range of grasses and rushes.

7.4.1.2 Surface water runoff – Wind Farm Site

The northern part of the wind farm site drains via a tributary into the Mealagh River, which flows into the sea at Bantry. The southern part of the site is drained by a tributary of the Ilen River which flows into the sea to the west of Skibbereen. The River Ilen is an important salmonid
river and contains stocks of salmon and sea trout.

7.4.1.3 Surface Water Drainage – Wind Farm Site

The following table summarises the observed channels and flows in the surface water drainage.

Table 7.1: Observed surface water drainage channels and flows at Wind Farm Site

Channel ID	Type of channel	Flow (l/s)	Relationship to proposed development
D1	stream	10	Flows southwest along southern boundary of the site alongside the proposed access road – tributaries of Ilen River.
D2	stream	3	Flows west along northern boundary of the site before turning north and flowing to the Mealagh River

Channel ID locations D1 and D2 are shown on Figure 7.7

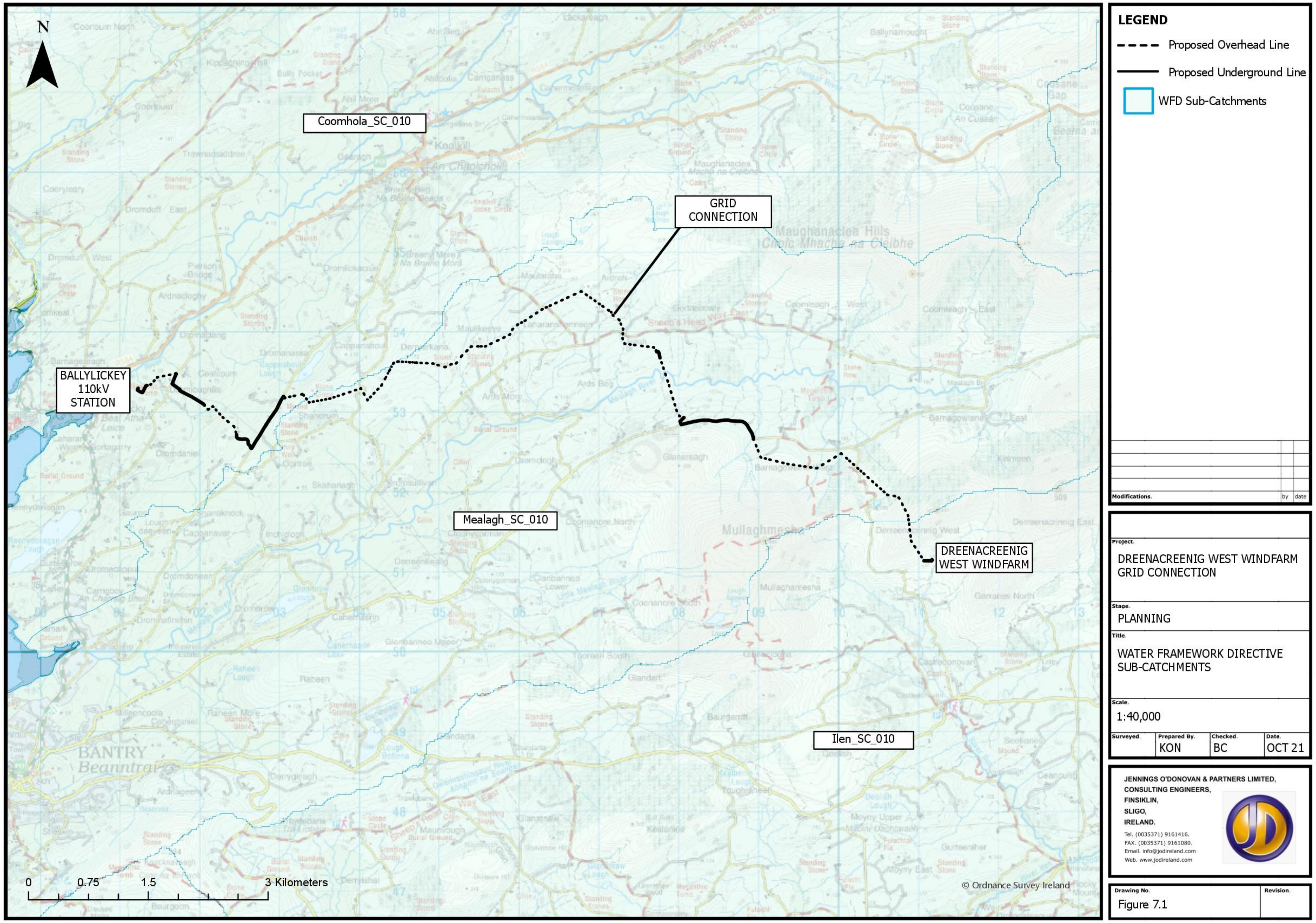

Figure 7.1 – Water Framework Directive Sub-Catchments

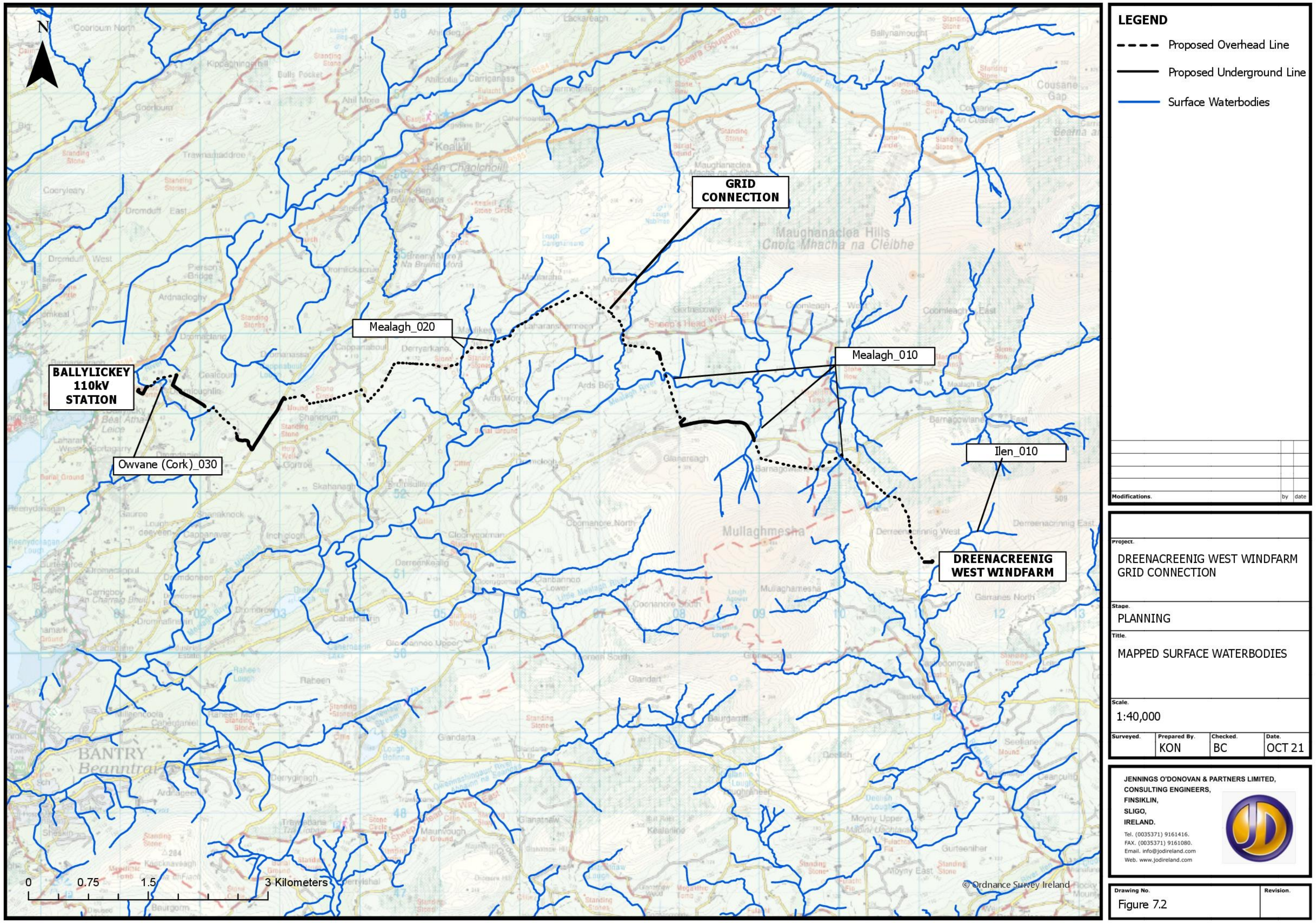

Figure 7.2 - Mapped Surface Waterbodies

7.4.1.4 Surface Water Quality – Grid Connection

Reference to Water Framework Directive Surface Water Body Status (see Figure 7.5) shows that the majority of the proposed grid connection i.e. .within the Mealagh Sub-Catchment (Mealagh_SC_010) is “High” in quality while the Ilen sub-catchment (Ilen_SC_010) and the Owvane (Owvane (Owvane _SC_030) sub-catchment are “Good” in quality.

In overall terms, the sensitivity of the watercourses is rated as “Sensitive/Very Sensitive”.

7.4.1.5 Surface Water Quality – Wind Farm Site

Field testing of physiochemical parameters on surface waters were undertaken in D1 and D2 at the Derreenacrinnig West site on the 29th June 2010.

Table 7.2 summarises the field hydro chemical measurements for each of the significant streams / drains at the site. These values are in-line with expected values for unpolluted water in this region and environmental setting.

Table 7.2: Watercourse field hydro chemical measurements

Sampling site	**Channel ID**	**EC (µScm)**	**pH**	**Temperature (ºC)**
D1	D1	60	8.57	18.1
D2	D2	30	8.90	14.1

Water samples were taken from D1 and D2 at the Derreenacrinnig West site on the 29th June 2010 and sent for laboratory analysis. The results of these analytical results are presented in Table 7.3 below. These values are in-line with expected values for unpolluted water in this region and upland environmental setting.

Table 7.3: Watercourse laboratory hydro chemical measurements

Parameter	**D1 S1**	**D2 S1**
Alkalinity, Bicarbonate	15.5	11
Sulphate	3.6	<3
Chloride	8.3	9.1
Calcium	2.92	1.68
Sodium	6.59	6.44
Magnesium	0.66	0.517
Potassium	<2.34	<2.34

7.4.1.6 Groundwater

7.4.1.6.1 Aquifer Classification

Consultation of the Geological Survey of Ireland's National Bedrock Aquifer Classification Map indicates that the site is underlain by a Locally Important Aquifer, which is generally productive only in local zones (LI). There are no significant sand and gravel aquifers recorded at or near the grid connection route or the Derreenacrinnig West Wind Farm site. Groundwater flow direction in elevated areas such as this route is likely to generally conform to the direction of land surface slope.

7.4.1.6.2 Vulnerability Assessment

The GSI has produced guidelines on groundwater vulnerability mapping that aim to represent the intrinsic geological and hydrogeological characteristics that determine how easily groundwater may be contaminated by human activities. Vulnerability depends on the quantity of contaminants that can reach the groundwater, the time taken by water to infiltrate to the water table and the attenuating capacity of the geological deposits through which the water travels. These factors are controlled by the types of subsoil that overlie the groundwater, the way in which the contaminants recharge the geological deposits (point or diffuse source) and the unsaturated thickness of geological deposits from the point of contaminant discharge (Ref. 4).

Where low permeability subsoil overlies the bedrock, it is the thickness of subsoil between the release point of contaminants and bedrock that is considered when assessing vulnerability of bedrock aquifers, regardless of whether the low permeability materials are saturated or not. The GSI vulnerability mapping guidelines allow for the assignment of vulnerability ratings from "extreme" to "low", depending upon the subsoil type and thickness. With regard to sites where low permeability subsoil is present, the following thicknesses of unsaturated zone are specified (Ref. 4):

Vulnerability Rating	**Thickness of unsaturated zone (m)**
Extreme	0 to 3
High	3 to 5
Moderate	5 to 10
Low	>10

On the basis of these GSI recommendations and field investigation data, an Extreme (E) vulnerability is assigned across the Derreenacrinnig West Wind Farm site where there is a thickness of peat and/or unconsolidated sediments of <3m overlying the bedrock.

By reference to the GSI Groundwater Data Viewer, there is confirmation of 'Extreme' at and close to the wind farm site and start of grid connection due to rock at or near the surface.

As the grid connection route proceeds westwards, the vulnerability reduces alternative 'High' and 'Extreme' areas.[17] – See Figure 7.3.

7.4.1.6.3 Groundwater Usage

Consultation of the national well database compiled by the GSI indicates that there are no known wells recorded within 2 km of the proposed grid connection or wind farm site of development. The nearest appears to be c.8km south-east of the wind farm site (see Figure 6.4 in Soils & Geology Chapter).

7.4.1.6.4 Groundwater Quality

Due to the absence of any recorded groundwater quality data within or proximal to the study area, no published data on groundwater quality is available. However, the Water Framework Directive data confirms that the groundwater body's status is "Good" – see Figure 7.4.

7.4.1.6.5 In overall terms, the sensitivity of groundwater is rated as "Sensitive/Very Sensitive".

7.4.1.6.6 Designated Areas

The proposed wind farm site is neither contained within nor bordered by any designated areas for nature conservation. The proposed development is >7km from any proposed or designated areas for nature conservation. – see Figure 7.6.

Freshwater pearl mussel is known to occur within the Mealagh, Owvane and Ilen River. A tributary of the Ilen River runs along the southern boundary of the site. It is not known at present how high up the river system this species occurs. The presence of undesignated populations of this species in these watercourses is considered to be of national ecological value.

[17] www.dcenr.maps.arcgis.com/apps/webappviewer

The lands occurring within the grid connection route corridor range from local (low value) to national ecological value. Habitats of national ecological value include the Mealagh River. Habitats of County Importance include the wet heath habitat, particularly the examples at Laharanshermeen, Cappanaboul and Ards Beg, the dry heath along the ridge line of Derreenacrinnig West and the wet willow woodland. The humid acid grassland is considered to be of local (higher) value while other habitats such as gorse scrub, conifer plantation, recently felled woodland improved agricultural grassland, amenity grassland and built land are of local (lower) value.

7.5 DO NOTHING IMPACT

Site investigations of the 2010 baseline geological and geotechnical conditions at the Derreenacrinnig West wind farm site indicate that parts of the site have already experienced impacts to baseline conditions through the planting of commercial forestry and construction of associated access tracks to the north of the site. Much of the wind farm site has been partially developed with the site tracks installed together with five hardstands. There are no indications that the construction of the access tracks/hardstands or any previous forestry tracks has had adverse impacts with regard to the hydrology or hydrogeology of the study area.

Some 9.6km of the grid route has already been constructed as an overhead line (to be removed and replaced with a new grid connection) and again, there are no indications that water quality has been affected or that there has been adverse impacts with regard to the hydrology or hydrogeology of the study area.

Should the proposed development not proceed, the existing land-use practice of agriculture and commercial afforestation and associated access track construction will possibly continue with associated alteration of the existing environment.

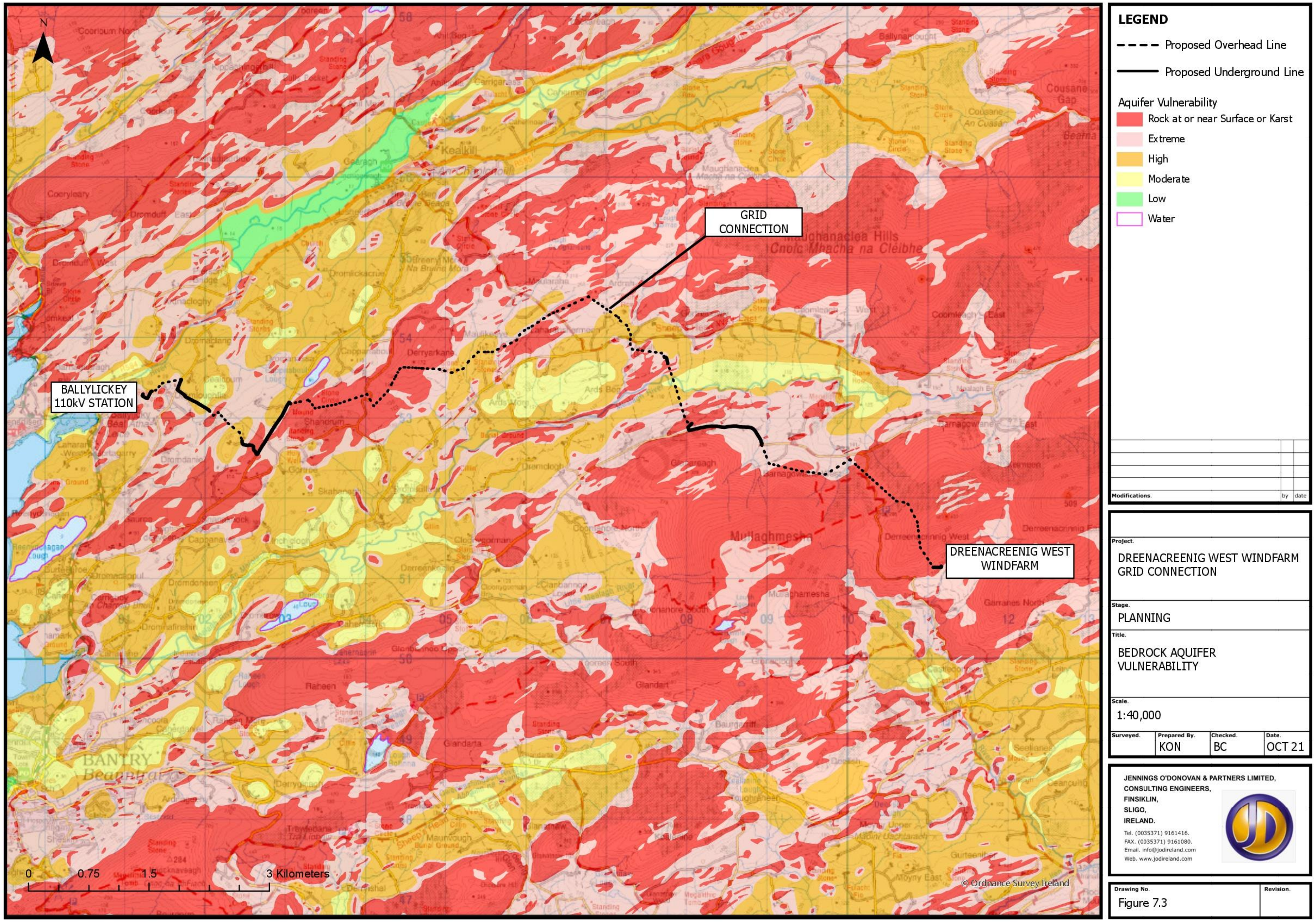

Figure 7.3 – Bedrock Aquifer Vulnerability

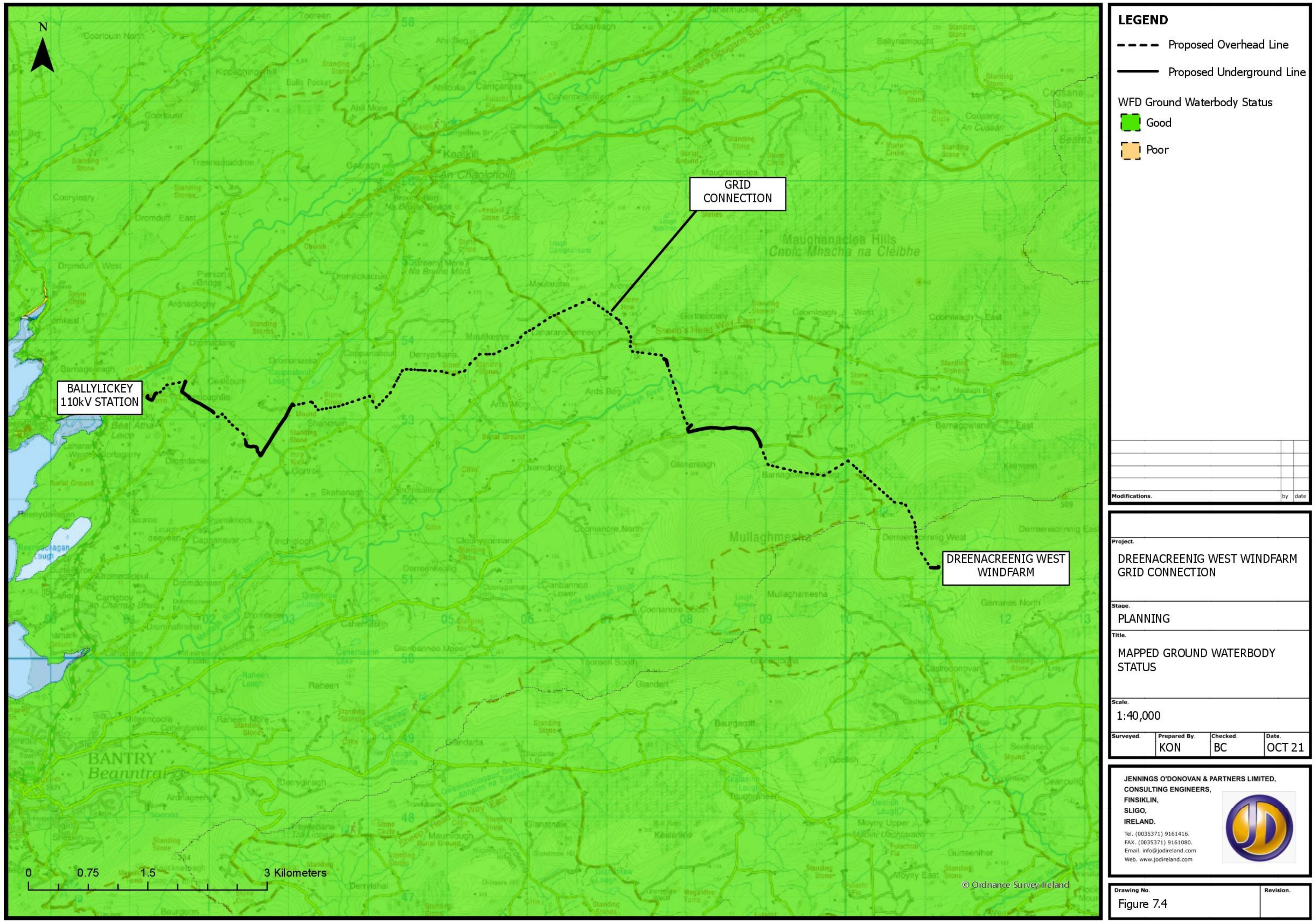

Figure 7.4 – Mapped Ground Waterbody Status

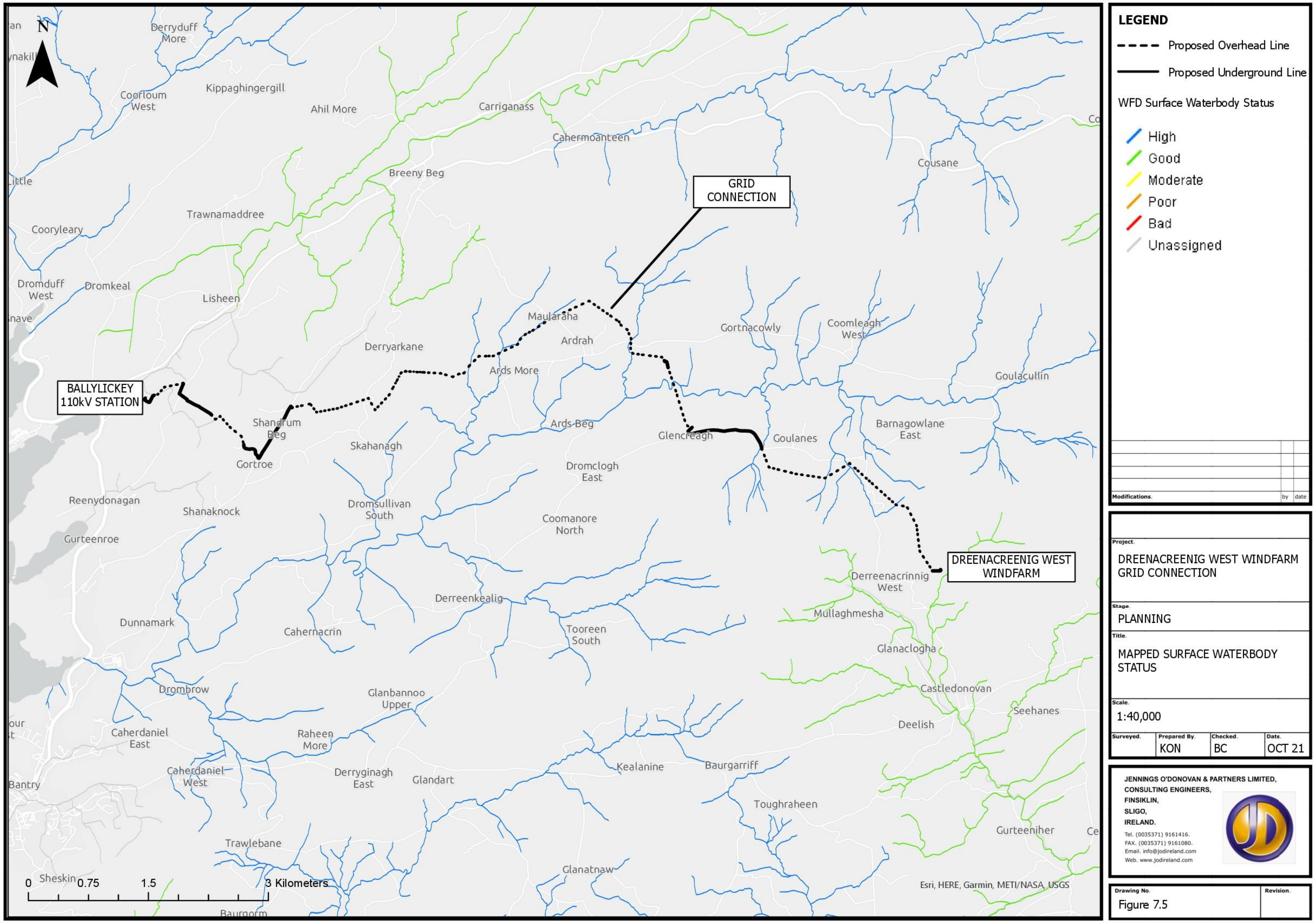

Figure 7.5 – Mapped Surface Waterbody Status

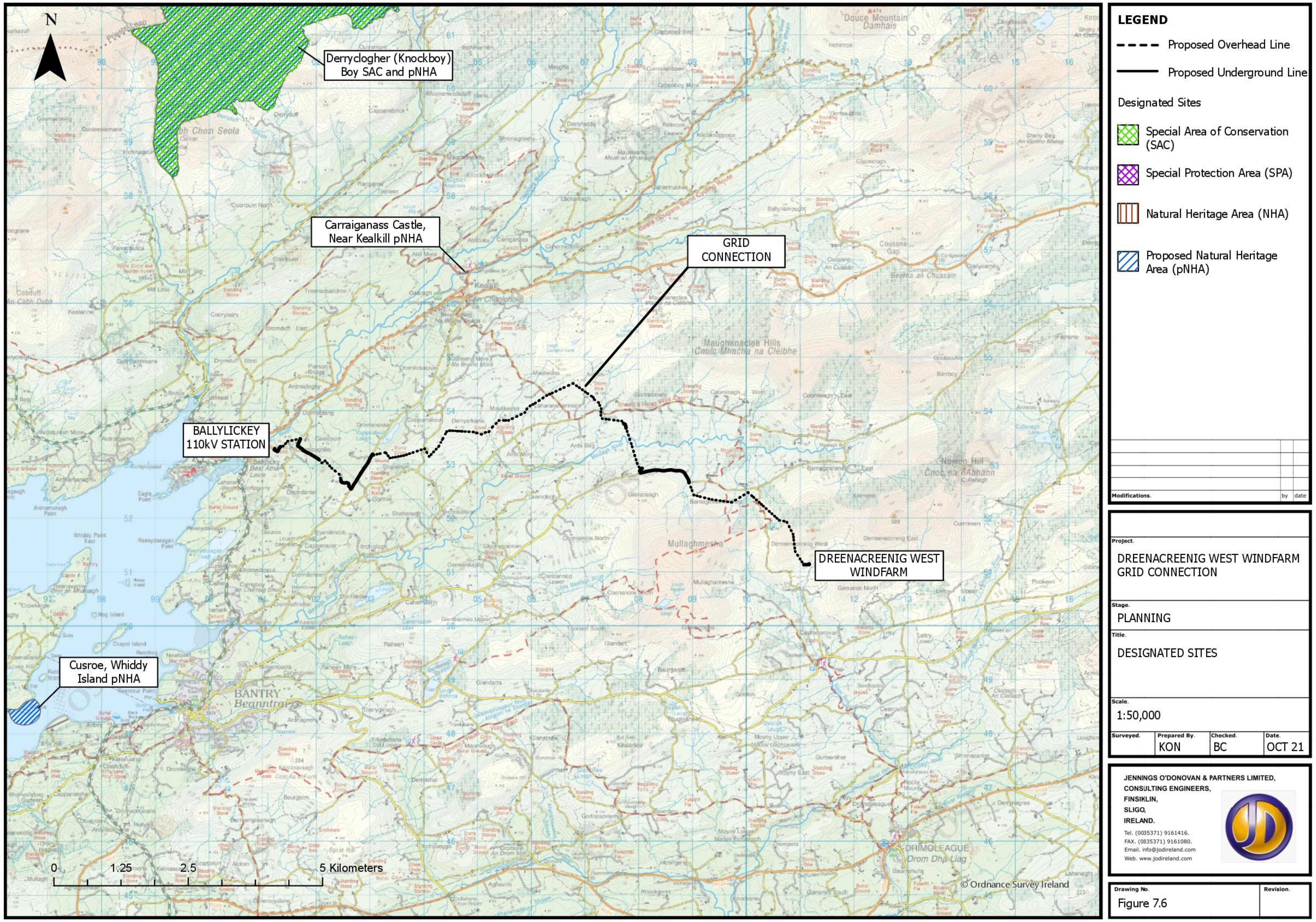

Figure 7.6 – Designated Sites

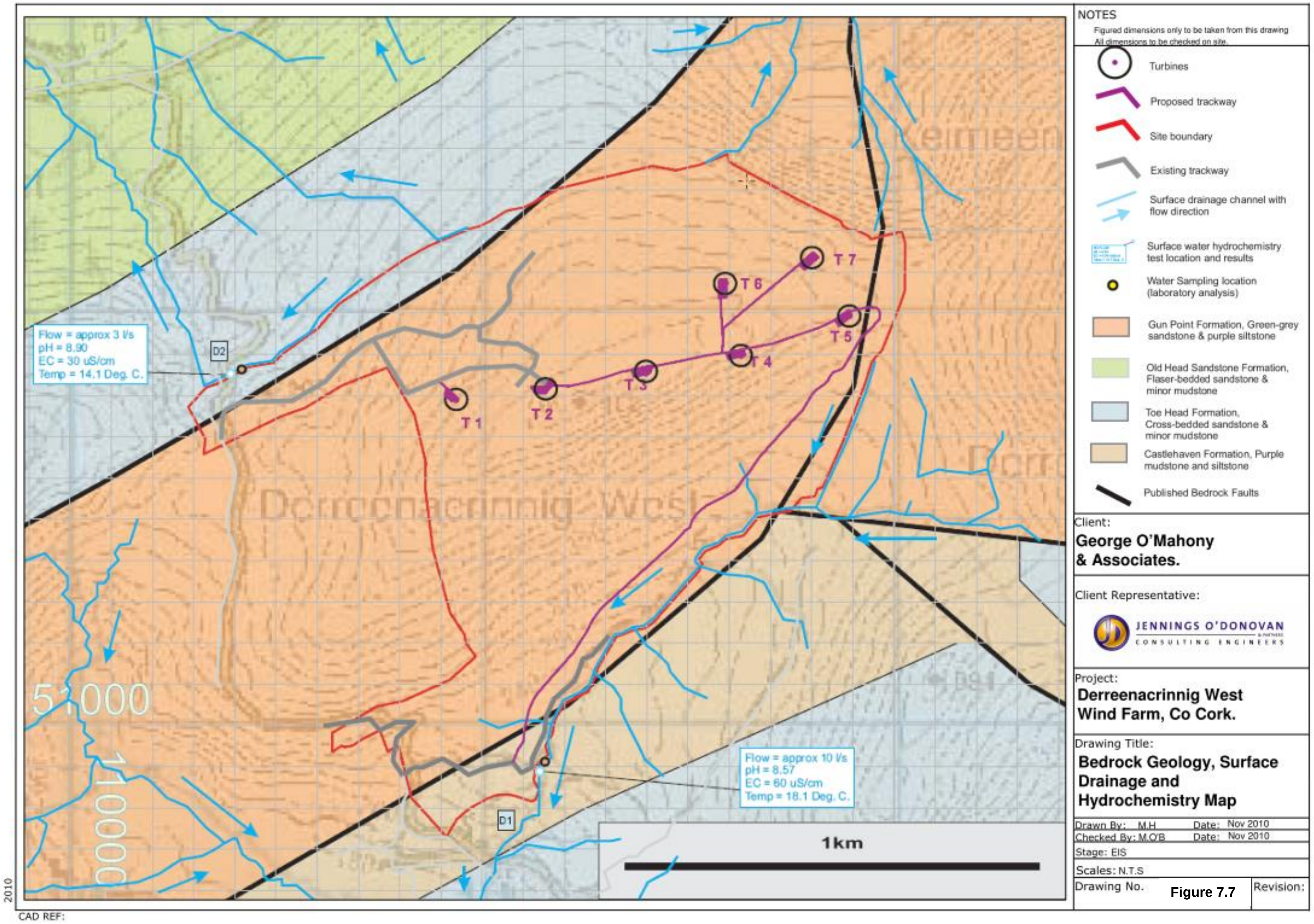

Figure 7.7 – Bedrock Geology, Surface Drainage and Hydrochemistry Map

7.6 POTENTIAL IMPACTS OF THE DEVELOPMENT

7.6.1 Construction Phase

7.6.1.1 Surface Water Runoff

7.6.1.1.1 Increased runoff

The proposed development has the potential to result in increased volumes of runoff during the construction phase of the project relative to baseline conditions. This is a function of the progressive excavation and removal of vegetation cover along the proposed development footprint and thus removing the hydraulic absorption / buffer control from this part of the site. Table 7.4 summarises a preliminary water balance analysis for the Derreenacrinnig West site. The Meteorological Service records for the period 1961 to 1990 show that the highest monthly rainfall average recorded at Drimoleague (Garda Station) is in the month of January, and the lowest evapotranspiration at Valentia Synoptic Station is in the month of December. As this data represents the worst-case scenario, it has been used to estimate runoff volumes from both the grid connection and the Derreenacrinnig West Wind Farm site for both (a) baseline (in-situ vegetation) conditions and (b) operation phase (changed ground conditions on footprint). Worst case scenario baseline calculations indicate that (Tables 7.4A and 7.4B) this would amount to a runoff from developed areas (assuming impermeable grounds) of approximately $0.7m^3$ for the grid connection plus $39m^3$/day for the wind farm that would need to be controlled and attenuated before release to natural drainage.

Further analysis indicates that the proposed infrastructure (grid plus wind farm) would lead to increased runoff of $1,177m^3$ ($21 + 1,156m^3$) in a worst-case scenario. In reality therefore, the change in runoff as a function of the proposed development will result in a net increase of $40m^3$/day during the wettest month(s) of the year. The quantification of this increased runoff as a function of the proposed development is discussed in Table 7.4A (Grid Connection) and Table 7.4B (Wind Farm).

Table 7.4A: Surface Water Runoff Calculations – Grid Connection

Baseline / Development	Parameter	Value
Baseline	Average January rainfall (R) Month with highest rainfall based on 30 years data from Drimoleague (Garda Station) rain gauge	0.1970m
Baseline	Average December potential evapotranspiration (PE) Month with lowest PE based on 30 years data from Valentia Synoptic Station	0.0087m

Baseline / Development	Parameter	Value
Baseline	Average December actual evapotranspiration (AE) (PE x 0.92)	0.0080m
Baseline	Effective Rainfall under highest rainfall & lowest PE conditions (ER = R – AE)	0.1890m
Baseline	Area of subject site (3,180m x 0.525 + 0.0346)	1,675m^2
Baseline	**Total Effective Rainfall** received over site area	226m^3
Baseline	**Baseline Site Runoff** (approximately 80% of total effective rainfall)	317m^3
Development	Proposed Area of Impermeable Surfaces – based on grid cable in roads	565m^2
Development	**Total Site Runoff** from impermeable areas (100% of total effective precipitation) in worst case month	107m^3
Comparison	**Baseline Runoff** from Proposed Area of Impermeable Surfaces under highest rainfall & lowest PE conditions	86m^3
Comparison	**Worst Case Net Increase in Runoff** in one month from Site as a function of Development	21m^3

Table 7.4B: Surface Water Runoff Calculations – Wind Farm

Baseline / Development	Parameter	Value
Baseline	Average January rainfall (R) Month with highest rainfall based on 30 years data from Drimoleague (Garda Station) rain gauge	0.1970m
Baseline	Average December potential evapotranspiration (PE) Month with lowest PE based on 30 years data from Valentia Synoptic Station	0.0087m
Baseline	Average December actual evapotranspiration (AE) (PE x 0.92)	0.0080m
Baseline	Effective Rainfall under highest rainfall & lowest PE conditions (ER = R – AE)	0.1890m
Baseline	Area of subject site	1,221,633m^2

Baseline / Development	Parameter	Value
Baseline	**Total Effective Rainfall** received over site area	230,888m^3
Baseline	**Baseline Site Runoff** (approximately 80% of total effective rainfall)	184,710m^3
Development	Proposed Area of Impermeable Surfaces – based on areal calculations supplied by Jennings O'Donovan	30,568m^2
Development	**Total Site Runoff** from impermeable areas (100% of total effective precipitation) in worst case month	5,777m^3
Comparison	**Baseline Runoff** from Proposed Area of Impermeable Surfaces under highest rainfall & lowest PE conditions	4,621m^3
Comparison	**Worst Case Net Increase in Runoff** in one month from Site as a function of Development	1,156m^3

Increased volumetric runoff for the study area (grid and wind farm) has been provisionally calculated as contributing a net increase of +40m^3/day during the wettest months of the year from the proposed footprint area. This is a direct permanent impact, but it is not considered to be a potentially significant negative impact given that only a small proportion of the study site is to be developed. Hence the magnitude of the proposed change to the hydrological runoff regime is considered minor relative to the total water balance for the site.

The effect of the removal of existing poles will be negligible.

7.6.1.1.2 Increased Hydraulic Loading

The proposed grid connection development has the potential to result in increased rates of runoff during the construction phase of the project relative to baseline conditions. However, the surfaces will be reinstated to pre-existing condition apart from the poles and the area is small at 1,675m^2. Increased surface water runoff from the construction footprint of the wind farm has the potential to result in increased hydraulic loading to the receiving drainage network. However, because the footprint area of the wind farm is small at c.30,568m^2 and preliminary estimates of increased runoff are c.+40m^3/day during the wettest months of the year, any potential increase in hydraulic loading to the existing drainage network is considered to be an insignificant impact as a function of this particular development.

Dewatering / Diversion of Drainage

The proposed grid connection development has the potential to result in diversion of the existing drainage network during the construction and operation phases of the project relative to baseline conditions. However, such diversions have been avoided, to a large degree by design. Apart from one crossing of tributary of the Mealagh River at Glanareagh is by incorporating the duct within the roadway of an existing bridge structure, all other crossings are via overhead lines and no poles will be sited within watercourses. While there is the potential for road drainage to be disturbed temporarily during duct laying, such drainage will be restored (where disturbed) as work progresses. For the wind farm site, the southern access road of the proposed development will cross two streams that are tributaries of the Ilen River at the wind farm site. The crossings have already been developed but are likely to require completion works. Provided that appropriate remedial actions are implemented, it is unlikely that the functioning of these streams will be impacted by the development.

7.6.1.2 Surface Water Quality

Release of Suspended Solids

The proposed development has the potential to result in the release of suspended solids during the construction phase of the project relative to baseline conditions. This is particularly likely as a result of the excavation of in-situ peat, and where necessary, the underlying mineral subsoil. Runoff of suspended solids can add turbidity to the surface water which can clog fish gills, smother spawning grounds, reduce light penetration for flora growth, and add bacteria and algae to the water. Nutrients that are associated with the solids (inorganic nutrients such as phosphorus and organic such as hydrocarbons, sewage if present) can lead to eutrophication of the water environment and eventually to fish-kills due to lowering of oxygen supply.

During the excavation, storage and re-use of materials, it is likely that a high content of suspended solids will be entrained by sustained rainfall and surface water runoff. All proposed joint bay locations remote from streams, the closest being Joint Bay Chamber 1 which is c.140m from a tributary of the Owrane River. The most vulnerable areas to surface water quality deterioration are at pole locations close to streams and at trench locations close to streams. All poles are sited at least 25m from watercourses. The Mealagh River is the only major watercourse to be crossed by the overhead line in the townland of Ards Beg towards the end of the route corridor. At that crossing, proposed pole P105 is 25m from the Mealagh River while proposed Pole P104 is c.55m from the Mealagh River.

At Glanareagh Townland, the duct trench, within a roadway bridge, will cross over a tributary of the Mealagh River.

The risks to water quality at these locations are considered to be a short-term, temporary but potentially significant negative impact. However, with appropriate environmental engineering controls and measures, this impact can be reduced to within water quality regulatory limits.

Risk of Pollution from Hydrocarbons Leakage

The proposed development has the potential to result in the accidental leakage of hydrocarbons into the drainage network during the construction phase of the project. The plant equipment to be used during the construction stage is run on hydrocarbons. This implies that mobile equipment will require regular refuelling which will be supplied by a truck / tanker that will be scheduled to re-fuel the plant directly. This poses the potential for spillage and leakage of hydrocarbons from plant equipment and associated transfer during the construction phase of this project.

Hydrocarbon is a pollutant risk due to its toxicity to all flora and fauna organisms. Hydrocarbons chemically repel water and sparingly dissolve in water. The majority of hydrocarbons are light non-aqueous phase liquids (L-NAPL's) which means that they are less dense than water and therefore float on the water's surface (whether surface water or groundwater). Hydrocarbons absorb (stick) onto the majority of natural solid objects it encounters, such as vegetation, animals, earth materials. It burns most living organic tissue, such as vegetation, due its volatile chemistry. It is also a nutrient supply for adapted micro-organisms, which can deplete dissolved oxygen at a rapid rate and thus kill off water based vertebrate and invertebrate life. An accidental hydrocarbon spillage would have a severe, medium term, negative impact on surface water quality in the Mealagh, Ilen and Owvane Rivers. However, with appropriate environmental engineering controls and measures, this potential risk can be reduced.

Wastewater Sanitation

The proposed development has the potential to result in the accidental leakage of wastewater into the drainage network during the construction phase of the project. Temporary, mobile portaloos will be required for the construction stage of the development. These will be towed from time to time as work progresses i.e. they will be transient/on wheels. Associated with this facility is the potential risk of water and soil contamination by wastewater release or chemical contamination of water and soil from temporary sanitation facilities. The level of risk posed is typically dependent on the type of facilities that are put in place and therefore can range from potentially significant to insignificant impact in direct correlation to the type of sanitation used (e.g. septic tank versus portaloo).

Other Potential Pollutants

Other potential pollutants that may impact on surface water quality as a function of excavation works and associated with entrained suspended solids from peat, mineral subsoil and bedrock (dust) are:

- Inorganic nutrients such as nitrogen and phosphorus compounds (if present in excavated sediment).

- Bacteriological contamination arising from availability of organic nutrients (e.g. livestock waste on acrotelm peat).

7.6.1.3 Groundwater Flow

Excavation Seepage / Inflows

Peat is essentially an aquitard, characterised by low permeability but high porosity (like a sponge that holds water). Peat should not contribute any significant seepage or inflows to excavations during the construction phase of the project. However, some seepage is expected to occur at and along the contact of the base of the peat with underlying glacial till (present throughout the site) or more importantly from the fractured / weathered bedrock (if present).
From the recovered mineral subsoil within the site, the glacial sediments (where present) are characterised by SILT or CLAY matrix which is unlikely to contribute significant groundwater inflow during excavation as the sediments were observed to be dry during the site visit. However limited and discontinuous seepage / inflow might be expected from the back-wall excavations for the turbine pads. The time of year for excavation will be a significant control in how much inflow / seepage is expected, however overall in the context of the site geology and its high elevation within the catchment, any seepage that does occur is likely to be low in volume and is likely to be short-lived. Excavation seepage / inflow is a low magnitude, short-term negative impact that can be easily controlled by appropriate interceptor drainage and in the case of turbine bases by pumps.

<u>Lowering of Water Table</u>

While locally there may be some ‘perched’ water in the upper bedrock along more permeable or fractured zones, regionally the water table is likely to be below the deepest excavation by the proposed development as the site is located on high ground relative to the surrounding countryside. No impact is anticipated on the water table as a function of the proposed development.

<u>Dewatering of Wells</u>

No wells were identified at or within 2 km of the proposed development; therefore, no impact is anticipated for dewatering or hydraulic impact on groundwater supply.

7.6.1.4 Groundwater Quality

<u>Groundwater Contamination</u>

The bedrock aquifer that underlies the development footprint is classified as a Locally Important Aquifer (LI) and due to Water Framework Directive requirements with respect to the protection of all groundwater quality, the groundwater beneath the site requires preventative mitigation measures for potentially polluting activities, of which hydrocarbons release is the main threat to groundwater quality.

The vast majority of groundwater eventually discharges to the surface water network in the form of baseflow or spring seepage mechanisms. This implies that if groundwater is contaminated locally, it has the potential to contaminate drains, streams, rivers and lakes that are located down-gradient of the groundwater body, thus highlighting the inter-connectivity of groundwater and surface water in the hydrological cycle.

The potential threats to groundwater contamination are essentially the same for surface water and include the same potential sources. These are:

1. Hydrocarbons from introduced plant equipment / fuel stations.
2. Wastewater and chemical treatment compounds from sanitation facilities.
3. Inorganic nutrients such as nitrogen and phosphorus compounds (if present in excavated sediment).
4. Bacteriological contamination arising from availability of nutrients (e.g. sanitation, livestock etc).
5. Trace metals that may naturally be present and therefore potentially released from bedrock.

Unlike surface water, suspended solids or turbidity is not generally a problem for groundwater due to the filtering ability of the granular mineral subsoil that overly the bedrock and / or the small aperture size of the fractures of the Sedimentary bedrock, which also provide attenuation of suspended solids / turbidity. Under steady flow conditions, by the time the groundwater discharges there is generally very little turbidity present.

While groundwater through-flow has a greater ability to attenuate potential pollutants compared to the surface water system, there is still a potential negative, short to medium term impact on groundwater quality as a function of the proposed development.

7.6.1.5 Operational Phase

7.6.1.5.1 Surface Water

<u>Surface Water Flow</u>

The removal or installation of poles will not interfere with surface water flow. Provided that road reinstatement measures include the reinstatement of road drainage, Surface water flow at trenches and joint bays will be unaffected during the operational phase.

Trenches in roadways will be sealed with bituminous material for the operational phase. Trenches in verges and fields/lands will be reinstated with the topsoil/soil that was excavated. Excavations associated with the removal of existing poles and the installation of new poles will be vegetated using the same topsoil/soil that was excavated.

The risk to surface water quality is considered to be insignificant for the operational phase.

Surface Water Quality

While the main threat to water quality, in particular surface water quality arises during the construction phase of the project due to earthworks activity, there is also a risk of pollution during the operation phase of the project that is associated with drainage runoff and attenuation of suspended solids. Mitigation measures to avoid and reduce impacts on surface water quality arising during the lifetime of the project are outlined in Section 7.7.

7.6.1.5.2 Groundwater

Groundwater Flow

During the construction phase of the project, groundwater seepage, water ponding and wetting of previously dry spots may occur around the development footprint. It is possible that water ingress may be encountered in the upper weathered zone of the bedrock during the construction phase.

Groundwater Quality

There is a potential risk of groundwater contamination during the operation phase of the project, however this risk is low and largely a function of the legacy of introduced services during the construction phase of the project. Using the precautionary principle however, mitigation measures to prevent, identify and remediate any potential groundwater contamination must be adhered to.

7.7 MIITGATION MEASURES

7.7.1 Construction Phase Mitigation

7.7.1.1 Constructed Drainage

Potential impacts on site hydrology, surface water course hydrology and associated ecologies during construction and operational phases are mitigated by designing a system which causes minimal disturbance to the current hydrological regime and which minimises suspended sediment loading. Reduction of sediment loading is important since the main watercourses drain into the Owvane River, Mealagh River, and the Ilen River to the south which is an important salmonid river. Mitigation measures are required to protect against suspended solid loading of headwater drainage during the construction stage of the project. This is to be achieved by including the following features:

- Grid Connection crossings of watercourses should be via overhead line with poles at least 25m away from streams or within roadway bridges. No instream works shall be carried out.

- Drainage and associated pollution control measures shall be implemented on site before the main body of construction activity commences. Where possible drainage control should be installed during seasonally dry ground conditions.

- Interface with road drainage will be minimised and any road drainage temporarily disrupted will be restored at the end of the working day.

- Existing farm tracks will be utilised to facilitate access to the pole locations where possible. Where existing tracks are not in situ, temporary matting will be used to access the pole locations where necessary to avoid ground rutting, damage, and release of sediment to surface water.

- All construction works should be set back a minimum of 25m from watercourses. No poles or vehicles should be installed or operate within this buffer zone.

- Construction works will be confined to the minimum area possible. Minimum removal of vegetation will take place at pole locations.

- The footprints of all temporary access routes will be kept to the minimum compatible with sound engineering practice.

- Construction traffic and machinery movement will be confined to specific roads and access routes. Construction vehicles to be used on peatland habitats should be of low ground bearing pressure.

- Trampling and the use of machinery on saturated, quaking surfaces will be avoided. The locations of poles will be configured to minimise the number occurring within wet grassland and wet heath and the use of brash mats will be used if required.

7.7.1.2 Surface Water Flow – Mitigation Measures

Increased Runoff and Hydraulic Overloading

Additional surface water runoff emanating from the construction phase of the development requires hydraulic runoff buffering. The main reason for concern for additional site runoff is that during the construction phase, surface water drainage is at risk to water quality deterioration. It is essential therefore that an environmental management programme that checks, audits and facilitates repair and in places improvement of the constructed drainage scheme is undertaken as part of mitigation measures for surface water runoff during the operation phase.

Surface water flows in all waterways and drainage should not be impeded in any way by the proposed development.

Trenching shall be avoided during periods of prolonged or heavy rainfall.

Dewatering / Diversion of Drainage

There will be no interception, diversion, infilling or dewatering of water drainage channels by the proposed development; therefore, no mitigation is required.

7.7.1.3 Surface Water Quality – Mitigation Measures

<u>Release of Suspended Solids</u>

In order to mitigate the impact posed by release of suspended solids to the surface water environment, the following mitigation measures are recommended:

a. Protection of riparian zones around drainage by restricting construction disturbance to outside of 50 m buffer zones from streams and drains. This will protect what vegetation that is in place and provides some filtering of runoff erosion from the site.

b. Silt fencing shall be installed between the trenches and any watercourses.

c. Where water is to be pumped from excavations, it will be discharged to a mobile siltbuster. Treated water will be removed from site by tanker and disposed of to a non-polluting discharge location such as a wastewater treatment plant.

d. The drainage and attenuation system should be installed prior to the main construction activities to control increased runoff and associated suspended solids loads in discharging waters from the development areas. This may involve the construction of temporary drainage ditches, the installation of silt traps, stilling ponds and the implementation of prescribed buffer zones. Where possible drainage control should be installed during seasonally dry ground conditions.

e. Monitoring of drainage discharge during the construction stage is recommended. Monitoring should be undertaken during and immediately following high rainfall events. As part of the construction phase environmental management plan regular checking and maintenance of pollution control measures are required, with an immediate plan for repair or backup if any breaches of design occur.

Risk of Pollution from Hydrocarbons Leakage

- To control and contain any potential hydrocarbon and other harmful substances spillage by vehicles during construction, it is recommended where possible to refuel plant equipment off the development site, thus mitigating this potential impact by avoidance.
- There is also the risk of leakage from vehicles and plant equipment during construction activity, as opposed to refuelling. The plant equipment used on site will require regular mechanical checks and audits to prevent spillage of hydrocarbons on the exposed ground (during construction).

Waste Water Sanitation

- During the construction phase, a self-contained mobile port-a-loo with an integrated waste holding tank should be used on site for toilet facilities. This should be maintained by the service contractor on a regular basis and removed from the site on completion of the construction phase. In relation to a water supply for the site office and service area, bottles of fresh water should be brought to the site each day and disposed from the site to a suitable wastewater drainage system. In summary, wastewater of all kinds should be taken off site for disposal / treatment to controlled facilities.

7.7.1.4 Groundwater Flow – Mitigation Measures

Excavation Seepage / Inflows

- During the construction phase of the project, the development areas (trenches, joint bays) should be monitored daily for evidence of groundwater seepage, water ponding and wetting of previously dry spots. Any water ingress that may be encountered in the upper weathered zone of the bedrock during the construction phase should be intercepted by a drain and diverted after attenuation, to an existing artificial drainage channel or a natural watercourse. The design of the drainage must take into account factors of slope stability and where possible, should be impermeable and closed at the base. Any water ingress that may be encountered in the weathered bedrock / mineral subsoil during the construction phase should be intercepted by an interceptor drain and diverted to the constructed drainage system for pollution control attenuation prior to discharge. This diversion of seepage is likely to be sufficient for most parts of the construction activity. All pumped water must be captured, treated within a siltbuster and directed to constructed drainage for attenuation. No freshly pumped water must enter the existing drainage network directly or be pumped out onto the adjacent blanket bog habitat.

Lowering of Water Table

- No impact is anticipated on the regional water table as a function of the proposed development; therefore, no mitigation is required.

Dewatering of Wells

- There will be no dewatering or hydraulic impact on groundwater supply as a function of the elevated position of the site and absence of wells from within 2 km of the proposed development. No mitigation is required.

7.7.1.5 Groundwater Quality– Mitigation Measures

Groundwater Contamination

The main threat to groundwater quality is the introduction of hydrocarbons to the site. In order to mitigate groundwater contamination by hydrocarbons in particular, the following are strongly recommended:

a. No fuel storage should occur on site and, ideally, re-fuelling of plant equipment should occur off-site at a controlled fuelling station.
b. On site re-fuelling of machinery at the Proposed Development Site and at those areas of construction works associated with the grid connection will be carried out using a mobile

double skinned fuel bowser. The fuel bowser, a double-axel custom-built refuelling trailer will be re-filled off site and will be towed along the site by a 4x4 jeep to where machinery is located. The 4x4 jeep will also carry fuel absorbent material and pads in the event of any accidental spillages.

c. If a significant hydrocarbon spillage does occur, the contractor on behalf of the developer must have an approved and certified clean-up consultancy available on 24-hour notice to contain and clean-up the spill. The faster the containment or clean-up starts, the greater the success rate, the lower the damage caused and the lower the cost for the clean-up.

The following mitigation measures are recommended in relation to non-hydrocarbon potential contamination:

a. Wastewater from sanitation facilities will be mitigated by use of temporary and portable sanitary facilities that are self-contained. These facilities will not interact with the existing hydrological environment in any way, and they will be maintained, serviced and removed from site at the end of the construction phase.
b. Inorganic nutrients such as nitrogen and phosphorus compounds (if present in excavated sediment) will be controlled by attenuation of the suspended solids to which they adsorb to and by retention of discharge waters within stilling ponds to allow peak runoff to recede prior to discharge. It is noted that the baseline surface water chemistry (under low flow regime) indicates low total nitrogen and low, albeit trace concentrations of phosphorus. It is expected overall that the site is a low nutrient environment; therefore, nutrient loading should not pose a major threat to the site’s hydrology or hydrogeology.
c. Bacteriological contamination arising from availability of nutrients (e.g., sanitation, livestock etc) will be mitigated by appropriate self-contained sanitation facilities (above) and livestock grazing control on the site overall, but particularly on areas zoned for excavation and development.
d. There is low risk of mobilising trace metals that may naturally be present. The potential impact may arise from introduced water percolation with excavated bedrock substrate. Concentrations of trace metals are usually low in the natural environment; however, water quality should be checked for metals concentration before, during and after the construction phase (e.g., S.I. No. 12 of 2001).

Pollution of Groundwater Supply

Due to the absence of recorded wells proximal to the site, specific measures for resource protection are not required, outside of preventing any deterioration in the existing groundwater body as per requirements of the Water Framework Directive.

7.7.1.6 Operational Phase Mitigation

7.7.1.6.1 Surface Water

<u>Surface Water Flow</u>

Some changes in the drainage network may be required as a result of unanticipated changes in the hydrological regime during the operation phase of the project. The line should be checked quarterly to check that there are no issues relating to surface water flow.

<u>Surface Water Quality</u>

The line should be checked quarterly such that trenches or areas around poles are sealed or vegetated so as to prevent the leaching of soil sediment to surface water.

7.7.1.6.2 Groundwater Flow

There is no anticipated impact on groundwater flow during the operation phase of the grid connection development and therefore no requirement for mitigation.

7.7.1.6.3 Groundwater Quality

There is no anticipated impact on groundwater quality during the operational phase of the grid connection development and therefore no requirement for mitigation.

7.8 RESIDUAL IMPACTS OF THE DEVELOPMENT

7.8.1 Construction Phase

The residual impact on the water environment during the construction phase of the development is anticipated to be a limited local temporary decrease in water quality likely to arise from the release of suspended solids and sediments during the excavation and construction process, particularly following rainfall events after a sustained dry period. This local deterioration in water quality is likely to be reduced naturally by dilution and managed by mitigation prior to exiting from the site boundary to main catchments of the streams in question. Thus, this impact overall is anticipated to be slight, and temporary.

7.8.2 Operational Phase

The residual impact on the water environment during the operation phase of the development is anticipated to be insignificant given that surfaces along the grid connection will be restored to baseline conditions.

7.9 MONITORING

7.9.1 Monitoring Locations

Collection and analysis of water samples at three of monitoring locations (i.e. upstream & downstream of construction work locations) shall be taken before, during and after construction works. It is proposed that one round of sampling will be undertaken prior to the commencement of development and will be used as a baseline by which all subsequent samples will be compared. Monthly sampling will then be completed for the duration of the construction phase while one round of sampling will be completed following the completion of a construction and reinstatement activities.

Water sampling locations for Derreenacrinnig West Wind Farm Grid Connection are specified in Management Plan 2: Water Quality Inspection and Monitoring Plan attached to the CEMP (Appendix H to this EIAR).

These locations are

- On the Derreenacrinnig Stream upstream and downstream of the substation location.
- On the Glanareagh Stream, upstream and downstream of the existing road bridge.
- On the Ballylickey Stream east and north of the 110kV substation.

7.9.2 Hydrochemistry Monitoring

7.9.2.1 Field Monitoring

Field monitoring of water quality parameters and collection of samples will be undertaken by an Environmental Manager (EM) who will be appropriately qualified on the required monitoring methods and the use, calibration and maintenance of all monitoring equipment used.

7.9.2.2 Laboratory Analysis

Laboratory analysis of water samples will also be undertaken as part of the monitoring programme by an independent and appropriately certified laboratory to be appointed by the EM.

7.9.2.3 Monitoring Programme

The monitoring programme will include:

- At least one baseline monitoring visit.
- Daily visual observation in areas of high construction activity or during high rainfall periods to identify any evidence of siltation, oil or silt. Visual inspections will include details of the color of the water at the time of inspection.

- Weekly visual inspections and monthly field hydrochemistry monitoring.
- One round of post construction monitoring.

The suite of grab sample determinants may include the following:

Parameters for hydrochemistry analysis

- pH
- Temperature
- Total Suspended Solids (TSS)
- Dissolved Organic Carbon (DOC)
- Conductivity
- Dissolved Oxygen (DO)
- Total Oxidized Nitrogen (TON)
- Ammoniacal Nitrogen
- Ammonia
- Potassium
- Phosphate
- Biological Oxygen Demand (BOD)
- Chemical Oxygen Demand (COD)
- Total Petroleum Hydrocarbons (TPH) (*Only during construction phase)

7.9.3 Cumulative Effects

Cumulative effects from the EIA Development and other developments in the area will only occur during the construction and decommissioning phases of the Development as grid connections will not normally have an effect on water during operation.

While much of the earthworks for site roads (including crossings of the Dereenacrinnig Stream which is a tributary of the Ilen River) and some hardstands have been carried out for the windfarm, there remains the excavation for foundations as well as the completion of hardstands. Site trenching and cabling is required as well as the excavation of the foundations for the sub-station building. These works are more locally contained on the site then the works already undertaken but are likely to be undertaken concurrent or in advance of the construction of the grid connection and could give rise to water quality impacts.

Provided the mitigation measures in the EIAR for the wind farm are implemented by the wind farm developer, no significant impacts on water are anticipated during the construction or operation phases of the grid connection.

7.10 SUMMARY OF SIGNIFICANT EFFECTS

This assessment has identified no potentially significant residual effects on either the Proposed Grid Connection Development or the Wind Farm Site.

7.11 STATEMENT OF SIGNIFICANCE

This Section has assessed the significance of potential effects of the proposed EIA Development on the water resources along the proposed grid connection route. The proposed EIA Development has generally been assessed as having the potential to result in effects of a negative, slight direct, high probability, permanent impact or lower.

Given that only effects of significant impact or greater are considered "significant" in terms of the EIA Regulations, the potential effects of the EIA Development on water resources are considered to be not significant.

7.12 CONCLUSION

If the mitigation measures outlined for the surface water and groundwater aspects of the site are implemented as described in this report, the resultant predicted impact of the development is that there will be some local changes to how water flows at the site. There is likely to be some short-term deterioration of the quality of runoff waters along the grid route. Monitoring of water discharge and water quality during the construction phase and regular monitoring at an agreed frequency during the operation phase is recommended. Thus, it is anticipated that the hydrological impacts of the development will be negative, slight and temporary overall, with increased runoff being a negative, slight and permanent impact.

7.13 REFERENCES

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10.	DoE-LG (1988) “S.I. No. 293 of 1988: European Communities (Quality of Salmon Waters) Regulations”.
11.	European Economic Union (1975) “75/440/EEC: Council Directive on the Quality of Surface Water for Human Consumption”.
12.	DoE-LG (1989) “S.I. No. 294 of 1989: European Communities (Quality of Surface Water intended for the abstraction of Drinking Water) Regulations”.
13.	Forestry Commission (2004). “Forests and Water Guidelines”. 4th Edition. Forestry Commission, Edinburgh, Scotland.
14.	DoE-LG (2001) “S.I. No. 12 of 2001: Water Quality (Dangerous Substances) Regulations”.
15.	DoM-NR, Coillte (2000) “Forestry and Water Quality Guidelines’’.

8 AIR AND CLIMATE

8.1 INTRODUCTION

This chapter assesses the impacts of the Development on air and climate. The Development refers to all elements of the application for the for the removal of the partially built grid connection works for the erection of the full length, over a distance of approximately 14.8 km of a new grid connection between the Ballylicky ESB substation and Derreenacrinnig West Windfarm. (See **chapter 2: Project Description**)

Where negative effects are predicted, the chapter identifies appropriate mitigation strategies therein. The assessment will consider the potential effects during the following phases of the Development:

- Construction of the Development
- Operation of the Development
- Decommissioning of the Development

8.1.1 Background and Objectives

Despite the ongoing deterioration in air quality on a national level due to the reliance on fossil fuel generated energy, transportation, and heating, Ireland as a whole is relatively free of air pollution, when compared with other more industrialised EU countries. The combustion of fossil fuels for energy results in the release of several gases which contribute to climate change and acid rain, including carbon dioxide (CO_2), sulphur dioxide (SO_2) and nitrogen oxides (NOx), and Particulate Matter (PM_{10} and $PM_{2.5}$).

Climate change has begun to manifest itself in Ireland, as it has globally in recent years, with increased air temperatures and changes in precipitation patterns. In 2005, emissions data estimated that Ireland was 25.4% above the level for 1990. Emissions data from 2007 show that Ireland was 24.6% above the level for 1990 (the base year for Kyoto targets). By 2013, total emission levels in Ireland had dropped back almost to 1990 levels, largely as a result of the economic downturn, with indications that individual households had reduced their emissions (EPA, 2014)[18]. No levels above the EU limit were recorded at any of the ambient air quality network monitoring sites in Ireland in 2015 (EPA, 2015[19]).

This section assesses the air quality environment of the area of the Proposed Development Site and the potential effects of the proposed EIA Development on air quality during the

[18] Environmental Protection Agency "Air Quality in Ireland 2014 - Key Indicators of Ambient Air Quality" www.epa.ie
[19] http://www.epa.ie/pubs/reports/air/quality/Air%20Quality%20Report%202015.pdf

construction, operation and decommissioning phases of the wind farm. Mitigation measures are then recommended which can reduce effects and residual effects are then assessed. This section also quantifies the emissions avoidance levels of the EIA Development.

8.1.2 Statement of Authority

JOD have extensive experience in all aspects of wind farm development, from design and planning stages through to construction. JOD have been active as engineering consultants in the wind energy market in Ireland since 1998 and have completed numerous wind farm projects, varying from single wind turbine installations to large-scale, multi-turbine developments with over 2,000MW generation capacity.

This section has been prepared by Mr. Brian Doyle of Jennings O'Donovan & Partners Ltd. Mr. Doyle has a diploma in Geosciences, Bachelors' degrees in Environmental Protection and Environmental Science (First class) and a Master's degree in Environmental Science (by research). He has over 25 years' experience working in the construction and environmental sectors and has carried out numerous Air and Climate assessments for EIAR's.

The chapter has been reviewed by Mr. David Kiely of Jennings O'Donovan & Partners Ltd. Mr. Kiely has 38 years' experience in the civil engineering and environmental sector. He has obtained a Bachelor's Degree in Civil Engineering and a Masters in Environmental Protection, has overseen the construction of over 40 wind farms and has carried out numerous Air and Climate Assessments for EIAR's.

8.1.3 Assessment Structure

This Section contains the following sections:

- Assessment Methodology and Significance Criteria – a description of the methods used in baseline surveys and in the assessment of the significance of effects;
- Baseline Description - a description of the soils and geology of the Proposed Development Site based on the results of surveys, desk information and consultations, and a summary of any information required for the assessment that could not be obtained;
- Assessment of Potential Effects - identifying the ways in which soils and geological resources could be affected by the proposed EIA Development, including a summary of the measures taken during design of the EIA Development to minimise soils and geological effects;
- Mitigation Measures and Residual Effects - a description of measures recommended to off-set potential negative effects and a summary of the significance of the effects of the EIA Development after mitigation measures have been implemented;

- Cumulative Effects – identifying the potential for effects of the EIA Development to combine with those from other developments to affect soils and geological resources;
- Summary of Significant Effects;
- Statement of Significance;

8.2 ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

8.2.1 Assessment Methodology

This assessment of air quality and climate involved the following:

- A desk study of the air quality / climate baseline in the area of the Proposed Development Site area and nationally;
- Evaluation of potential effects;
- Evaluation of the significance of effects; and
- Identification of measures to avoid and mitigate potential effects.

8.2.2 Relevant Legislation and Policy

There are various regulatory measures in force for the prevention or control of air pollution, adopted In 1996, the Air Quality Framework Directive (96/62/EC) was published. This Directive was transposed into Irish law by the Environmental Protection Agency Act 1992 (Ambient Air Quality Assessment and Management) Regulations 1999. The Directive was followed by four Daughter Directives, which set out limit values for specific pollutants:

•The first Daughter Directive (1999/30/EC) addresses sulphur dioxide, oxides of nitrogen, particulate matter and lead.

•The second Daughter Directive (2000/69/EC) addresses carbon monoxide and benzene. The first two Daughter Directives were transposed into Irish law by the Air Quality Standards Regulations 2002 (SI No. 271 of 2002).

•A third Daughter Directive, Council Directive (2002/3/EC) relating to ozone, was published in 2002 and was transposed into Irish law by the Ozone in Ambient Air Regulations 2004 (SI No. 53 of 2004).

•The fourth Daughter Directive, published in 2007, relates to polyaromatic hydrocarbons (PAHs), arsenic, nickel, cadmium and mercury in ambient air.

The Air Quality Framework Directive and the first three Daughter Directives have been replaced by the Clean Air for Europe (CAFE) Directive (Directive 2008/50/EC on ambient air quality), (as amended by Directive EU 2015/1480) which encompasses the following elements:

•The merging of most of the existing legislation into a single Directive (except for the Fourth Daughter Directive) with no change to existing air quality objectives.

•New air quality objectives for PM2.5 (fine particles) including the limit value and exposure concentration reduction target

•The possibility to discount natural sources of pollution when assessing compliance against limit values

•The possibility for time extensions of three years (for particulate matter PM10) or up to five years (nitrogen dioxide, benzene) for complying with limit values, based on conditions and the assessment by the European Commission.

The limit values of the CAFE Directive are set out in Table 8.1, as derived from the Air Quality Framework Daughter Directives. Limit values are presented in micrograms per cubic metre (µg/m3) and parts per billion (ppb). The notation PM10 is used to describe particulate matter or particles of ten micrometres or less in aerodynamic diameter. PM2.5 represents particles measuring less than 2.5 micrometres in aerodynamic diameter. The CAFE Directive was transposed in to Irish legislation by the Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011) as amended by the Air Quality Standards (Amendments) and Arsenic, Cadmium, Mercury, Nickel and Polycyclic Aromatic Hydrocarbons in Ambient Air Regulations, 2016 (S.I. 659 2016). These Regulations supersede the Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002), the Ozone in Ambient Air Regulations 2004 (S.I. No. 53 of 2004) and the Ambient Air Quality Assessment and Management Regulations 1999 (S.I. No. 33 of 1999). both nationally and by the EC.

Table 8.1 Limit values of Directives 2008/50/EC, 1999/30/EC and 2000/69/EC (Source: EPA)

Pollutant	Limit Value Objective	Averaging Period	Limit Value (µg/m^3)	Limit Value (ppb)	Basis of Application of Limit Value	Attainment Date
SO_2	Protection of human health	1 hour	350	132	Not to be exceeded more than 24 times in a calendar year	1 Jan 2005

Pollutant	Limit Value Objective	Averaging Period	Limit Value (μg/m³)	Limit Value (ppb)	Basis of Application of Limit Value	Attainment Date
SO_2	Protection of human health	24 hours	125	47	Not to be exceeded more than 3 times in a calendar year	1 Jan 2005
SO_2	Protection of vegetation	Calendar Year	20	7.5	Annual mean	19 July 2001
SO_2	Protection of vegetation	1 Oct to 31 Mar	20	7.5	Winter mean	19 July 2001
NO_2	Protection of human health	1 hour	200	105	Not to be exceeded more than 18 times in a calendar year	1 Jan 2010
NO_2	Protection of human health	Calendar year	40	21	Annual mean	1 Jan 2010
$NO + NO_2$	Protection of ecosystems	Calendar year	30	16	Annual mean	19 July 2001
PM_{10}	Protection of human health	24 hours	50	-	Not to be exceeded more than 35 times in a calendar year	1 Jan 2005
PM_{10}	Protection of human health	Calendar year	40	-	Annual mean	1 Jan 2005
$PM_{2.5}$ - Stage 1	Protection of human health	Calendar year	25	-	Annual mean	1 Jan 2015
$PM_{2.5}$ - Stage 2	Protection of human health	Calendar year	20	-	Annual mean	1 Jan 2020
Lead	Protection of human health	Calendar year	0.5	-	Annual mean	1 Jan 2005
Carbon Monoxide	Protection of human health	8 hours	10,000	8620	Not to be exceeded	1 Jan 2005
Benzene	Protection of human health	Calendar year	5	1.5	Annual mean	1 Jan 2010

The Ozone Daughter Directive 2002/3/EC is different from the other Daughter Directives in that it sets target values and long-term objectives for ozone rather than limit values. Table 8.2 presents the limit and target values for ozone.

Table 8.2 Target values for Ozone Defined in Directive 2008/50/EC

Objective	Parameter	Target Value for 2010	Target Value for 2020
Protection of human health	Maximum daily 8-hour mean	120 mg/m^3 not to be exceeded more than 25 days per calendar year averaged over 3 years	120 mg/m^3
Protection of vegetation	*AOT_{40} calculated from 1 hour values from May to July	18,000 mg/m^3 h^{-1} averaged over 5 years	6,000 mg/m^3 h^{-1}
Information Threshold	1-hour average	180 mg/m^3	-
Alert Threshold	1-hour average	240 mg/m^3	-

*AOT40 is a measure of the overall exposure of plants to ozone. It is the sum of the excess hourly concentrations greater than 80 µg/m^3 and is expressed as µg/m^3 hours.

8.2.3 Air Quality Zones

The EPA has designated four Air Quality Zones for Ireland:

- Zone A: Dublin City and environs
- Zone B: Cork City and environs
- Zone C: 16 urban areas with population greater than 15,000
- Zone D: Remainder of the country

These zones were defined to meet the criteria for air quality monitoring, assessment and management described in the Framework Directive and Daughter Directives. The Development lies within Zone D, which represents rural areas located away from large population centres.

8.2.4 Existing Climate

The Irish climate is defined as a temperate oceanic climate on the Köppen climate classification system. Ireland’s climate is mild, moist and changeable with abundant rainfall and a lack of temperature extremes. The country generally receives cool summers and mild winters and it is considerably warmer than other areas on the same latitude. Ireland’s land mass is warmed by the North Atlantic Current all year and as a result does not experience a great annual range of air temperatures.

Nationally, the mean air temperature is generally between 9 and 11 degrees. Annual rainfall totals on the West coast generally average between 1000 and 1400mm with the wettest months being December and January and April being the driest month. The prevailing wind direction is between South and West. Average wind speed ranges from 3m/s in south Leinster to 8m/s in the extreme North of the country.

Cork Airport, located 48km south-east of the Development has the closest Met Eireann climate station to the Development. The mean annual air temperature between 1981 and 2010 was 9.9°C. Mean monthly temperatures ranged from 5.6°C in January to 15.3°C in July. Mean annual rainfall over this period was 1227.9mm, with a maximum monthly mean rainfall of 138.2mm in and a minimum monthly mean rainfall of 50.2mm in July.[20]

8.2.5 Existing Air Quality Conditions

Generally, Ireland is recognised as having some of the best air quality in Europe. However, from time to time, and under certain weather conditions, it is possible to experience some air pollution in the larger towns and cities. The most recent published report on air quality in Ireland is the 'Air Quality in Ireland 2019' report published by the EPA in 2020 . This report provides an overview of the ambient air quality in Ireland in 2019. It is based on monitoring data from 30 stations across Ireland. The measured concentrations are compared with both EU legislative standards and WHO air quality guidelines for a range of air pollutants. The closest monitoring site to the Development within the same air quality zone is Macroom. Macroom was one of nine EU monitoring sites brought online in 2019. Results from the monitoring campaign during 2019 show:

- No levels above the EU limit value were recorded at any of the ambient air quality network monitoring sites in Ireland in 2019.
- WHO guideline values were exceeded at a number of monitoring sites for fine particulate matter (PM2.5), ozone, NO2. However, no pollutants were found above WHO guidelines at Macroom.
- The annual mean PM10 and PM2.5 levels for Macroom were 28 and 15µg/m3 respectively.

[20] https://www.met.ie/climate/30-year-averages, accessed 10th May 2021

8.2.6 DO NOTHING IMPACT

If the Development was not to proceed, the opportunity to reduce emissions of carbon dioxide, oxides of nitrogen (NOx), and sulphur dioxide (SO2) to the atmosphere would be lost due to the continued dependence on electricity derived from coal, oil and gas-fired power stations, rather than renewable energy sources such as the Development. This would result in an indirect, negative impact on air quality.

8.3 POTENTIAL IMPACTS OF THE DEVELOPMENT

8.3.1 Assessment Methodology

Dust Emissions

The main potential source of impacts on air quality during construction is dust. There is potential for the generation of dust from excavations and from construction of the trench for the cable ducting for the grid connection. The potential nuisance issues arising from this are dependent on the terrain, weather conditions, (i.e. dry and windy conditions), and the proximity of receptors. Dust from cement can cause ecological damage if allowed to migrate to water courses, though it is proposed that ready-mix concrete will be used with no on-site batching taking place, and therefore this will not be a potential source of emissions. Potentially dust generating activities are as follows:

- Earth moving and excavation plant and equipment for handling and storage of soils and subsoils

The potential impact from dust becoming friable and being a nuisance to workers, residents and local road users is considered, a slight, negative, short-term, direct impact during the construction phase.

Friable dust cannot remain airborne for a very long time. The distance it can travel depends on the particle sizes, disturbance activities and weather conditions. Larger dust particles tend to travel shorter distances than smaller particles. Particle sizes greater than 30µm will generally deposit within approximately 100m of its source, while particles between 10-30µm travel up to approximately 250-500m and particle sizes of less than 10µm can travel up to approximately 1km .

Generally, (depending on the conditions outlined), dust nuisance is most likely to occur at sensitive receptors within approximately 100m of the source of the dust. In addition, vegetation such as trees and hedgerows in the vicinity will help to mitigate any airborne dust migrating off the Site. Any effects of dust on vegetation will be confined to the construction of the grid connection and possibly the decommissioning phases and be short-term in duration.

Impacts from dust deposition at sensitive receptors would give rise to nuisance issues for residents of those properties. However, with strict adherence to mitigation measures and the distance from the main sites of dust generation, the impacts would be predicted to be a slight and short-term.

Exhaust Emissions

Emissions from plant and machinery, including trucks, during the construction of the Development are a potential impact. The engines of these machines produce emissions such as carbon dioxide (CO_2), carbon monoxide (CO), Nitrogen Oxides (NO_x), and Particulate Matter (PM_{10} and $PM_{2.5}$).

Particulate Matter ("PM") less than ten micrometres in size (PM_{10}) can penetrate deep into the respiratory system increasing the risk of respiratory and cardiovascular disorders. PM_{10} arises from direct emissions of primary particulate such as black smoke and formation of secondary PM in the atmosphere by reactions of gases such as sulphur dioxide and ammonia. The main sources of primary PM_{10} are incomplete burning of fossil fuels such as coal, oil and peat and emissions from road traffic, in particular diesel engines. Other sources of particulates include re-suspended dust from roads. Natural PM includes sea-salt and organic materials such as pollens. The diverse sources and impacts of PM make it one of the most challenging issues to address.

Nitrogen oxides (NO_x), include the two pollutants, nitric oxide (NO) and nitrogen dioxide (NO_2). Power-generation plants and motor vehicles are the principal sources of NO_x, through high temperature combustion. NO_x contributes to the formation of acid rain and is also a recognised ozone precursor. Short-term exposure to NO_2 is associated with reduced lung function and airway responsiveness, and increased reactivity to natural allergens. Long-term exposure is associated with increased risk of respiratory infection in children. The construction phase of the grid connection is likely to lead to small localised increases in these emission levels which is likely to lead to a temporary, imperceptible effect.

8.3.2 Operational Phase

During the operational phase any air quality impacts are predicted to be imperceptible.

8.3.3 Decommissioning Phase

The decommissioning phase would be expected to last approximately 8 weeks in the scenario described above, and any air quality impacts would be predicted to be imperceptible.

8.4 MITIGATION MEASURES AND RESIDUAL EFFECTS

8.4.1 Construction Phase Mitigation

The main potential impact during the construction phase of the Development will be from dust nuisance at sensitive receptors close to the Site. Good practice site procedures will be followed by the appointed contractor to prevent dirt and dust being transported onto the local road network. Good practice site control measures are likely to include the following:

- Approach roads and construction areas will be cleaned on a regular basis to prevent mud built-up and from migrating around the site and off-site;
- 'Damping down' will be used if dust becomes an issue on any part of the site;
- Vehicles delivering materials to the site will be covered appropriately when transporting materials that could result in dust, e.g., crushed rock or sand;
- Ready-mix concrete will be delivered to site, and it is envisaged that no batching of concrete will take place on site;
- Public roads along the grid route will be inspected regularly and if dirt/mud is identified that could result in dust generation then the road will be cleaned as necessary;
- Weather will be monitored so that during periods of dry weather when dust is likely to become airborne, sporadic damping down of access tracks (and other surfaces as necessary) will be undertaken;
- Stockpiling of materials will be minimised and will be carried out in such a way as to minimise their exposure to wind where possible and damping down will be carried out where needed; and
- A complaints procedure will be implemented on site where complaints will be reported to the site manager, logged and appropriate action taken.

The appointed contractor responsible for the detailed design of the project will provide details to the planning authority for agreement in writing, prior to the commencement of the development, of environmental safety methodology including best practice procedures to manage construction activities.

8.4.2 Operational Phase Mitigation

Given the nature of the development no emissions will be generated during the operation of the grid connection unless through maintenance in which case the impacts will be short-term and similar to those of construction, though for a shorter time. In the longer term, the development will help in improving air quality on national level given that it will facilitate the development of the consented Derreenacrinnig West Wind Farm which will help Ireland reduce its consumption of fossil fuels.

8.4.3 Decommissioning Phase Mitigation

Mitigation measures during the decommissioning phase will be similar to those employed during the construction phase as outlined above.

8.4.4 Cumulative Effects

The proposed development of the wind farm and grid connection has the potential to cause negative effects in combination with other plans and projects during the construction phase should they be constructed at the same time. Increased amounts of dust could become friable and increased traffic could lead to increased emissions in the local area. However, given the short-term nature of the proposals any effects would be minor in nature. The Development construction is a short-term activity, so the potential cumulative impact could be predicted to be slight, negative, temporary/short-term, direct, medium probability given the distance of the Development to sensitive receptors

8.5 RESIDUAL IMPACTS OF THE DEVELOPMENT

The Grid Connection itself will not generate renewable electricity and therefore will not contribute in itself to Climate Change mitigation action. However, the Grid Connection will indirectly cause positive effects to climate as the purpose of Grid Connection is to transport the renewable electricity produced by Derreenacrinning West Wind Farm to the National Grid.

The use of plant and machinery will impact air quality in the area, both in terms of dust generation and exhaust emissions. Overall, this impact is assessed as slight/imperceptible, negative, direct and temporary/short-term in nature.

8.6 SUMMARY OF SIGNIFICANT EFFECTS

This assessment has identified no potentially significant effects, given the mitigation measures embedded in the design and recommended for the implementation of the Development.

8.6.1 Statement of Significance

This Section has assessed the significance of potential effects of the Development on air quality. The Development has been assessed as having the potential to result in slight, negative, temporary/short-term effects during construction.

Potential cumulative effects were assessed as being of a **slight, negative, short-term** impact. Given that only effects of significant impact or greater are considered "significant" in terms of the EIA Regulations, the potential effects of the Development on air quality are considered not significant.

8.7 CLIMATE CHANGE AND GREENHOUSE GASES

Climate change means a significant change in the measures of climate, such as temperature, rainfall, or wind, lasting for an extended period – decades or longer. The Earth's climate has changed naturally many times during the planet's existence. However, currently human activities are significantly contributing to climate change through greenhouse gases emissions. The global average temperatures have now increased by more than 1°C since pre-industrial times. The increase in the concentration of greenhouse gases is resulting in increased ocean temperatures, drought, melting ice and snow, rising sea levels, increased rainfall, flooding and other influences[21].

There are a wide range of gases known as greenhouse gases. The most critical greenhouse gases are carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). There are also other greenhouse gases known as F-Gases, man-made gases used in refrigeration and air conditioning appliances. Greenhouse gases produced by human activities are changing the composition of the earth's atmosphere. This is known as the greenhouse effect. Human activities that produce greenhouse gases include:

- Carbon dioxide emissions through burning fossil fuels such as coal, oil and gas and peat
- Methane and nitrous oxide emissions from agriculture
- Emissions through land use changes such as deforestation, reforestation, urbanization, desertification

[21] https://www.epa.ie/climate/communicatingclimatescience/whatisclimatechange/

Current projections indicate that continued emissions of greenhouse gases, including the burning of fossil fuel to produce electricity, will cause further warming and changes to our climate. Climate is predicted to have indirect and direct impacts on Ireland including:

- Rising sea-levels threatening habitable land and particularly coastal infrastructure
- Extreme weather, including more intense storms and rainfall affecting our land, coastline and seas
- Further pressure on our water resources and food production systems with associated impacts on fluvial and coastal ecosystems
- Increased chance and scale of river and coastal flooding
- Greater political and security instability
- Displacement of population and climate refugees
- Heightened risk of the arrival of new pests and diseases
- Poorer water quality
- Changes in the distribution and time of lifecycle events of plant and animal species on land and in the oceans [22]

8.7.1 Relevant Legislation and Guidance

Greenhouse gases are the subject of international agreements, such as the United Nations Framework Convention on Climate Change and the Paris Agreement. These agreements along with International and National Policy and Legislation are discussed in Chapter 3 Planning Policy Context. This section will examine the Carbon losses and savings from this Development and its impact on Climate Change.

8.7.2 Assessment Methodology

This assessment of climate involved the following:

- A desk study of the climate baseline in the area of the Development and nationally
- Evaluation of potential effects
- Evaluation of the significance of effects
- Identification of measures to avoid and mitigate potential effects

8.7.3 Existing Climate

Discussion on the existing climate is set out in Section 8.2.4. For the purpose of the assessment of Climate Change, meteorological data from the nearest meteorological station to the

22 Climate Action Plan 2019 – To Tackle Climate Breakdown, Department of Environment, Climate and Communications, https://www.gov.ie/en/publication/ccb2e0-the-climate-action-plan-2019/, accessed 10th May 2021

Development, Cork Airport monitoring station, over a period of 1981-2010 is shown in Table 8.3. The wettest months are January, October and December, and June and July are usually the driest. July is the warmest month with a mean temperature of 15.3° Celsius.

Table 8.3 Cork Airport Meteorological Station Data Averages (1981- 2010)

	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
TEMPERATURE (degrees Celsius)													
mean daily max	8.2	8.3	9.9	11.8	14.4	17.0	18.7	18.5	16.5	13.2	10.3	8.5	12.9
mean daily min	3.0	3.1	4.0	4.9	7.4	10.0	11.8	11.8	10.2	7.7	5.2	3.7	6.9
mean temperature	5.6	5.7	6.9	8.4	10.9	13.5	15.3	15.2	13.3	10.5	7.8	6.1	9.9
absolute max.	16.1	14.0	15.7	21.2	23.6	27.5	28.7	28.0	24.7	21.4	16.2	13.8	28.7
min. maximum	-4.3	-1.6	1.4	5.0	7.6	10.7	12.8	11.9	10.4	6.0	0.6	-3.2	-4.3
max. minimum	10.6	10.6	10.9	11.4	15.1	16.2	19.0	18.4	17.3	15.4	12.8	11.6	19.0
absolute min.	-8.0	-4.7	-4.3	-2.3	-0.9	3.7	6.7	5.3	2.3	-0.9	-3.3	-7.2	-8.0
mean num. of days with air frost	4.6	4.1	1.8	1.2	0.0	0.0	0.0	0.0	0.0	0.2	1.2	3.6	16.7
mean num. of days with ground frost	12.8	11.8	9.7	7.8	2.1	0.1	0.0	0.0	0.5	2.4	7.3	11.0	65.3
mean 5cm soil	4.5	4.5	5.9	8.3	12.0	15.0	16.4	15.7	13.1	9.8	6.8	5.2	9.8
mean 10cm soil	4.8	4.8	5.9	7.9	11.3	14.1	15.7	15.2	13.0	10.0	7.2	5.6	9.6
mean 20cm soil	5.5	5.5	6.6	8.5	11.5	14.2	15.8	15.7	13.9	11.0	8.1	6.3	10.2
RELATIVE HUMIDITY (%)													
mean at 0900UTC	89.8	89.4	87.8	83.1	80.6	81.3	83.2	85.4	88.4	90.1	90.7	90.5	86.7
mean at 1500UTC	83.7	78.9	75.5	71.3	70.9	71.5	72.9	72.8	75.4	80.4	83.4	85.4	76.8
SUNSHINE (hours)													
mean daily duration	1.8	2.4	3.3	5.3	6.2	5.8	5.4	5.2	4.3	3.0	2.3	1.7	3.9
greatest daily duration	8.5	10.0	11.5	13.6	15.5	16.0	15.3	14.4	11.9	10.3	8.7	7.6	16.0
mean no. of days with no sun	10.1	7.9	6.3	3.1	2.1	2.5	2.0	2.6	3.6	6.4	8.6	11.9	67.1
RAINFALL (mm)													
mean monthly total	131.4	97.8	97.6	76.5	82.3	80.9	78.8	96.8	94.6	138.2	120.0	133.1	1227.9
greatest daily total	45.7	49.9	55.2	34.2	34.9	59.7	73.2	60.9	58.9	52.1	47.9	41.9	73.2
mean num. of days with >= 0.2mm	20	17	19	16	15	14	15	15	16	19	19	19	204
mean num. of days with >= 1.0mm	16	13	14	11	12	10	10	11	11	15	14	15	152
mean num. of days with >= 5.0mm	9	6	5	5	5	5	5	5	5	8	7	8	73
WIND (knots)													
mean monthly speed	12.1	12.0	11.6	10.3	10.1	9.4	9.0	9.0	9.4	10.7	10.9	11.6	10.5
max. gust	78	83	70	62	59	49	57	54	58	75	66	80	65.9
max. mean 10-minute speed	52	54	43	40	40	33	40	38	39	48	46	56	44.1
mean num. of days with gales	2.3	1.8	1.3	0.3	0.3	0.0	0.1	0.2	0.3	1.0	1.2	1.9	10.8
WEATHER (mean no. of days with..)													
snow or sleet	3.1	3.1	2.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.3	2.2	11.3
snow lying at 0900UTC	0.7	0.5	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	2.0
hail	1.0	1.1	1.4	1.9	0.7	0.2	0.1	0.0	0.1	0.3	0.2	0.4	7.4
thunder	0.2	0.1	0.1	0.1	0.6	0.5	0.8	0.3	0.0	0.4	0.1	0.1	3.3
fog	7.8	6.8	8.5	7.5	7.6	7.6	8.4	8.8	9.1	8.7	7.6	8.4	96.8

8.7.4 Carbon Savings

The 2010 EIS had assessed the carbon savings of the wind farm in section 1.5 of The EIS 'Project Predictions'.

"The proposed project aims to generate approximately 18,243MWh of electricity per year operating at 35% efficiency. This would be enough to supply up to 3,868 households. This is the equivalent energy production from 38,184 barrels of oil each year. By displacing fossil fuel generation, Dereenacrinnig West Wind Farm would avoid the following annual discharges to the atmosphere:

- *16,065 tonnes of Carbon Dioxide (CO 2)*
- *292 tonnes of Sulphur Dioxide (SO 2)*
- *33 tonnes of Nitrous Oxide (NO x)*
- *1,041 tonnes of ash"*

8.8 DO NOTHING IMPACT

If the Development was not to proceed, greenhouse gas emissions, e.g. carbon dioxide, carbon monoxide and nitrogen oxides associated with construction and decommissioning works would not arise. However, the greenhouse gas savings that would arise from the operation of the Development would also be lost leading to a long-term, moderate, negative impact.

8.9 POTENTIAL IMPACTS OF THE DEVELOPMENT

8.9.1.1 Construction Phase

Greenhouse gas emissions, e.g. carbon dioxide (CO_2), carbon monoxide and nitrogen oxides are associated with vehicles and plant utilised for construction activities. This potential impact will be slight, given the insignificant quantity of greenhouse gases that will be emitted, and will be restricted to the duration of the construction phase. Therefore, this is a short-term, slight, negative impact. Mitigation measures to reduce this impact are outlined in **Section 8.2.9**.

8.9.1.2 Operation Phase

The Development is a renewable energy project in that it will generate electricity from a renewable source. This energy generated will be in direct contrast to energy and the associated emission of greenhouse gases from electricity-generating stations dependent on fossil fuels, thereby having a positive impact on the climate. The Development will displace carbon dioxide from fossil fuel-based electricity generation, over the proposed 40-year lifespan of the

Development. The Development will assist in reducing carbon dioxide (CO2) emissions that would otherwise arise if the same energy that the Development will generate were otherwise to be generated by conventional fossil fuel plants. This is a long-term, moderate, positive effect on the climate.

8.9.1.3 Decommissioning Phase

Any impacts that occurs during the decommissioning phase are similar to that which occur during the construction phase. The mitigation measures prescribed for the construction phase of the Development will be implemented during the decommissioning phase thereby minimising any potential impacts.

8.10 CUMULATIVE AND IN COMBINATION EFFECTS

Potential cumulative effects on climate between the Development and other developments in the vicinity were also considered as part of this assessment. The nature of the Development is such that, once operational, it will have a long-term, moderate, positive impact on the air climate.

The proposed development of the wind farm and grid connection has the potential to cause negative effects in combination with other plans and projects during the construction phase should they be constructed at the same time. Increased amounts of dust could become friable and increased traffic could lead to increased emissions in the local area. However, given the short-term nature of the proposals any effects would be minor in nature.

There will be no net carbon dioxide (CO2) emissions from operation of the Development. Emissions of carbon dioxide (CO2), oxides of nitrogen (NOx), sulphur dioxide (SO2) or dust emissions during the operational phase of the Development will be minimal, relating to the use of operation and maintenance vehicles onsite, and therefore there will be no measurable negative cumulative effect with other developments on climate.

The nature of the Development and other wind energy developments within 20km are such that, once operational, they will have a cumulative long-term, moderate, positive effect on the climate.

8.11 RESIDUAL IMPACTS OF THE DEVELOPMENT

8.11.1.1 Construction Phase

There will be short-term imperceptible negative impact on Climate as a result of greenhouse gas emissions.

8.11.1.2 Operational Phase

There will be long-term, moderate, positive impact on Climate as a result of reduced greenhouse gas emissions.

8.12 STATEMENT OF SIGNIFICANCE

The Development has been assessed as having the potential to result in a short-term imperceptible, negative impact on climate during construction. There will be long-term moderate positive impact on Climate as a result of reduced greenhouse gas emission during the operational phase

Potential cumulative effects were assessed as being of a slight, negative, short-term impact. Given that only effects of significant impact or greater are considered “significant” in terms of the EIA Regulations, the potential effects of the EIA Development Farm on air quality and climate are considered not significant.

8.13 CONCLUSION

In conclusion, the proposed development may have a localised negative impact on air quality in the area during construction but will contribute to a long-term positive impact in terms of air quality and climate on a national level by facilitating development of wind energy and the move to a lower carbon economy.

9 NOISE

9.1 INTRODUCTION AND METHODOLOGY

Planning permission was originally granted for development for a seven-turbine wind farm at Derreenacrinnig West, Drimoleague, Co. Cork. The 2010 EIS submitted as part of that application assessed the existing background noise levels at some of the dwelling locations closest to the proposed turbines. The potential impact on residential amenity at these Noise Sensitive Locations (NSLs) were assessed by comparing predicted noise levels from the wind turbines at the NSLs with existing background noise levels and extrapolated noise limits as recommended by the Wind Energy Development Guidelines 2006[23]. The background noise levels being the noise level equalled or exceeded for 90% of the monitoring interval.

The baseline noise monitoring was carried out in accordance with *ISO 1996 Part 1 (Description and Measurement of Environmental Noise - Part 1: Basic Quantities and Procedures)* while the impact statement was compiled according to the *Department of Environment, Heritage and Local Government 'Wind Energy Development Guidelines 2006'*.

The Wind Energy Development Guidelines state that *"noise is unlikely to be a problem where the distance from the nearest property is more than 500 metres"*. The nearest house (H1) to the proposed Derreenacrinnig West Wind Farm is 884 m north of the site.

9.2 STATEMENT OF AUTHORITY

This Section has been prepared by Mr Brendan O'Reilly of Noise and Vibration Consultants Ltd. Mr. O'Reilly has a Masters degree on noise and vibration from Liverpool University and has over 30 years' experience in noise and vibration control (and many years' experience in preparation of noise impact statements) and is a member of a number of professional organisations (including the Society of French Acoustics and European Association of Acoustics). Mr. O'Reilly was an author and project partner (as a senior noise consultant) in '*ENVIRONMENTAL QUALITY OBJECTIVES Noise in Quiet Areas*' administered by the Environmental Protection Agency on behalf of the Department of the Environment, Heritage and Local Government (as a first step towards implementation of the EC Directive relating to the Assessment and Management of Environmental Noise (EU, 2002).

Noise & Vibration Consultants have considerable experience in the assessment of noise impact and have compiled studies for in excess of 50 planned wind farm developments throughout Ireland ranging in size from 1 to 20 turbines.

[23]. The Department of Environment, Heritage and local Government has recently published 'Wind Energy Development Guidelines'- Guidelines for Planning Authorities June 2006

9.3 STUDY AREA

The study area includes a rural area stretching from the townlands of Derreenacrinning West where the permitted Derreenacrinning West Wind farm is located, to the townland of. Ballylicky. There are a number of receptors within 40m along the route of the grid line that connects the Derreenacrinning West Wind farm to the national grid.

The grid connection works have been assessed using a desktop assessment on the possible noise issues which could arise as a result of the proposed underground cable grid connection works. The grid connection works have the potential to generate noise impacts in the surrounding area during the construction phase. There will be no noise impacts generally during the operational phase due to the nature of the proposed development. There could however be noise impacts if any maintenance is required on the cable and this impact would be of a similar nature to that of construction. Therefore, this assessment will primarily focus on the construction phase.

9.4 ACOUSTIC TERMONOLOGY

Sound is simply the pressure oscillations that reach our ears. These are characterised by their amplitude, measured in decibels (dB), and their frequency, measured in Hertz (Hz). Noise is unwanted or undesirable sound; it does not accumulate in the environment and is normally localised. Environmental noise is normally assessed in terms of A-weighted decibels, dB (A), when the 'A weighted' filter in the measuring device elicits a response which provides a good correlation with the human ear. The criteria for environmental noise control are of annoyance or nuisance rather than damage. In general, a noise level is liable to provoke a complaint whenever its level exceeds by a certain margin the pre-existing noise level or when it attains an absolute level. A change in noise level of 3 dB (A) is 'barely perceptible'; while an increase in noise level of 10 dB (A) is perceived as a twofold increase in loudness. A noise level in excess of 85 dB (A) gives a significant risk of hearing damage.

Construction and industrial noise sources are normally assessed and expressed using equivalent continuous levels, L_{Aeq}[24]. Road traffic noise is normally assessed using L_{10} dB (A)[25] or L_{Aeq}.
In keeping with the requirements of the *Wind Energy Development Guidelines* the background noise level and the noise level due to wind turbines are expressed using the A weighted sound

[24] L_{Aeq} is defined as being the A-weighted equivalent continuous steady sound level during the sample period and effectively represents an average value.

[25] The value of the L_{10} hourly dB(A) is the noise level equalled or exceeded for just 10% of the time over a period of one hour

pressure level that is equalled or exceeded for 90% of a 10-minute measurement interval, $L_{A90,10min}$

Operational wind turbine noise is assessed using the LA90[26] descriptor, which allows reliable measurements to be made without corruption from relatively loud transitory noise events from other sources. The LA90 should be used for assessing both the wind energy development noise and background noise. As discussed in ETSU-R-97[27] the LA90 is 1.5-2.5dBA less than the LAeq measured over the same period. In this assessment, the difference between LAeq and LA90 is assumed to be 2dBA, which is the value most commonly applied in wind farm assessments in Ireland. Wind turbine noise levels are given as sound power levels (LWA) in dB at integer wind speeds up to maximum LWA levels which is no more than 10m/s wind speed at 10m height. **Table 9.1** gives a comparison of noise levels in our everyday environment.

Table 9.1: Comparison of sound pressure level in our Environment[28]

Source/Activity	Indicative noise level dBA
Threshold of hearing	0
Rural night-time background	20-50
Quiet bedroom	35
Wind farm at 350m	**35-45**
Busy road at 5km	**35-45**
Car at 65km/hr at 100m	55
Busy general office	60
Conversation	60
Truck at 50km/hr at 100m	**65**
Inside a typical shopping centre	70-75
Inside a modern car at around 90km/hr	75-80
Passenger cabin of jet aircraft	85
City Traffic	**90**
Pneumatic drill at 7m	95
Jet aircraft at 250m	105
Threshold of pain	140

[26] LA90, or L90dBA is defined as the noise level equaled or exceeded for 90% of the measurement interval and with wind farm noise the interval used is 10 minutes.

[27] ETSU-R-97, The Assessment & Rating of Noise from Wind Farms, June 1996

[28] Fact sheet published by the Australian Government (Greenhouse Office) and the Australian Wind Energy Association

9.5 METHODOLOGY

9.5.1 Relevant Guidance

A list of the relevant guidance and legislation used in the assessment is as follows

- Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4) (Jan 2016).
- ISO 1996-1-2016: Acoustics: Description and Measurement of Environmental Noise-Basic Quantities and Assessment Procedures.
- Integrated Pollution Control Licensing – Guidance Note for Noise in Relation to Scheduled Activities, EPA 1995.
- ISO 9613-2, First Edition 1996-12-15. Acoustics-Attenuation of sound during propagation outdoors-Part 2: General method of calculations
- Guidelines for the Treatment of Noise and Vibration in National Road Schemes (NRA), 2004
- BS5228-1: 2009+A1:2014 Code of Practice for Noise Control on Construction and Open Sites: Part 1: Noise.

9.5.2 Evaluation Criteria

9.5.2.1 Construction Noise Criteria

There is no published national guidance relating to the maximum permissible noise level that may be generated during the construction phase of a project. However National Roads Authority ("NRA") give limit values which are deemed acceptable ("the NRA Guidelines")[29]. Guidance to predict and control noise is also given in BS 5228:2009+A1:2014, *Code of Practice for Noise and Vibration Control on Construction and Open Sites* (two parts) where Part 1 deal with Noise. The NRA guidelines for construction noise which are considered typically acceptable are given in Table 9.2.

[29] National Roads Authority, *Guidelines for Noise and Vibration in National Road Scheme, 2004s.*

Table 9.2: Noise levels that are typically acceptable

Day / Times	Guideline Limits
Monday to Friday	
07:00 – 19:00hrs	70dB LAeq, (1h) and LAmax 80dB
19:00 – 22:00hrs	*60dB LAeq, (1h) and LAmax 65dB*
Saturday	
08:00 – 16:30hrs	65dB LAeq,1h and LAmax75dB
Sunday and Bank Holidays	
08:00 – 16:00hrs	*60dB LAeq,1h and LAmax 65dB*

*Construction at these times, other than required by an emergency works, will normally require explicit permission from the relevant local authority

Construction works during the development of the grid line were confined to the following hours:

- 0800 to 1800hrs weekdays Monday to Friday and
- 0800 to 1400hrs on Saturday with no evening, night, Sunday, or Bank Holiday work

9.5.2.1.1 Construction Vibration Criteria

There are no statutory legislation relating to the maximum permissible vibration levels generated during the construction phase of a development. There are many different standards and recommendations being used internationally, however, most of these standards and recommendations are derived from the considerable work carried by the U. S Bureau of Mines (USBM). The USBM Report of Investigation 8507[30] gives practical safe criteria for blasts that generate low frequency ground vibrations (<40Hz). These are 19mm/sec for modern houses and 12.7mm/sec for older houses. Since 1993 British Standards Institute have adopted BS 7385 Part 2: 1993[31] this is based predominately on a literature review of the considerable work of the USBM. BS 7385 states that there should typically be no cosmetic damage if transient vibration does not exceed 15mm/s at low frequencies rising to 20mm/s at 15Hz and 50mm/s at 40Hz and above. The guidelines relate to relatively modern buildings and should be reduced to 50% or less for more critical buildings (residential buildings do not constitute critical buildings in this context)'. The National Roads Authority (NRA)[32] published guidelines for vibration levels

[30] Siskind, D. E, Stagg, M. S., Kopp, and Dowding, C. H. (1980) '*Structure Response and Damage Produced by Ground Vibration From Surface Mine Blasting*' U .S Bureau of Mines RI 8507

[31] British Standard BS 7385-1:1993- Evaluation and Measurement for vibration in buildings-Part 2: Guide to damage levels from ground borne vibration

[32] NRA, 2004 Guidelines for the Treatment of Noise and Vibration in National Road Schemes

contains information on permissible construction ground vibration levels and are given in **Table 9.2 and Table 9.3.**

Table 9.3: Allowable vibration during road construction in order to minimise the risk of building damage

Allowable vibration velocity (Peak Particle Velocity) at the closest part of any sensitive property to the source of vibration at a frequency of		
Less than 10Hz	10 to 50Hz	50 to 100Hz+
8mm/s	12.5mm/s	20mm/s

The values in Table 9.3 have been derived through consideration of the various standards discussed above; compliance with this guidance should ensure that there is little to no risk of even cosmetic damage to buildings.

9.5.2.1.2 Human Response to Vibration

Human response to vibration varies considerable and can be related to the frequency of the source. Response can be greater inside a house than outside with whole body frequency response being between 4 to 12Hz which is similar to the response of a single story house. The threshold of sensitivity to humans is 0.2mm/s peak particle velocity[33]. There was no blasting or rock breaking during the construction of the grid connection route. Furthermore, there was no other activity (including use of vibrating plate) which would give perceptible ground vibration at any receptor.

9.6 EXISTING ENVIRONMENT

9.6.1 Description of Receiving Environment of Existing Grid Connection

The as built Grid Connection traverses mainly agricultural land as shown in **Figures 2.2-2.6-** Chapter 2. The as Built Grid Connection comprises 5 separate sections for Overhead Lines, running in an East – West direction.

The receptors along the grid route are predominately located on agricultural land and local roads. The nearest houses along the public roadways and through estates would be subjected to daily hourly ambient Leq values in the range of 45-50dBA along the Local roads and higher noise

[33] Wiss, J. F., and Parmelee, R. A.. (1974) Human Perception of Transient Vibrations, "*Journal of Structural Division*", ASCE, Vol 100, No. S74, PP. 773-787

levels at receptors along the Regional roads, with levels mainly generated by road traffic and elevated wind speed on vegetation.

Typically, an average of 100mm of trench will be excavated and backfilled in each working day which means that the maximum levels predicted along the trench route would exist at any single receptors for no more than a maximum one hour duration.

9.6.2 Description of Receiving Environment of The Consented Derreencrinning West Wind Farm and On-site Infrastructure

A 10 year planning permission for development of a wind farm comprising seven number wind turbines with a hub height of 55 metres and a rotor diameter of 52 metres, an electrical compound, sub-station building, four number car parking spaces, associated site roads and site works was granted by An Bord Pleanála under PL88.239767 Decision. permission on 05th December 2012, subject to 16 conditions.

9.7 EVALUATION OF POTENTIAL EFFECTS

The potential impacts of construction are evaluated by comparing the predicted noise and vibration levels against the guidelines limits given in **Table 9.2** and **Table 9.3**.

9.7.1 Sensitivity

The sensitivity of the development during construction is based on the guideline values in **Table 9.2, Table 9.3**.

9.7.2 Magnitude

The magnitude of the potential impacts is based on the values in **Table 9.3.**

9.7.3 Significance Criteria

The significance of construction is based on the potential impacts based on the predicted values and compliance with the guideline limits in **Table 9.2, Table 9.3**.

9.7.4 Potential Noise Impacts

9.7.4.1 Impacts of Existing Grid Connection

The difference between noise levels at two different locations can be modelled as follows:

$$\mathbf{L}_{p2} - \mathbf{L}_{p1} = 10 \log (R_2 / R_1)^2 - (A_{atm} + A_{gr} + A_{br} + A_{mis})$$

$$= 20 \log (R_2 / R_1) - (A_{atm} + A_{gr} + A_{br} + A_{mis})$$

L_{p1} = sound pressure level at location 1

L_{p2} = sound pressure level at location 2

R_1 = distance from source to location 1

R_2 = distance from source to location 2, and where

A_{atm} = Attenuation due to air absorption

A_{gr} = Attenuation due to ground absorption

A_{br} = Attenuation provided by a berm/barrier

A_{mis} = Attenuation provided by miscellaneous other effects

Attenuation by A_{atm}, A_{gr}, A_{br} and A_{mis} is assumed as zero in all the predictions within 40m from source while at distance greater than 40m, attenuation by these effects are assumed as 4dBA.

The grid connection will be predominately routed along agricultural land and public roads where noise levels are likely to be elevated at receptors located close to the roadway, or close to a footpath in front of a house. A list of the main noise sources used in the construction of the grid line is given in Table **9.4.**

Table 9.4: Grid Connection Plant

Plant	BS 5228 Ref.	LAeq dB 1hr	Percentage on -time (%)	LAeq dB 1hr	Activity
Wheeled excavator	C5.11 17t	73	50	= 70	Trenching
Vibratory plate	C2.41	80	12.5	= 71	Compaction
Dump truck	C4.2	78	Average 3 movements/hr		Drive by level
Directional drilling JT30 Ditch Witch	Noise Spec.	83	100	= 83	Drilling under crossings
Readymix truck	C4.20	75	12.5	= 66	Delivery/discharging
Road sweeper		60	12.5	= 51	

Dump truck movements to transport subsoil is calculated at 15 trucks/day (30 movements) which equates to 3 movements/hr over a 10-hour day. Ready mix concrete trucks deliveries required 9 truck loads /day (18 movements). This will generate 1.8 movements/hr over 10 hrs.

Road surface material at 8 truck movements/day will be delivered to a separated licenced facility low which equates to less than 1 movement per hr. The total trucking movement equated to no more than 6 movements/hr.

Typically, an average of 100mm of trench will be excavated and backfilled in each working day which means that the maximum levels predicted along the trench route existed at any single receptor for no more than a two-hour duration.

Table 9.5 gives the predicted noise levels from plant used in the construction activity associated with the development of the grid connection.

Table 9.5: Predicted Noise Levels at Varying Distances from Construction Activities as LAeq dB 1 hour

Plant	Percentage on -time (%)	10m	20m	40m	80m	81m	94m	187m
Wheeled excavator	50	70	64	58	48			
Vibratory plate	12.5	71	65	59	49			
Dump truck	3 trips/hr	60	54	48	38			
Directional drilling JT30 Ditch Witch	100	83				61.2	59.5	53.7
Readymix truck	12.5	66	60	54	44			
Road sweeper	12.5	51	45	39	29			

9.7.5 Assessment of Impacts

The construction of the development including removal of the OHL will result in some localised noise emissions from construction plant and machinery. Due to the generally transient nature of the construction works, noise will only be experienced on a temporary basis.

The proposed development has the potential to cause noise nuisance issues at the residential dwellings along the proposed route. This effect will only occur during the estimated 4 to 6-month construction phase unless maintenance is required on sections of the cable during operation.

The construction phase has the greatest potential to cause noise nuisance to residents in the area along the underground cable route, both along the route itself and in the surrounding area. However, these will be of short duration. Noise will emanate from the transport of materials to and from progressing works as well as from plant and equipment excavating and laying the cable.

It is estimated that 2,325 trucks will travel to the works over the 4 to 6-month construction period. This equates to 15 trucks per day in a 6 month construction period. The plant to be used for the various planned works is outlined in the dedicated CMS in Appendix G but will generally consist of 1 no. tracked excavator and 1 no. tracked dumper or tractor and trailer per gang, with two separate gangs. The exact specifications of these are not yet known so the precise noise levels are not known.

Based on BS 5228 Noise control on construction and open sites, construction activities are likely to give rise to noise levels in excess of 45dB(A) up to 200 m from the works. Mitigation measures will be put in place to minimise nuisance to the residents in the area as necessary. It should be noted that any nuisance will be very short-term in nature as the works will progress along the route in 100m sections over the 4 to 6-month construction period.

Operational Phase

There will be no noise emitted from the operation of the cable. In the event that any maintenance or replacement of cable is required during operation then the effects will be short-term and similar to those of the construction phase.

Impacts from Vibration

There will be no blasting during the construction phase of the development. Some rock breaking activity may be required to install the cable ducts. Any rock breaking activity will be carried out in accordance with BS 5228 Noise Control on Construction and Open Sites and monitored to BS 7385 Evaluation and Measurement for Vibration in Buildings. Any rock breaking will be short-term in duration and will be limited to 8 mm/s peak particle velocity at occupied .

Construction Impacts

The predicted noise levels are based on maximum levels at the nearest point along the route as the development goes past the nearest receptors at a rate of 10m per hour resulting in the maximum levels existing for less than two hours. When using a vibrating plate in trench compaction ameliorative is provided when the plate is below ground level. The levels from construction are within the guidance given by the NRA, persist for very short periods and are not considered significant.

Operational Impacts

High voltage lines can generate audible noise in certain weather conditions when above ground, however these cables being buried will not generate any audible noise at any receptor so these impacts will be negligible. In the unlikely event that there is a breakdown on the grid line then maintenance will be required, however no heavy plant/machinery will be required for this task and any noise emissions will be short term and negligible.

Road Traffic Impacts

Typically doubling the volume of traffic flow on a road increase the noise levels by 3dBA and an increase of 400% would mean a 6dBA increase in road traffic noise level. The noise levels on the local road would be elevated due to the increase in truck movement, however the level increase along the regional roads would be insignificant due to the existing traffic flow. The level of ground vibration from road traffic flow will be below the threshold of sensitivity to humans of 0.2mm/s at 5m from the roadside.

Commissioning Impacts

It is assumed that the ducting will remain in place and decommissioning will involve removal of cable which will not involve any heavy plant/machinery. The impacts from decommissioning is considered negligible.

9.8 SUMMARY OF SIGNIFICANT EFFECTS

Table 9.6 below summarises the Significant Effects

Table 9.6: Summary of Significant Effects

Potential Effect	Mitigation	Residual Effect
Construction noise	Implementation of good practice measures	Not Significant
Operational Noise	Designed to meet the limits in Condition of planning permit and the 2006 Wind Energy Development Guidelines. No noise generated by operation of Grid Line	Within guideline limits and not significant

9.9 MITIGATION MEASURES & RESIDUAL EFFECTS

9.9.1 Construction Phase

Mitigation by Avoidance

No blasting will be carried out during construction. Heavy construction works such as excavation, rock breaking (if required), use of heavy machinery etc. will be carried out between 08:00 and 18:00 Monday to Friday and on Saturday between 08:00 and 13:00. Heavy construction will not take place on Sundays or Bank Holidays. General guidance for controlling construction noise through the use of good practice given in BS 5228 will be followed.

During decommissioning of the Development, noise levels are likely to be considerably less than predicted in **Table 9.4** as heavy plant / machinery will not be utilised. Any legislation, guidance or best practice relevant at the time of decommissioning will be complied with.

Mitigation by Reduction

Noise levels will be controlled in accordance with the principles of BS 5228:1984 Noise Control on Construction and Open Sites. Construction equipment will be maintained in accordance with the EC (Construction Plant and Equipment) (Permissible Noise Levels) Regulations 1988, SI 320 of 1988. Heavy equipment will be, where possible, enclosed, located away from sensitive sites and shut down when not in use.

Mitigation by Remediation

A documented complaints procedure will be put in place prior to commencement of works on site. If noise complaints arise, appropriate corrective action will be taken, and Cork County

Council advised. Works will also be supervised by a Project Engineer in line with that specified for the Derreenacrinnig West Wind Farm.

Operational Phase Mitigation

There will be no noise impacts from the underground cable unless any maintenance and/or cable replacement works are needed. In this case, the same mitigation measures as outlined above for the construction phase will be implemented.

9.10 RESIDUAL IMPACTS OF THE DEVELOPMENT

With the implementation of the measures outlined in this chapter it is unlikely there will be any significant negative effects from the proposed underground cable development. If any effects arise then they will be short-term as the works move progressively along the route.

9.10.1 Residual Construction and Decommissioning Effects

The residual effects are the same as construction and decommissioning effects identified in the assessment.

9.10.2 Operational Noise Mitigation

No operational mitigation measures are necessary for the operating of the Derreenacrinnig Windfarm, or the grid connection.

9.10.2.1 Residual Operational Effects

The residual effects are the same as the operational effects identified in this assessment.

9.11 CUMULATIVE AND IN-COMBINATION IMPACTS

There is potential for cumulative impacts with the Derreenacrinnig West Wind Farm during the construction phase if the works are undertaken at the same time in the area at the wind farm substation. However, any effect would be temporary in nature as the works on the proposed underground cable grid connection will move progressively over a distance of 13.178km from the consented Derreenacrinnig West Wind Farm substation to the Ballylicky 110kV substation. There could also be an in-combination impact along sections of the route if any of the planned developments take place at the same time, though these will also be temporary in nature and unlikely to give rise to significant effects given the nature of the planned developments being mostly for dwelling house construction and extension etc.

The noise assessment undertaken for the EIS in 2010 stated that construction is short term and works will be carried out in daytime hours only and under the supervision of the Project Engineer. The operational noise assessment concluded that the 6 turbines would not exceed the criteria and all dwellings in the area are well below recommended levels.

9.12 STATEMENT OF SIGNIFICANCE

This Section has assessed the significance of the potential effects of the Development during construction, operation and decommissioning.

The effects of noise from the operation of the Derreenacrinnig Windfarm have been assessed against the noose limits for the Development using the methodology in the 2006 Guidelines, the methodology described in ETSU-R-97, the IOA Good Practice Guide.

The effects of the construction on site and grid line have been assessed and found to be in compliance with the NRA guidance using BS 5228 best practice guidance.

9.13 CONCLUSION

The impact of the proposed wind turbines on the local environment has been assessed in line with the recommendations documented in the Department of the Environment, Heritage and Local Government recently published '*Wind Energy Development Guidelines'- Guidelines for Planning Authorities June 2006*. Noise levels have been predicted at the nearest residences and, at all of these, the predicted noise levels meet the requirements of the Wind Energy Development Guidelines for noise for both day and night-time. The noise impact at all residence should be negligible.

The low frequency noise and vibration from the proposed wind farm operation is predicted to have a negligible impact on residents and on local properties.

With implementation of the mitigation measures outlined above (and additional mitigation as needed) it is unlikely that the Grid Connection will have any significant effects in terms of noise and vibration.

10 LANDSCAPE AND VISUAL

10.1 INTRODUCTION

10.1.1 Background and Objectives

This section of the EIAR is concerned with the assessment of the Landscape and Visual effects of the proposed EIA Development. Planning permission is sought for the removal of the partially built grid connection and the construction of a full length Grid Connection to connect the previously consented wind farm at Derreenacrinnig West Wind Farm to Ballylicky Substation. A full project description is set out in **Chapter 2 of this EIAR**.

This section of the EIAR sets out the potential Landscape and Visuals impact from the Grid Connection and the potential cumulative impact of the proposed development with the already consented wind farm project including all associated infrastructure. As well as this, the in-combination impacts of the project with other projects will also be assessed. The Landscape and Visual Impacts of the consented wind farm was already assessed in the 2010 EIS.

The emphasis in this chapter is on the likely significant effects of the grid connection. It covers the assessment methodology, a description of the subject development and the existing landscape as well as landscape policy and relevant guidance. It includes a description of Cork County Council's landscape policy and the landscape in which the subject development site is located.

The Landscape and Visual Impacts of the operational wind farm were already assessed in the 2010 EIS. The emphasis in this chapter is on the likely significant effects of the underground connection. It covers the assessment methodology, a description of the subject development and the existing landscape as well as landscape policy and relevant guidance. It includes a description of Cork County Council's landscape policy and the landscape in which the subject development site is located.

The landscape in this area is described in terms of its existing character, which includes a description of landform, landcover, and landscape sensitivity to change. The potential effects on both landscape and visual receptors is then assessed.

10.1.2 Statement of Authority

This section of the EIAR has been prepared by of Jennings O'Donovan & Partners Ltd who were responsible for the preparation of the Landscape and Visual Impact Assessment as part of the 2010 EIS.

10.1.3 Extent of the Project Area

The project area comprises the extent of the Grid Connection Route. Planning permission is sought for the removal of 9.5km of OHL. The proposed Grid Connection comprises 10.75km comprises OHL and 3.4 km of UGC.

10.1.4 Permitted Derreenacrinnig West Wind Farm

The study area of the consented Derreenacreenig West Wind Farm site is set out in the 2010 EIS and includes a radius of 15km from the consented wind farm sites. Chapter 11of the original EIS assessed the Landscape and Visual Impacts of the wind farm and described the landscape context assessed the likely landscape and visual impacts of the wind farm on the receiving environment.

The Landscape and Visual Assessment (LVA) parped as part of the 2010 EIS explored the potential effects of siting the proposed seven wind turbines at Derreenacrinnig West in County Cork. This Assessment takes into consideration the character and features of the landscape and concomitant views/viewers. Impacts are assessed under various headings.

The proposed turbines for the site at Derreenacrinnig West will have a hub height of up to 81m and a rotor diameter of up to 52 m. While the likely turbine model to be used at the site will be Enercon E44/E48 which have height to blade top of up to 79.6m. The visual assessment was based on the Vestas V52 wind turbine which has a hub height of 55m, a rotor blade diameter of 52m and an overall height of 81m i.e. greater dimensions then the turbines. Accordingly, the worst-case scenario was considered. The 2010 EIS had examined the landscape and visual policy context and designations, together with likely significant impacts.

10.2 ASSESSMENT METHODOLOGY FOR THE GRID CONNECTION

As part of this assessment, an initial desk study was undertaken which identified relevant policies and guidelines. This includes policies on landscape character, designated landscapes, and protected views. The site and study area are described in terms of the landscape character assessment and landscape designations contained in the Cork County Development Plan. In addition, a field visit was undertaken to assess the landscape character and elements both on the site itself and in the wider landscape.

Due to the nature of the development, the grid connection will not have a material visual impact on the existing landscape. The grid connection is comprises elements of both OHL and underground elements of grid connection Therefore, it is not necessary to use the full suite of traditional LVIA tools such as ZTV maps and photomontages to assess the potential visibility.

10.2.1 Assessment Criteria

The following criteria are used in this LVIA and are based on the GLVIA-2013.

Table 10.1 Assessing Landscape Value and Sensitivity

Sensitivity	Description
Very High	Areas where the landscape character exhibits a very low capacity for change in the form of development. Examples of which are high value landscapes, protected at an international or national level (World Heritage Site/National Park), where the principal management objectives are likely to be protection of the existing character.
High	Areas where the landscape character exhibits a low capacity for change in the form of development. Examples of which are high value landscapes, protected at a national or regional level (Area of Outstanding Natural Beauty), where the principal management objectives are likely to be considered conservation of the existing character.
Medium	Areas where the landscape character exhibits some capacity and scope for development. Examples of which are landscapes which have a designation of protection at a county level or at non-designated local level where there is evidence of local value and use.
Low	Areas where the landscape character exhibits a higher capacity for change from development. Typically, this would include lower value, non-designated landscapes that may also have some elements or features of recognisable quality, where landscape management objectives include, enhancement, repair and restoration.
Negligible	Areas of landscape character that include derelict, mining, industrial land or are part of the urban fringe where there would be a reasonable capacity to embrace change or the capacity to include the development proposals. Management objectives in such areas could be focused on change, creation of landscape improvements and/or restoration to realise a higher landscape value.

Table 10.2: Landscape Impact Assessment Criteria

Magnitude of Landscape Impact	Description
Very High	Change that would be large in extent and scale with the loss of critically important landscape elements and features, that may also involve the introduction of new uncharacteristic elements or features that contribute to an overall change of the landscape in terms of character, value and quality.
High	Change that would be more limited in extent and scale with the loss of important landscape elements and features, that may also involve the introduction of new uncharacteristic elements or features that contribute to an overall change of the landscape in terms of character, value and quality.

Magnitude of Landscape Impact	Description
Medium	Changes that are modest in extent and scale involving the loss of landscape characteristics or elements that may also involve the introduction of new uncharacteristic elements or features that would lead to changes in landscape character, and quality.
Low	Changes affecting small areas of landscape character and quality, together with the loss of some less characteristic landscape elements or the addition of new features or elements.
Negligible	Changes affecting small or very restricted areas of landscape character. This may include the limited loss of some elements or the addition of some new features or elements that are characteristic of the existing landscape or are hardly perceivable.

10.2.2 Landscape Significance Criteria

Landscape Impact	Sensitivity of Receptor				
Scale/Magnitude	**Very High**	**High**	**Medium**	**Low**	**Negligible**
Very High	**Profound**	**Profound-substantial**	**Substantial**	Moderate	Slight
High	**Profound-substantial**	**Substantial**	Substantial - moderate	Moderate-slight	Slight-imperceptible
Medium	**Substantial**	Substantial - moderate	Moderate	Slight	Imperceptible
Low	Moderate	Moderate-slight	Slight	Slight-imperceptible	Imperceptible
Negligible	Slight	Slight-imperceptible	Imperceptible	Imperceptible	Imperceptible

***Categories with orange shading are considered to equate with 'significant' impacts in EIA terms**

10.2.3 Landscape Baseline for the Grid Connection

The landscape baseline represents the existing landscape context and is the scenario against which any changes to the landscape brought about by the proposal will be assessed. This also includes reference to any relevant landscape character appraisals and the current landscape policy context (both are generally contained within County Development Plans.

The proposed Grid Connection is shown on **Figure 10.1 - Site Location. The Grid Connection.** The grid route from the wind farm is located for approximately 300m in the Broad Marginal Middleground and Lowland Basin Landscape Character Type (LCT) area, it then travels north for approximately 5.7km in the Ridged and Peaked Upland LCT and then turns east for approximately 7.1km within the Rugged Ridge Peninsulas LCT. Approximately 7km of the western section of the route from Ardrah to Ballylicky is within an area of '***High Value Landscape***. [See **Figure 10.3**]. The existing Ballylicky Substation is approximately 680m East of the S111scenic route along the N71 from Glengariff to Ballylicky and on to Bantry Bay. The nature and scale of the grid connection works proposed is such that it can be accommodated in a landscape where there are existing overhead electricity lines, housing and forestry. This landscape is a working landscape capable of accommodating change.

10.2.4 Vegetation and Land Use

The vegetation and land use of the study area is almost as varied as the topography but is predominantly agricultural and public roadway along the Grid Connection route. These areas tend to consist of a combination of plantation forestry, marginal farmland and peatland. There is a small section of overhead line located within the townland of Shundrum is in an Area of High Landscape Value.

Part of the Grid Connection route is located within a Type 4 landscape designation *'Rugged Ridge Peninsulas'* located within the carriageway of the existing road network thus having an imperceptible impact on the landscape. The wind farm site itself is located within an area which is considered to be acceptable in principle in the County Wind Energy Strategy.

10.3 LANDSCAPE POLICY CONTEXT AND DESIGNATIONS

The existing wind farm development was assessed under the planning policies contained in the Cork County Development Plan 2009 which has since been superseded by the adoption of The Cork County Development Plan 2014-2020. The latter will be considered herein.

10.3.1 The Cork County Development Plan 2014-2020

Chapter 13 of the Cork County Development Plan 2014-2020 sets out details relating to Landscape views. There are a number of specific planning policies relating to landscape and visual impact. With regard to the Grid Connection, planning policies ED6:1 and ED6:2 from the CDP are applicable to the proposals in question.

Relevant Planning Policies from The Cork County Development Plan 2014-2020

ED 6-1: Electricity Network: "Support *and facilitate the sustainable development, upgrade and expansion of the electricity transmission grid, storage and distribution network infrastructure.*
Support the sustainable development of the grid including strategic energy corridors and distribution networks in the region to international standards.

Facilitate where practical and feasible infrastructure connections to wind farms and other renewable energy sources subject to normal proper planning considerations.

Proposals for development which would be likely to have a significant effect on nature conservation sites and/or habitats or species of high conservation value will only be approved if it can be ascertained, by means of an Appropriate Assessment or other ecological assessment, that the integrity of these sites will not be adversely affected."

The supporting text in paragraph 9.6.2 further states that "*The siting of overhead power lines can have a significant impact on the visual character of an area. Proposals for connections to renewable energy developments should where practical be fully assessed as part of the renewable energy application. When processing applications involving the siting of electricity powerlines and other overhead cables, the following should be considered:*

- *Avoid areas of high value landscape where practical;*
- *Avoid sites and areas of nature conservation and archaeological interest;*
- *Minimise their visual impact;*
- *Consider the use of underground technology in areas of special sensitivity where appropriate. The best option (underground or over ground) for each particular site will be chosen having regard to the particular conditions or sensitivities pertaining to the site."*

ED 6-2: Transmission Network: "*Proposals for new electricity transmission networks need to consider the feasibility of undergrounding or the use of alternative routes especially in landscape character areas that have been evaluated as being of high landscape sensitivity. This is to ensure that the provision of new transmission networks can be managed in terms of their physical and visual impact on both the natural and built environment and the conservation value of European sites.*

Proposals for development which would be likely to have a significant effect on nature conservation sites and/or habitats or species of high conservation value will only be approved if it can be ascertained, by means of an Appropriate Assessment or other ecological assessment, that the integrity of these sites will not be adversely affected."

A Landscape Character Assessment was undertaken as part of the Draft Cork Landscape Strategy (2007). This has been incorporated within the current CDP and divides the county into 16 No. Landscape Character Types (LCTs).

The Landscape Character Assessment describes in broad terms the 16 different Landscape Character Types identified for the County. Each of the 16 landscape types include an assessment methodology with three main stages/concepts: Landscape Character, Landscape Value and Landscape Sensitivity.

Based on the Government's Draft Guidelines for Landscape and Landscape Assessment (2000), Cork County Council prepared a Draft Landscape Strategy in 2007. The Landscape Character Assessment (LCA) of County Cork established a set of 76 landscape character areas reflecting the complexity and diversity of the entire County. These have been amalgamated into a set of 16 landscape character types based on similarities evident within the various areas. The Draft Landscape Strategy for Cork County evaluated the sixteen different landscape types in terms of:

- Landscape Value - the environmental or cultural benefits, including services and functions, which are derived from various landscape attributes;

- Landscape Sensitivity - the measure of a landscape's ability to accommodate change or intervention without suffering unacceptable effects to its character and values; and

- Landscape Importance - importance of a landscape rated as Local Importance, County Importance or National Importance.

- Landscape sensitivity is a measure of the ability of the landscape to accommodate change or intervention without suffering unacceptable effects to its character and values.

- Low sensitivity landscapes are robust landscapes which are tolerant to change, and which have the ability to accommodate development pressure.

- Medium sensitivity landscapes can accommodate development pressure but with limitations in the scale and magnitude. In this rank of sensitivity, landscape elements can accept some changes while others are more vulnerable to change.

- High sensitivity landscapes are vulnerable landscapes with the ability to accommodate limited development pressure. In this rank of sensitivity, landscape quality is at a high level and landscape elements are highly sensitive to certain types of change.

Table 10.4: Landscape Character Types which apply to the Proposed Grid Connection and consented Derreenacrinnig West Wind Farm

Landscape Character Type	Draft Landscape Strategy 2007
4	Summary: Rugged Ridge Peninsulas Landscape Value: Very High Landscape Sensitivity: Very High Landscape Importance: National *This landscape type is located in the extreme southwestern corner of Ireland. The predominant components of this landscape type include rocky peninsulas such as Mizen Head, Beara and Sheep's Head, separated by drowned valleys and relatively low-lying bays such as Bantry, Dunmanus and Roaringwater Bay. The high ridges and mountainous peaks of the peninsulas, such as Hungry Hill, are characterised by a jagged profile and include the occasional corrie lake and steep pass while others, notably on the Mizen Head peninsula, are more rounded with occasional rock outcrops and streams. The same variety and ruggedness characterise much of the shoreline, with rocky promontories and islands extending out into the sea. The sheltered recesses of the bay areas typically comprise flatter terrain extending inland and rising to low ridges and hills, including drumlins within Bantry Bay. Roaringwater Bay includes many small islands, including Shirkin Island, while Bantry Bay includes the notably larger Bere Island and Whiddy Island. The exceptional depth of Bantry Bay provides a natural harbour, which can accommodate large ocean– going tankards, while large metal cylinders are a significant feature in this coastal landscape.*

Landscape Character Type	Draft Landscape Strategy 2007
	Typically, the rocky peninsulas comprise a mix of moorland, some relatively fertile patches of farmland and woodland including some smaller patches of coniferous plantations on higher ground. Fields of regular shape are more prevalent inland on the flatter ground but become more irregularly shaped and less fertile on the slopes of the surrounding hills, and include patches of bracken, rush and scrub as well as a mix of broadleaf hedgerows and coniferous shelterbelts.
15a	Summary: Ridged and Peaked Upland Landscape Description The ridged, peaked and forested upland landscape type flanks much of the mid-western boundary of County Cork, from the vicinity of Bantry in the south to Millstreet in the north. This landscape type has been glaciated and comprises a fairly rugged and rolling mountainous topography at a relatively high elevation. The area around the Cousane Gap provides a good example of this landscape type which is inclined towards the rugged whereas the southern slopes of the Boggeragh Mountains further to the north in type 15B are a somewhat smoother example, thus adding to the openness of the moorland. These are often delineated by tight gorse hedgerows, walls, banks or post and wire fencing and punctuated by coniferous or broadleaf shelterbelts around small farmsteads. The landscape, with its rapid and steep rising and falling, seems to tumble down along the valleys. The rugged and diverse landcover, involving moorland, heath and scrub, lends a strong sense of the naturalistic. Urban settlements tend to be located on lower ground and include Ballingeary, Inchigeelagh.
9	Summary: Broad Marginal Middleground and Lowland Basin

Landscape Character Type	Draft Landscape Strategy 2007
	Landscape Value: Low Landscape Sensitivity: Medium Landscape Importance: Local **Landscape Description** A broad shallow basin serving the River Ilen and its tributaries enclosed by rugged ridges and rocky outcrops characterises this landscape in respect of landform. Contained by Mullaghmesha, Nowen Hill and Millane Hill to the north, Mount Kid to the west and Carrigfadda to the east, it falls gently southwards, gradually expanding its width in an east-west direction and southwards towards Skibbereen and ultimately beyond to the coastal fringe and the sea.

10.3.2 Landscape and Visual Impacts; Scenic Routes and Scenic Landscapes

Certain parts of the County are designated as Scenic Landscapes and Scenic Routes in the Cork County Development Plan, 2014 -2020 as varied. Any wind farm development must have regard to the impact on same. Designated Scenic Routes and Views

Due to their identification in the County Development Plan this type of VRP location represents a general policy consensus on locations of high scenic value within the Study Area. These are commonly elevated, long distance, panoramic views and may or may not be mapped from precise locations. They are more likely to be experienced by static viewers who seek out or stop to take in such vistas.

Local Community Views

This type of VRP represents those people who live and/or work in the locality of the proposed EIA Development, usually within a 5 km radius of the site. Although the VRPs are generally located on local level roads, they also represent similar views that may be available from adjacent houses. The precise location of this VRP type is not critical; however, clear elevated views are preferred, particularly when closely associated with a cluster of houses and representing their primary views. Coverage of a range of viewing angles using several VRPs is necessary in order to sample the spectrum of views that would be available from surrounding dwellings.

Centres of Population

VRPs are selected at centres of population primarily due to the number of viewers that are likely to experience that view. The relevance of the settlement is based on the significance of its size in terms of the Study Area or its proximity to the site. The VRP may be selected from any location within the public domain that provides a clear view either within the settlement or in close proximity to it.

Major Routes

These include national and regional level roads and rail lines and are relevant VRP locations due to the number of viewers potentially impacted by the proposed development. The precise location of this category of VRP is not critical and might be chosen anywhere along the route that provides clear views towards the proposal site, but with a preference towards close and/or elevated views. Major routes typically provide views experienced whilst in motion and these may be fleeting and intermittent depending on screening by intervening vegetation or buildings.

Tourism, Recreational and Heritage Features

These views are often one and the same given that heritage locations can be important tourist and visitor destinations and amenity areas or walking routes are commonly designed to incorporate heritage features. Such locations or routes tend to be sensitive to development within the landscape as viewers are likely to be in a receptive frame of mind with respect to the landscape around them. The sensitivity of this type of visual receptor is strongly related to the number of visitors they might attract and, in the case of heritage features, whether these are discerning experts or lay tourists. Sensitivity is also heavily influenced by the experience of the viewer at a heritage site as distinct from simply the view of it. This is a complex phenomenon that is likely to be different for every site. Experiential considerations might relate to the sequential approach to a castle from the car park or the view from a hilltop monument reached after a demanding climb. It might also relate to the influence of contemporary features within a key view and whether these detract from a sense of past times. It must also be noted that the sensitivity rating attributed to a heritage feature for the purposes of a landscape and visual assessment is not synonymous with its importance to the Archaeological or Architectural Heritage record.

Landscape Character Assessment - Scenic Routes and Scenic Landscapes in County Cork
Cork County Council has designated areas of the county their unique scenic quality. These areas include scenic routes and scenic landscapes. There are 118 designated scenic routes in County Cork. There are three scenic routes in the vicinity of the proposed S30 Scenic Route. The S30 scenic route is the closest of these routes to the Grid Connection.

Road between Dunmanway and Coolkellure, Castledonovan and Bantry
This scenic route encompasses local roads between Dunmanway and Coolkellure, Castledonovan and Bantry and takes in views of hills, mountains, the Rivers Clodagh, Derreenacrinnig West Wind Farm, namely the S29, S30 and the S111.

10.4 LANDSCAPE AND VISUAL SENSITIVITY

10.4.1 Landscape Sensitivity

An aerial overview of the existing grid connection is set out at Figure **10.1**. The grid connection traverses several different landscape character areas as shown in **Figures 10.2.** The proposed grid connection traverses the same landscape character areas.There is a small section of overhead line located within the townland of Shundrum is in an Area of High Landscape Value.[See Figure 10.3].

Part of the Grid Connection route is located within a Type 4 landscape designation *'Rugged Ridge Peninsulas'* The majority of the proposed Grid Connection is underground cables, located within the carriageway of the existing road network thus having an imperceptible impact on the landscape. The wind farm site itself is located within an area which is considered to be acceptable in principle in the County Wind Energy Strategy.

The overhead grid connection is located within a Type Four Landscape Area which is classified as a "Rugged Ridge Peninsulas –Type 4.' In terms of visual impact, this is the only element of the planning application proposals which will have an impact in visual terms and this impact will be limited. The balance of the proposed Grid Connection is underground cables, located within the carriageway which will have an imperceptible impact on the landscape.

The overhead grid connection is located within a Type Four Landscape Area which is classified as a "Rugged Ridge Peninsulas –Type 4.' In terms of visual impact, this is the only element of the planning application proposals which will have an impact in visual terms and this impact

will be limited. The balance of the proposed Grid Connection is underground cables, located within the carriageway which will have an imperceptible impact on the landscape.

The proposed grid connection does not encounter any significant settlements between the existing wind farm and the existing Ballylicky substation.

10.4.2 Visual Sensitivity

Whilst some of the road sections that incorporate the cable route are identified as Scenic Views in The Cork County Development Plan, it is the road itself conveys the receptors (road users) and the scenic designations relate to the views afforded from those roads.. For these reasons, the sensitivity of visual receptors is not considered to exceed **High-medium**.

10.5 IMPACT ASSESSMENT OF THE GRID CONNECTION ROUTE

10.5.1 Do Nothing Impacts

The do-nothing scenario is an important aspect of the proposed EIA Development as there is an existing ‘live’ permission at this site to develop a 7-turbine wind farm (“the 2012 Permission”). Should this EIA Development not receive planning permission, the currently permitted wind farm (“the 2012 Permission”) cannot be expected to be constructed, as this is an essential part of the project. The proposed Grid Connection is required to allow the wind farm to become operational and transfer energy to the national grid.

10.5.2 Landscape Impacts

Landscape impacts are assessed on the basis landscape sensitivity weighed against the magnitude of physical landscape effects within the site and effects on landscape character within the wider landscape setting. This wider setting is considered in respect of the immediately surrounding landscape (<5 km) as well as the broader scale of the study area (5-20km). **Process of Change**

The assessment also notes that the character of this part of the Landscape has undergone, and continues to undergo, significant visual change arising from construction of new and replacement dwellings, and changes to the frontages of properties, including construction of new drives, boundary walls and gates. Accordingly, the landscape character of the area cannot be described as static or unchanging.

Given the context of the grid connect within the landscape and surrounding existing ESB network, it is considered unlikely to be visually intrusive and therefore, there will be no significant impacts on the receiving environment.

10.5.3 Ongoing Landscape Changes

Ongoing human interaction with the environment and the landscape such as afforestation, deforestation and house building will mean that views and the landscape in the Derreenacrinnig West area are constantly changing regardless of the proposed Derreenacrinnig West Wind Farm grid connection.

Demographic changes alter the character of the landscape such as the presence of empty and derelict buildings, indicating the outward movement of population and the loss of traditionally built structures. Continued infrastructure extension of the road network in the vicinity of the proposed development site may result in straightening, widening and increased signage on local secondary roads. This may have a cumulative impact resulting in the loss of roadside trees and hedgerows and impacts to the local landscape character.

10.5.4 Climate Change Impacts to the Landscape

It is important to highlight the impact of climatic change on the Irish countryside as predicted regularly in the media and government policy. Climate change impacts will have profound and extensive effects on the both natural and built environment, as well as commerce and human well-being generally. Climate change would result in more extreme weather patterns, which are likely to cause floods, coastal erosion and disruption of energy supply (among other impacts.) Countryside impacts could include damage to native woodland, threats to species range and native species, freshwater eutrophication, invasive species, pest survival, forest fires, flooding and hydrological system changes, less outdoor recreation due to higher rainfall, could result. These occurrences would have further resultant impacts on the landscape, the built environment and human ways of life.

The Development will contribute to achieving policies established by government and international agreements to reduce global warming, carbon emissions and climatic changes created on the planet by due to human activities. The contribution to alleviating climatic change by the proposed wind farm can help positively in halting the predicted changes to Irelands countryside. This is a positive impact of the proposal.

Photograph 1: View of northwest ridge in Derreenacrinnig West where the OHC commences

Photograph 2: View to west along proposed OHC route as it extends through Barnagowlane West townland

Photograph 3: View to west along Mealagh valley through which the constructed OHC extends

Photograph 4: View to northwest of constructed OHC in Maularaha townland

Photograph 5: View south-westwards along the section of roadway in Shandrum Beg townland where underground cabling is proposed to extend.

10.5.5 Landscape Character, Value and Sensitivity

The landscape of the Proposed Development Site and its immediate surrounds is a varied one in terms of landscape character and the site is contained at something of a threshold between character types and this reflected in its location on the border between three LCAs in the Cork Draft Landscape Appraisal 2007.

10.5.6 Magnitude of Landscape Impact

It is considered that the proposed Grid Connection will have a relatively minor physical impact on the landscape within the Proposed Development Site as none of the proposed development features have a significant 'footprint'

In terms of scale and function, the proposed EIA Development is well assimilated within the context of the central study area, which consists of a range of productive rural and industrial land uses within the hinterland setting of the Wind Farm Site and Proposed Grid Connection Rout. It is a working landscape and although the EIA Development represents a stronger human presence and level of built development than currently exists on the site, it will not detract significantly from its productive rural hinterland character.

In summary, there will be physical impacts on the land cover of the Proposed Development Site as a result of this EIA Development, but these will be relatively minor in the context of this modified rural hinterland. This scale of development can be comfortably assimilated into this landscape context without undue conflicts of scale with underlying landform and land use patterns or with the area for which it will form something of a backdrop when viewed from some locations. For these reasons the magnitude of the landscape impact is deemed to be **Medium-low** in the central study area (< c. 5 km) reducing to **low** and **negligible** at increasing distances beyond this threshold.

10.5.7 Construction Stage Landscape Effects

During the construction stage there would have been minor physical impacts on landcover and vegetation. This mainly relates to excavation works within existing road and track beds to install the cable before recovering. However, there is likely to have been some very minor losses of hedgerow vegetation due to trenching operations through open farmland and locally along road verges. Such impacts would have been temporary (lasting less than one year) and transient (constantly moving along the cable route).

The associated impacts on landscape character would also have been very minor on the basis that (with brief exceptions) the localised landscape character, regardless of development plan designations, is governed by the enclosed road corridors. The cabling works would have been perceived as simply road works that a common in frequency and nature throughout the country and are not associated with impacting on landscape character in any material way.

For the reasons outlined above, the magnitude of construction stage landscape impacts is deemed to have been no greater than Low-negligible.

10.5.8 Construction Stage Visual Effects

During the construction stage there will be very minor visual impacts associated with the movement of vehicles, machinery and workers as well as the temporary storage of excavated material and cabling materials either at the road side or in small temporary construction compounds. As with landscape character effects, the works will be temporary and transient in nature, largely confined to road track corridors and perceived as standard road works. Regardless of the reason for the works, there is a general acceptance amongst the population that ‘road works’ take place on a reasonably frequent basis and are considerably ameliorated by the fact that they do not last long a move continuously as was the case here.

For the reasons outlined above, the magnitude of construction stage visual impacts is deemed to have been no greater than **Low-negligible**

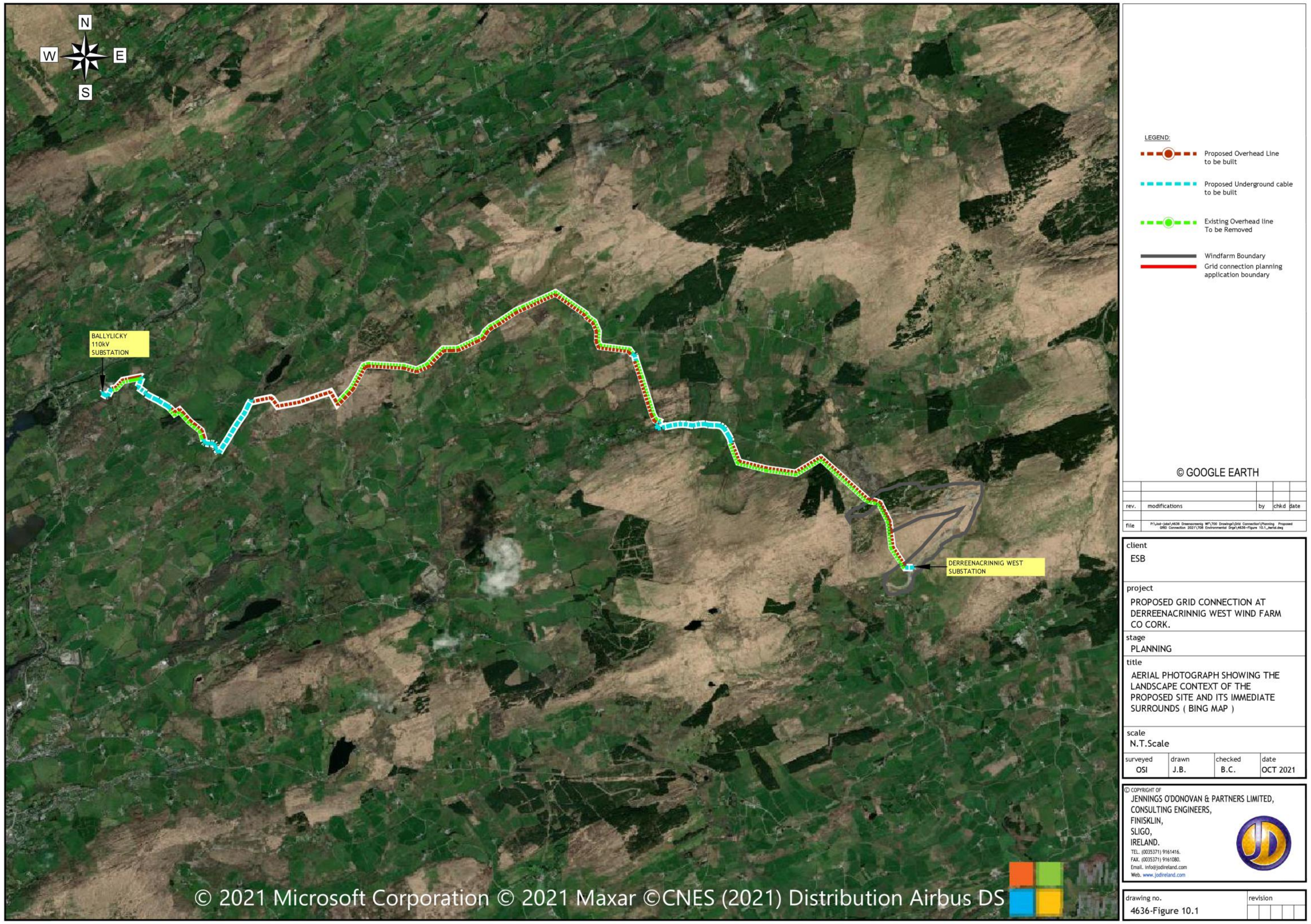

Figure 10..1: Aerial photograph showing the landscape context of the Proposed Development Site and its immediate surrounds (Bing maps)

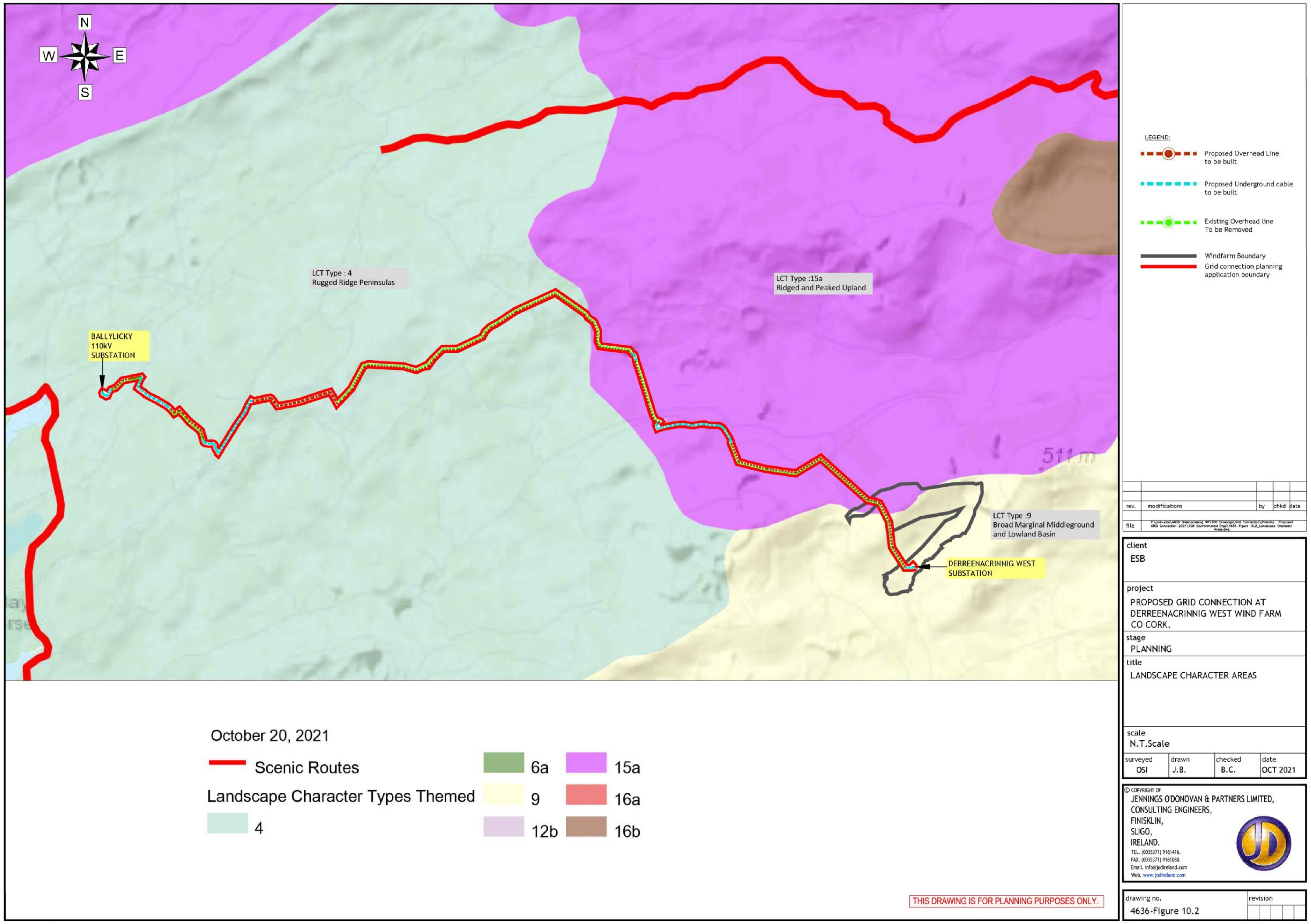

Figure 10.2 Extract from the Cork County Council Proposal Map showing Landscape Character Areas

Figure 10.3 - Area of High Landscape Value

10.5.9 Cumulative Baseline

A search was conducted on the Cork County Council Planning portal within the townlands of the 20kV grid connection in relation to permitted plans and projects that may have the potential to result in cumulative impacts have been undertaken. The searches revealed no additional large scale permitted projects that have the potential to result in likely significant cumulative impacts. Planning applications identified in the townlands and vicinity of the 20kV grid connection were small scale domestic or small scale agricultural, equestrian, electrical or retention applications. No large scale permitted developments were identified within the scope of the search, aside from Dreenacreenig West Wind Farm.

Table:10.6

Development	Planning Reference	Decision Date
Dreenacreenig West Wind Farm consisting of 7 no. turbines with a hub height up to 55 metres and a rotor diameter up to 52 metres	Cork County Council (CCC) Pl Ref: 10/857 An Bord Pleanála (ABP) (Ref. No.: PL 88.239767)	Decision to Grant Planning Permission by ABP (05/12/12)
Barrboy Wind Farm consisting of 5 turbines with a hub height 46m and a rotor diameter of 62m located approximately 2 km north east of the proposed Derreenacrinnig West Wind Farm site	CCC Pl. Ref. 14143 & 025124	Decision on Extension of Duration Granted (16/04/2014). The application for this development included an appropriate assessment screening which concluded that significant direct, indirect and in-combination impacts in light of the conservation objectives of the respective Natura 2000 sites were not likely to arise.
Coomanore North - Demolition of dwelling, construction of dwelling & erection of domestic wind turbine located approximately 3.5 km west of	CCC Pl. Ref. 012687	Decision to Grant Planning Permission (26/02/2002)

Development	Planning Reference	Decision Date
the proposed Derreenacrinnig West Wind Farm site		
1 no wind turbine of hub height 54.5m to serve the existing plastic factory (Brugmann Ltd) located approximately 3 south of Ballylickey.	CCC Pl. Ref. 16457 & 1147	Decision on Extension of Duration Granted (15/07/2016)
Erection of a 38kV overhead line from Glanta wind farm in Dromourneen to the 110kV ESB station in Ballylicky	CCC Pl Ref. 041990 ABP Pl 04.208577	Grant permission with revised conditions by An Bord Pleanála (10/01/2005)

Land Use

The environs of the proposed route are dominated by agriculture, with a small degree of commercial forestry. The eastern extent of the route traverses a more upland area with more unenclosed or unimproved grazing of sheep and drystock cattle rearing. The section in the lower Mealagh valley and the western extent of the route crosses more improved agricultural land with increased fertiliser usage, though stocking densities are unlikely to be very high.

The cumulative impacts in terms of neighbouring developments will be negated by the employment of a construction design to the highest standards, incorporating best practice methods. Considering this, significant effects on the environment are not likely, as outlined in the following sections.

The use of natural resources, in particular land, soil, water and biodiversity;

Overall the lands occurring within the route corridor range from local (low value) to national ecological value. All watercourses will be over sailed by the overhead line and no poles will be places within 25m of any watercourse transected by the route. No significant effects to watercourses are predicted. The grid connection will not result in significant disturbance to the hydrology of the wet heath habitat present along sections of the route due to the thin peats and will not undermine the functioning of this habitat in areas surrounding the excavation locations.

The overhead line will over-sail areas of gorse-dominated scrub at five locations along the route. There will be no disturbance or loss of this scrub habitat. The overhead line will skirt along the edge of wet willow woodland occurring in a meander of the Mealagh River in the townland of Ards Beg. The overhead line will over-sail the edge of the woodland at this location and will not result in any reduction to the footprint of the woodland. There will be no loss of linear hedgerows or treelines during the construction phase of the grid route. The construction of the elements of the proposed grid connection will not impact on the biodiversity of the region.

10.6 MITIGATION MEASURES AND RESIDUAL EFFECTS

Aside from construction stage mitigation measures to minimise the likes of land and vegetation disturbance, dust emissions and light spill during construction.

10.7 STATEMENT OF SIGNIFICANCE

This LVIA has assessed the significance of potential effects of the EIA Development on the Landscape and visual setting of the Proposed Development Site. The EIA Development has been assessed as having the potential to result in effects of negative long-term effects in the range of Moderate to Imperceptible. Given that only effects of Substantial or Profound impact are considered “significant” in terms of the EIA Regulations, the potential effects of the EIA Development on the landscape and visual setting are not significant.

10.8 CUMULATIVE AND IN-COMBINATION IMPACTS

The cumulative effect assessment includes the subject development in addition to the Derreenacrinnig West Wind Farm and its associated infrastructure. Aside from the likelihood that there will be some very minor in-combination effects during the construction stages of both projects due to there being a cross-over of construction time periods, there are no other material cumulative effects. Notwithstanding the landscape and visual impacts of the wind farm, which were assessed in the 2010 LVIA the operational stage landscape and visual effects of the cable route are negligible. Thus, the cumulative effect is also considered to be Negligible.

10.9 CONCLUSION

The Grid Connection has had no significant negative effects on the landscape and visual setting.

10.10 BIBLIOGRAPHY & REFERENCE DOCUMENTS

This Landscape and Visual Impact Assessment also refers to or has reviewed the following guideline s and key documents:

1. Sitting and Designing Windfarms in the Landscape (Scottish Natural Heritage, 2009)

2. Visual Representation of Windfarms- Good Practice Guidelines (Scottish Natural Heritage, 2006)
3. Cork County Development Plan, 2014-2020.
4. Guidelines for Landscape and Visual Impact Assessment (The Landscape Institute & Institute of Environmental Assessment & Management, 2nd ed.,2002)
5. Landscape Character Assessment Guidance for England and Scotland (Scottish Natural Heritage & The Countryside Agency, 2002)
6. Environmental Impact Assessment DCAN 10 (revised; Department of the Environment Planning Service, 1999)
7. Best Practice Guidelines for Wind Energy Development (British Wind Energy Association, 1994)
8. Planning Policy and Guidance
9. Planning Guidelines for Wind Farm Development (Department of the Environment, Heritage and Local Government, 2006)
10. Attitudes Towards the Development of Wind Farms in Ireland (Sustainable Energy Ireland, 2003)
11. Atlas of the Irish Rural Landscape (Aalen, F.H.A., Whelan, K. & Stout, M., 1997) ISBN 1 85918 0957

11 MATERIAL ASSETS

11.1 INTRODUCTION

11.1.1 Background

This chapter describes the potential impacts the Grid Connection and the consented Derreenacrinnig West Wind Farm could have on physical material assets, including the following:

- Agriculture
- Natural Resources of Economic Value
- Road Network
- ESB Network
- Borrow Pit
- Forestry
- Telecommunications
- Air Traffic

For each topic a description of the existing environment is provided along with an analysis of what impact, if any, could be predicted and the mitigation measures that can be implemented to reduce or remove the impact.

11.2 RECEIVING ENVIRONMENT

11.2.1 Introduction

This section describes the regional and local agricultural practices as well as those specific to the site. A description of the effects, if any, that would arise from the proposed development of the wind farm is provided, along with mitigation measures designed to reduce or remove negative effects where possible.

11.2.2 Existing Environment

The environs of the grid connection route are dominated by agriculture, with a small degree of commercial forestry. The eastern extent of the route traverses a more upland area with more unenclosed or unimproved grazing of sheep and dry stock cattle rearing. The section in the lower Mealagh valley and the western extent of the route crosses more improved agricultural land with increased fertiliser usage, though stocking densities are unlikely to be very high.

The consented wind farm is located in a mountainous region predominantly covered in exposed bedrock and upland blanket bog. Blanket bog is unsuited to tillage crops because of its water retention, acidity and poor nutrient profile. The site is generally more suited to grazing and the higher areas only suited to sheep grazing.

The site of the proposed development has several characteristics that affect its suitability for agriculture as follows:

- The elevation of the site ranges from 200 to 402mOD; the site is exposed to the prevailing wind, making weather conditions unfavourable for crop growth.
- The site is situated within a landscape of mainly exposed bedrock and upland blanket bog.
- The prevalent weather pattern is wet and windy.

In general, the site consists of one distinct type of landscape and vegetation formation, namely exposed bedrock and upland blanket peat. A small amount of grazing is currently undertaken at the site.

11.2.3 Predicted Impacts

The total land take of the turbine foundations borrow pit and site roads is approximately 3.06 hectares from a total of a 123.2-hectare site. The effect of the proposed Derreenacrinnig West Wind Farm will be to remove less than 2.5 % of the total site area. It is expected that agricultural practices in the lands adjacent to the proposed Derreenacrinnig West Wind Farm will not change or experience any impacts resulting from the proposed development.

The proposed Grid Connection will be located in agricultural fields and within the road carriageway. There will be some areas of improved agricultural grassland through which the cable will run. However, it is intended to reinstate the ground to its original use after the cable is laid.

11.2.4 Mitigation Measures

No significant impacts are predicted on agricultural practices. Therefore, no mitigation measures are required.

11.2.5 Conclusion

No significant impacts are predicted on agricultural practices.

11.3 NATURAL RESOURCES OF ECONOMIC VALUE

11.3.1 Introduction

This section evaluates the effect on the natural resources of the site and also resources, which will be used in the locality during the construction phase. These resources include quarries, hydrocarbon fuels, precious metals etc.

11.3.2 Existing Environment

There are no known hydrocarbon fuel or precious metal resources within the site boundary. There is an existing borrow pit on site, this is located to the north of the site. This borrow pit was used to construct the existing road network on site. There are extensive conifer plantations to the north, north east, and north west of the site. The layout has been designed to minimise the amount of tree felling that will be required.

11.3.3 Predicted Impact

By the nature of this project, in that it is relatively non-invasive, no significant negative effect is predicted for the site or region. There may be some tree felling required and the expansion of the existing borrow pit which will be used for the extraction of rock for road and hardstand construction, but overall, no significant negative impact can be predicted as a result of this development. The impacts arising from the use of an on-site borrow pit are discussed further in section 12.6.

11.3.4 Mitigation Measures

As no negative impacts are predicted, no mitigation measures are required.

11.3.5 Conclusion

The impacts predicted on the natural resources in the area are low negligible.

11.4 ROAD NETWORK

11.4.1 Introduction

This section describes the proposed delivery traffic haul route to the site in terms of the national, regional and local road network. A description of the effects, if any, that would arise from the proposed development is provided along with mitigation measures designed to reduce or remove negative effects, where possible.

11.4.2 Proposed Haul Route

The assessment is based on the turbine components arriving in Ireland through the Port at Ringaskiddy and travelling from there to the proposed wind farm site. Delivery traffic will travel via the N28 and the N25 National Roads from Ringaskiddy, past Cork City as far as the roundabout in Bishopstown that joins the N25 and the N71. Here the traffic will turn left onto the N71 and travel through Inishannon as far as Bandon. In Bandon the traffic will turn right onto the R586 over the bridge and turn left, continuing along the R586. The traffic will then travel along R586 Regional road, through the town of Dunmanway, across the north of the square to Castle Street and on to the Regional road network. The traffic will follow Castle Street onto the L4609 for approximately 0.5km and turn left onto the Castledonovan Road (L4614-0). The traffic will follow this road for approximately 12km and turn right onto the local road to the site just before it reaches Castledonovan Bridge. The traffic will then follow this local road for approximately 1.6km before it reaches the site entrance. Please refer to Drawing 4636/TIA/01 for details of the haul route to site.

The routes for civil works construction traffic will be designated the same as that chosen for the turbine delivery traffic.

11.4.3 Existing Environment

The section of the proposed haul route between the Port of Ringaskiddy and Bandon Town will follow National Primary and National Secondary and Regional Roads. As such, it is not anticipated that any significant widening of or strengthening of roads will be required along these sections to drive vehicles along the haul route. This section of the route does not present any issues for the delivery of wind turbines.

In Bandon the traffic will turn right onto the R586 over the bridge and turn left, continuing along the R586 as far as Dunmanway Town. This section of road has been used to deliver turbines of similar dimensions, to the Milane Hill Wind Farm, before and does not present any issues for the delivery of turbines. Due to the one-way system in place in Dunmanway Town, a contra flow system will be required to allow long vehicles to navigate across the north of the square. Once past the square, vehicles will follow the route described above. There will be no road widening works required as far as Castledonovan as the road has a sufficient running width. The road will not need any improvement works either although there are two bridges in between the entrance to Milane Hill Wind Farm entrance and Casltedonovan that will require a structural assessment before any haulage takes place.

The proposed haul route turns right before Castledonovan Bridge towards the site entrance. Traffic will travel for approximately 1.6km along this road to the site entrance. The road has an average useful width of 3.2m along the majority of this stretch with an average verge width of 0.5m along both sides, some widening, strengthening and re-grading of the road will be required to accommodate delivery vehicles. The splay required at the junction of the L4614 and the local road to the site to accommodate the delivery vehicles is shown in Drawing 4636/TIA/003.

At least four telephone poles will have to be relocated as part of the road widening works. There is one small bridge to be crossed on the local road leading to the site. This bridge is 4.5m wide with a parapet approximately 0.8m high. The bridge is on a straight stretch of road therefore it may not need widening but a structural assessment will be undertaken prior to any haulage. A report will be issued to Cork County Council Roads Department outlining the structural condition of the bridge and a method statement outlining any required works prior to hauling the wind farm components. If works are required, then these will be discussed and agreed with Cork County Council prior to transporting turbine components.

11.4.4 Predicted Impact

The peak number of deliveries per day will occur during the period of turbine base construction when an estimated 43 concrete truck deliveries per day will be required. Some other materials may also be delivered on such days so that 11 – 13 deliveries per day are a realistic expectation of peak deliveries. On days when there is no turbine base construction there will be an average of 7 loads a day.

The majority of the haul route will follow National Primary and National Secondary Roads. As such, it is not anticipated that any widening or strengthening of roads will be required along these sections to drive vehicles along the haul route. Most of this haul route has been used to deliver turbines of similar dimensions to Milane Hill Wind Farm.

Furthermore, no significant widening or strengthening of the Regional Road Network will be required. Structural assessment will be required on two bridges on the road from Milane Hill Wind Farm site entrance to Castledonovan.

The Local Road leading up to the site will require widening, some strengthening and some minor re-grading. All local roads should be reassessed at turbine delivery stage.

11.4.5 Mitigation Measures

The developer will be required to lodge a bond with the local authority to offset the full cost of repair to the public roads used for access to the site. Should the local authority deem such a repair necessary the developer would be required to repair any damage to the roads that has arisen as part of the development pending more permanent repair after construction is complete. However, due to the high standard of roads on the haul route to the site, it is not expected that there will be any significant damage to the roads.

Other measures that should be undertaken to minimise road impact include:

- Any road works/modifications involving the public roads would be discussed and agreed with the roads section of Cork County Council prior to the commencement of the development.

- A structural assessment of all bridges and culverts on the local road should be carried out prior to commencement of construction. Smaller culverts can be temporarily strengthened by placing steel plates on the road surface to give a better distribution of vehicle loads.
- The condition of all bridges, culverts and road surfaces should be continuously monitored throughout the construction period. If any deterioration is observed, appropriate remedial action should be agreed with the roads department of Cork County Council and completed as soon as practical.
- Prior to delivery of turbine components, any overhanging hedgerows should be cut back.
- Abnormal load permits shall be acquired by the turbine supplier prior to delivery, and where necessary, Garda escorts will be utilised to assist the delivery of the largest loads.
- Warning vehicles will be used for the delivery of all large turbine components.
- A trial run to the site with an empty turbine delivery vehicle should be carried out prior to the turbine delivery. Should the trial run highlight any problematic areas, the additional work required would then be discussed and agreed with Cork County Council.

11.4.6 Conclusion

It is concluded that the proposed haul route offers the least amount of disruption to local road users. The proposed haul route and any associated works and traffic management plans shall be discussed and agreed with Cork County Council prior to the commencement of construction.

11.5 THE GRID CONNECTION

11.5.1 Introduction

This section describes the grid connection option. A description of the effects, if any, that would arise from the proposed Derreenacrinnig West Wind Farm development is provided along with mitigation measures designed to reduce or remove negative effects where possible.

11.5.2 Predicted Impact

The proposed Derreenacrinnig West Wind Farm will be connected to a 38kV substation. There is a substantial distribution network in the area. The Derreenacrinnig West substation will be linked to this distribution network, to an existing 110kV substation at Ballylicky Substation located approximately 14.8 km to the north west of the consented Derreenacrinnig West Wind Farm.

11.5.3 Mitigation Measures

As set out in Chapter 2- Project Description, the line route will be designed by ESB to ESB specifications. Within the site, all on site cabling will be underground so no impact is predicted within the landholding boundary.

11.5.4 Conclusion

There is a substantial distribution network in the area, and it is likely that the Derreenacrinnig West substation will be connected to this. Thus, it is considered that this proposed development will not create an unacceptable additional impact.

The project will indirectly, and in the long term, improve the standard of living in the region by virtue of providing a power supply platform on which to develop industrial sectors.

11.6 BORROW PIT

This section describes the exiting borrow pit on the site. A description of the effects, if any, that would be experienced from the expansion of the borrow pit is provided along with mitigation measures designed to reduce or remove negative effects, where possible.

11.6.1 Existing Environment

The majority of the site is underlain by the Gun Point Formation of the Old Red Sandstone Magnafacies. This formation is dominated by the green-grey sandstones and purple siltstones. The south of the site is underlain by the Castlehaven Formation, which is dominated by purple mudstone and siltstone. The very north of the site is underlain by the Toe Head Formation which is dominated by cross-bedded sandstones and purple siltstones with some mudstones. The site is mostly characterised by exposed bedrock; the remainder of the study area is mostly upland blanket peat ranging from depths of 0.1 m to 3.15 m. There is one area to the north of the site that has been previously used as a borrow pit.

11.6.2 Predicted Impacts

No significant negative impacts are predicted from the development if the mitigation measures below are put in place. Potential impacts include loss of habitat, release of suspended solids to surrounding water courses and short-term visual impact.

There are no slope stability issues where it is proposed to locate the borrow pit. There will be a direct loss of habitat during the construction phase as a result of the excavation of the borrow pits of approximately 0.32ha. There will be a short-term visual impact during the construction phase as there will be more bedrock exposed. This will not alter the landscape significantly as most of the site is already exposed bedrock. Both these impacts will be mitigated against by reinstating the borrow pit with excess peat from the construction phase. The potential hydrological impacts include the release of suspended solids and hydrocarbons into the surrounding water courses. These impacts should be avoided by establishing the drainage around and within the borrow pit prior to any excavation and the installation of an oil interceptor.

One significant positive impact is predicted in terms of traffic. It is anticipated that 952 delivery loads of hardcore will be required for the construction of roads, electrical compound and hardstandings for the proposed Derreenacrinnig West Wind Farm. By using the proposed on-site borrow pit and the material cut from the exposed bedrock; delivery traffic on the public road network would be reduced by 952 deliveries, resulting in a huge reduction in the traffic impact of the proposed wind farm.

11.6.3 Mitigation Measures

The borrow pit areas and extraction methodology should be reviewed by a geotechnical engineer prior to construction. Borrow Pit excavations have the potential to undermine the up-slope component of a peat and / or unstable subsoil slope. This should be sufficiently supported by buttress, frame or rampart to resist lateral slippage.

In the borrow pits pore water pressure should be kept low at all times and careful attention should be given to the existing drainage and how structures might affect it. In particular, ponding of water should not be allowed to occur in excavations. All deliberate or incidental sumps must be drained to carry water away from the sump following rainfall. Prior to excavation, drains should be established to effectively drain grounds before earthworks commence. Such drains should be positioned at an oblique angle to slope contours to provide for ground stability.

An oil interceptor will be located on the inner perimeter of the borrow pit drainage system to capture accidental hydrocarbon leaks from construction plant within the borrow pit. This is a precaution due to the expected intensity of plant operations within the borrow pit area. Blasting of bedrock will not be carried out in the borrow pit.

The Borrow Pits will be re-instated with excess spoil finished with layer of peat from the wind farm construction phase. This will allow for regeneration of the natural habitat. By using the uppermost layer (acrotelm layer < 0.3 m) from the excavated peat as the top layer of the reinstated peat, re-vegetation of the area should be accelerated which will also accelerate the stabilisation of the re-instated peat.

11.6.4 Conclusion

By using the proposed on-site borrow pit the environmental impact from this project will be greatly reduced for the following reasons:

The material cut from the exposed bedrock will reduce the delivery traffic on the public road network by 952 deliveries, resulting in a huge reduction in the traffic impact of the proposed wind farm.

Excess peat from the construction stage of the proposed Derreenacrinnig West Wind Farm can be used to reinstate the borrow pits.

The site's geochemistry will be maintained by using rock from within the site for the construction of roads and hardstanding areas.

11.7 TELECOMMUNICATIONS

Early consultation with O2 established that there was no potential impact on their networks. Vodafone, Meteor and RTÉ NL were consulted during the initial scoping phase of the project, no comment was issued. UPC communications confirmed that they have no concerns with the proposal. The written responses from the network operators can be seen in **Appendix D** of this report.

11.7.1 Existing Environment

There is an existing telecommunications tower on the nearby Nowen Hill. The nearest turbine to the telecommunications tower is approximately 700m. This tower is operated by O2 and after consultation with O2 they have stated that this development should not impact on their service in the area. The 2010 EIS set out details of consultation response.

11.7.2 Predicted Impact

No impact is predicted in terms of telecommunications.

11.7.3 Mitigation Measures

No mitigation measures are required.

11.7.4 Conclusion

No impact is predicted in terms of telecommunications.

11.8 FORESTRY

This section describes the forestry resource and practices on the site. A description of the effects, if any, that would be experienced from the development of the proposal is provided along with mitigation measures designed to reduce or remove negative effects, where possible.

11.8.1 Existing Environment

There is an existing conifer plantation covering the north and the north east of the site. This area of forestry covers 35.9 ha, just under 30% of the total 123 ha landholding. There are also conifer plantations in the fields immediately to the north of the site.

11.8.2 Predicted Impacts

There will be an impact on the current forestry activities on site. There are no turbines situated within the afforested area, however, the proposed borrow pit is within the afforested area and the existing site roads within that area will need to be widened to allow access for construction vehicles. Harvesting was carried out prior to Construction. There will be no impact on the forested areas adjacent to the site.

11.8.3 Mitigation Measures

Mitigation by avoidance was used by the design team when completing the layout for the proposed Derreenacrinnig West Wind Farm. No turbines were located in the afforested areas; this reduced the number of trees to be felled. No other mitigation measures are required as the forest is of low ecological value; see Chapter 5: Flora and Fauna.

11.8.4 Conclusion

The proposed development will impact slightly on forestry activities on site as there will be a number of trees felled. However, forestry activities will be able to continue during the construction and operational phase of this development. There will be no impact on forestry activities in lands adjacent to the proposed development.

11.9 AIR NAVIGATION

11.9.1 Introduction

Any tall object, particularly on an elevated site has the potential to affect air traffic. The wind turbine heights selected for the proposed Derreenacrinnig West Wind Farm are 81m metres above ground level.

11.9.2 Existing Environment

There are two airports equidistance from the proposed Derreenacrinnig West Wind Farm; one is Farranfore, which is situated approximately 54 km north west of the site. Cork Airport is situated 55 km east of the proposed Derreenacrinnig West Wind Farm site.

11.9.3 Predicted Impact

A consultation exercise was undertaken with the Irish Aviation Authority (IAA) and Cork Airport. The IAA stated that the proposed Derreenacrinnig Wind Farm would have no negative impact on aviation. Cork Airport had no comment to make on the proposed development. Their response is included in Appendix A of the 2010 EIS report.

11.9.4 Mitigation Measures

Although no significant impacts are predicted, it is standard policy of the IAA Safety Regulation Division to request an Obstruction Survey for wind farms. This survey is designed to collate data on the height, latitude, longitude, elevation and dimensions of any structures or feature that the IAA deems necessary. An Obstruction Survey will be undertaken at the pre-construction phase.

However, private air traffic, which may not follow routes to or from these airports, may use this airspace and it is considered prudent to fix each wind turbine with flashing warning beacons before they are erected. The IAA will be consulted on the type of beacon and their installation prior to the erection of the turbines and mast. The IAA will also be issued with the grid co-ordinates of the turbines upon completion of the project.

11.10 RESIDUAL IMPACTS OF THE DEVELOPMENT

No significant residual impacts are predicted from the proposed development regarding material assets.

11.11 CUMULATIVE AND IN-COMBINATION IMPACTS

There will be a small cumulative impact with the consented Derreenacrinnig West Wind Farm. There will be a short-term cumulative impact between the proposed Grid Connection route and the consented Derreenacrinnig West Wind Farm and in-combination with other plans and projects, should they be constructed at the same time, in terms of increased traffic on local roads. There could be a short-term minor negative impact between the proposed development and other plans and projects, if they are constructed at the same time, in terms of noise emissions during construction although this will be temporary.

11.12 CONCLUSION

No significant impacts are predicted in terms of agriculture, natural resources, aviation or house prices. A small temporary impact is predicted in terms of traffic as there will be a small increase in the numbers of truck movements on local and regional roads during the construction phase both on its own and in combination with other plans and projects should they constructed at the same time, in particular the consented Derreenacrinnig West Wind Farm.

12 ARCHAEOLOGY AND CULTURAL HERITAGE

12.1 INTRODUCTION

12.1.1 Background and Objectives

John Cronin Associates have been commissioned by Jennings O'Donovan & Partners Ltd to assess the potential impacts of the proposed EIA Development on the archaeological, architectural and cultural heritage environment of the study area. Full details of the proposed EIA Development are provided in Section 2 of the EIA and are not repeated here.

The study area comprises lands within a 100-metre-wide corridor centred on the grid connection route.

Archaeological heritage generally refers to objects, monuments, buildings or landscapes of an (assumed) age typically older than AD1700 and usually recorded as archaeological sites within the Record of Monuments and Places. The term architectural heritage applies to structures, buildings, their contents and setting of an (assumed) age, typically younger than AD 1700. Cultural heritage is applied to other aspects of the landscape such as historical events, folklore and cultural associations and can accompany archaeological and architectural designation.

Where appropriate, mitigation measures to limit potentially significant impacts to the archaeological, architectural and cultural heritage are documented, and thereafter residual effects are identified and assessed.

12.1.2 Statement of Authority

This report was written and compiled by David Murphy BA. David graduated from UCC with a BA (Hons) in Archaeology and Geography in 2003. Since graduating, David worked initially as a field archaeologist and subsequently as a project archaeologist, gaining significant experience along the way. He became licence eligible in 2012 and has since directed numerous archaeological excavations, archaeological testing and monitoring programmes, as well as working on a number of large-scale infrastructural projects. He has also authored a large number of archaeological assessments and screening reports in relation to infrastructural projects.

12.1.3 Assessment Structure

This Section contains the following sections:

- Assessment Methodology and Significance Criteria – a description of the methods used in baseline surveys and in the assessment of the significance of effects;

- Baseline Description - a description of the archaeology and cultural heritage of the Proposed Development Site based on the results of desk-based information and a walk over survey;
- Assessment of Potential Effects - identifying the ways in which archaeology and cultural heritage could be affected by the proposed EIA Development, including a summary of the measures taken during design of the proposed EIA Development to minimise any effects;
- Mitigation Measures and Residual Effects - a description of measures recommended to off-set potential negative effects and a summary of the significance of the effects of the proposed EIA Development after mitigation measures have been implemented;
- Cumulative Effects – identifying the potential for effects of the proposed EIA Development to combine with those from other developments to affect the archaeological and cultural heritage resources;
- Summary of Significant Effects;
- Statement of Significance; and
- Comparison with The Derreenacrinnig West Wind Farm Environmental Impact Statement ("EIS"), November 2010, prepared by Jennings O'Donovan Consulting Engineers ("the 2010 EIA") - commentary identifying any material variations in potential effects and levels of significance.

12.2 ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

12.2.1 Assessment Methodology

This assessment methodology has involved the following elements, further details of which are provided in the following sections:

- Legislation and guidance review;
- Desk study, including review of available maps and published information;
- Site walkover;
- Evaluation of potential effects;
- Evaluation of the significance of these effects; and
- Identification of measures to avoid and mitigate potential effects.

The methodology used for this assessment is based on the EPA (2017) Draft Guidelines for Information to be Contained in EIAR as well as guidelines for the assessment of impacts on the cultural heritage resource as published by the International Council on Monuments and Sites (ICOMOS 2011). The assessment was based on a programme of desk-based research combined with a site inspection of the route and these studies were undertaken to identify any features of archaeological, architectural or cultural heritage significance likely to be affected by the proposed development.

12.2.2 Relevant Legislation and Guidance

Archaeological monuments are protected through national and international policy designed to secure the protection of the cultural heritage resource. This is facilitated in accordance with the provisions of the European Convention on the Protection of the Archaeological Heritage (Valletta Convention), which was ratified by Ireland in 1997.

The National Monuments Act 1930 to 2004 and relevant provisions of the National Cultural Institutions Act 1997 are the primary means of ensuring the satisfactory protection of archaeological remains, which includes all man-made structures of whatever form or date except buildings habitually used for ecclesiastical purposes. A National Monument is described as: “a monument or the remains of a monument the preservation of which is a matter of national importance by reason of the historical, architectural, traditional, artistic or archaeological interest attaching thereto” (National Monuments Act 1930 Section 2).

A number of mechanisms under the National Monuments Act are applied to secure the protection of archaeological monuments. These include the Register of Historic Monuments, the Record of Monuments and Places and the placing of Preservation Orders and Temporary Preservation Orders on endangered sites.

The minister may acquire National Monuments by agreement or by compulsory order. The State or the Local Authority may assume guardianship of any National Monument (other than dwellings). The owners of National Monuments may also appoint the Minister or the local Authority of that monument if the State or Local Authority agrees. Once the site is in ownership or guardianship of the State, it may not be interfered with without the written consent of the Minister.

Section 5 of the 1987 Act requires the Minister to establish and maintain a Register of Historic Monuments. Historic monuments and archaeological areas present on the Register are afforded statuary protection under the 1987 Act. Any interference with sites recorded on the Register is illegal without the permission of the Minister. Two months’ notice in writing is required prior to any work being undertaken on or in the vicinity of a Registered Monument. The Register also includes sites under preservation orders and temporary preservation orders with the written consent, and at the discretion of the Minister.

Section 12(1) of the 1994 Act requires the Minister to establish and maintain a Record of Monuments and Places where the Minister believes that such monuments exist. The Record comprises a list of monuments and relevant places and a map showing each monument and relevant place in respect of each county in the state. All sites recorded on the Record of Monuments and Places receive statuary protection under the National Monuments Act 1994. Section 12(3) of the 1994 Act provides that:

"Where the owner or occupier (other than the Minister) of a monument or place included in the Record, or any other person, proposed to carry out, or to cause or permit the carrying out of, any work at or in relation to such a monument or place, he or she shall give notice to the Minister to carry out work and shall not, except in the case of urgent necessity and with the consent of the Minister, commence the works until two months after the giving of notice".

The Architectural Heritage and Historic Properties Act 1999 and the Planning and Development Act of 2000 are the main built heritage legislation. The Architectural Heritage Act requires the Minister to establish a survey to identify, record and assess the architectural heritage of the country. The National Inventory of Architectural Heritage ("NIAH") records all built heritage structures within specific counties in Ireland. The document is used to advise local Authorities on the register of a Record of Protected Structures ("RPS") as required by the Planning and Development Act, 2000.

The Act of 2000 requires Local Authorities to establish a Record of Protected Structures to be included in the County Development Plan ("CDP"). Buildings recorded in the RPS can include Recorded Monuments, structures listed in the NIAH or buildings deemed to of architectural, archaeological or artistic importance by the Minister. Once listed in the RPS the sites/areas receive statuary protection from injury or demolition under the 2000 Act. Damage to or demolition of a site registered in the RPS is an offence. The detail of the list varies from County to County. If the Local Authority considers a building to be in need of a repair, it can order conservation and/or restoration works. The owner or developer must make a written application/request to the local Authority to carry out any works on a protected Structure and its environs.

12.2.2.1 Cork County Development Plan 2014-2020

Cork County Council has written policies on the preservation of archaeological, architectural and cultural heritage remains in relation to permitted development in the Cork County Development Plan 2014-2020 ("the CDP"). These relate to archaeological features and objects, built structures, views and scenic routes.

Relevant policies include:

- **County Development Plan Objective HE 1-1*: "County Biodiversity Action Plan:*** *Continue to implement the County Biodiversity Action Plan (2008) in partnership with all relevant stakeholders."*
- **HE 1-2: County Heritage Plan:** *"Continue to implement the current County Heritage Plan (2005) in partnership with relevant stakeholders and any successor to this document."*

- ***HE 4-1: Record of Protected Structures***
  a) *The identification of structures for inclusion in the Record will be based on criteria set out in the Architectural Heritage Protection Guidelines for Planning Authorities (2005).*
  b) *Extend the Record of Protected Structures in order to provide a comprehensive schedule for the protection of structures of special importance in the County during the lifetime of the plan.*
  c) *Seek the protection of all structures within the County, which are of special architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest. In accordance with this objective, a Record of Protected Structures has been established and is set out in Volume 2, Chapter 1 of the Plan.*
  d) *Ensure the protection of all structures (or parts of structures) contained in the Record of Protected Structures.*
  e) *Protect the curtilage and attendant grounds of all structures included in the Record of Protected Structures.*
  f) *Ensure that development proposals are appropriate in terms of architectural treatment, character, scale and form to the existing protected structure and not detrimental to the special character and integrity of the protected structure and its setting.*

- **HE 4-2: Protection of Structures on the NIAH: "*Give*** *regard to and consideration of all structures which are included in the NIAH for County Cork, which are not currently included in the Record of Protected Structures, in development management functions."*
- ***HE 4-3: Protection of Non- Structural Elements of Built Heritage: "****Protect important non-structural elements of the built heritage. These can include designed gardens/garden features, masonry walls, railings, follies, gates, bridges, and street furniture. The Council will promote awareness and best practice in relation to these elements."*

- ***HE 5-1: Cultural Heritage*** *"Protect and promote the cultural heritage of County Cork as an important economic asset."*

12.2.3 Desk Study

This involved an examination of the archaeological, historical and cultural heritage context of the area in general and specifically the Proposed Development Site through a paper survey of archaeological, historical, architectural, cultural heritage and cartographic sources.

The following sources were examined as part of the assessment:

- Record of Monuments and Places ("RMP") for County Cork
- Sites and Monuments Record ("SMR") for County Cork
- The Archaeological Inventory for County Cork
- Topographical files of the National Museum of Ireland;
- Cork County Development Plan 2014-2020;
- National Inventory of Architectural Heritage;
- First edition ordnance survey maps;
- Second edition ordnance survey maps;
- Third edition ordnance survey maps;
- Aerial photography;
- Excavation bulletins; and
- Townland names.

12.2.4 Field Survey

An archaeological inspection of the areas impacted by the already constructed OHC portion of the grid connection route and the yet be constructed OHC and underground portions of the grid connection route was conducted in October 2018. A further inspection was undertaken in September 2021. A photographic record was kept of the surveys and extracts are provided below. Field inspections were also undertaken in March and May 2017 during the compilation of a previous archaeological assessment of the grid connection route (John Cronin & Associates, May 2017).

12.2.5 Assessment of Impacts

The methodology used for this assessment has been informed by the Environmental Protection Agency (EPA) *Draft Guidelines for Information to be Contained in EIAR* (2017), in accordance EIA requirements of codified EU Directive 2011/92/EU as amended by EU Directive 2014/52/EU, per current Planning Legislation, concerning EIA assessment: Planning and Development Act, 2000 (as amended) and in Part 10 of the Planning and Development

Regulations, 2001 (as amended). The assessment was also informed by ICOMOS (2011) *Guidance on Heritage Impact Assessments for Cultural World Heritage Properties*. The following summation of the criteria used to assess impacts is provided in order to clearly outline the methodology specifically applied to the cultural heritage resource.

Duration of Effect

The duration of effects is assessed based on the following criteria:

- Momentary (seconds to minutes)
- Brief < 1 day
- Temporary <1 year
- Short-term 1-7 years
- Medium Term 7-15 years
- Long Term 15-60 years
- Permanent > 60 years

Reversible: Effects that can be undone, for example through remediation or restoration

Quality of Effect

The quality of an effect on the cultural heritage resource can be positive, neutral or negative.

- *Positive Effect* – a change which improves the quality of the cultural heritage environment (e.g. increasing amenity value of a site in terms of managed access, signage, presentation etc. or high-quality conservation/restoration and re-use of an otherwise vulnerable derelict structure).

- *Neutral Effect* – no change or effects that are imperceptible, within the normal bounds of variation for the cultural heritage environment.

- *Negative Effect* – a change which reduces the quality of the cultural heritage resource (e.g. visual intrusion on the setting of an asset, physical intrusion on features/setting of a site etc.)

Type of Effect

The type of effect on the cultural heritage resource can be direct, indirect or no predicted impact.

- *Direct Impact* – where a cultural heritage site is physically located within the footprint of the proposed development, which will result in its complete or partial removal.

- *Indirect Impact* – where a cultural heritage site or its setting is located in close proximity to the footprint of the proposed development.

- *No predicted impact* – where the proposed development will not adversely or positively affect a cultural heritage site.

12.2.5.1 Magnitude

This is based on the degree of change, incorporating any mitigation measures, on a cultural heritage asset and can be negative or positive. The magnitude is ranked without regard to the value of the asset according to the following scale: High; Medium; Low and Negligible and has been informed by criteria published in the International Council on Monuments and Sites *Guidance on Heritage Impact Assessments for Cultural World Heritage Properties* (ICOMOS 2011).

Table 12.1: Magnitude of Effect on Cultural Heritage Assets

Magnitude of Impact	Description
High	• Most or all key archaeological or architectural materials affected such that the resource is totally altered • Comprehensive changes to setting • Changes to most or all key historic landscape elements, parcels or components; extreme visual effects; fundamental changes to use or access; resulting in total change to historic landscape character • Major changes to area that affect Intangible Cultural Heritage activities or associations or visual links and cultural appreciation
Medium	• Changes to many key archaeological or historic building materials/elements such that the resource is clearly/significantly modified. • Considerable changes to setting that affect the character of the archaeological asset. • Changes to the setting of a historic building, such that it is significantly modified. • Change to many key historic landscape elements, parcels or components, visual change to many key aspects of the historic landscape, considerable changes to use or access, resulting in moderate changes to historic landscape character. • Considerable changes to area that affect the Intangible Cultural Heritage activities or associations or visual links and cultural appreciation.
Low	• Changes to key archaeological materials/historic building elements, such that the resource is slightly altered/slightly different. • Slight changes to setting of an archaeological monument. • Change to setting of a historic building, such that it is noticeably changed. • Change to few key historic landscape elements, parcels or components; slight visual changes to few key aspects of historic landscape; slight changes to use or access; resulting in limited change to historic landscape character

	• Changes to area that affect the Intangible Cultural Heritage activities or associations or visual links and cultural appreciation.
Negligible	• Very minor changes to key archaeological materials or setting. • Slight changes to historic building elements or setting that hardly affect it. • Very minor changes to key historic landscape elements, parcels or components; virtually unchanged visual effects; very slight changes to use or access; resulting in very small change to historic landscape character. • Very minor changes to area that affect the Intangible Cultural Heritage activities or associations or visual links and cultural appreciation.
Profound	An impact which obliterates all previous sensitive characteristics

<u>Table 12.2:</u> Criteria for Rating Impact Significance on Archaeological, Architectural and Cultural Heritage

Significance	**Description**
Imperceptible	An effect capable of measurement but without significant consequences
Not Significant	An effect which causes noticeable changes in the character of the environment but without significant consequences
Slight	An effect which causes noticeable changes in the character of the environment but without affecting its sensitivities
Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends
Significant	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment
Profound	An effect which obliterates sensitive characteristics

12.3 BASELINE DESCRIPTION

12.3.1 Introduction

This section provides a description of the receiving environment and historical background of the Proposed Development and wider survey area and is based on the results of the desk based and walk over survey.

The National Monuments Acts 1930 to 2014, the Heritage Act 1995 and relevant provisions of the National Cultural Institutions Act 1997 are the primary means of ensuring the satisfactory protection of archaeological remains, which are deemed to include all man-made structures, of whatever form or date, except buildings habitually used for ecclesiastical purposes. The Record of Monuments and Places (RMP) was established under Section 12 (1) of the National Monuments (Amendment) Act, 1994 and replaced the earlier Sites and Monuments Record (SMR). It comprises of lists and maps of archaeological monuments and relevant places in respect of each county in the State. All sites recorded on the RMP receive statutory protection under the National Monuments Act 1994 and any work undertaken at these sites must be licenced by the National Monuments Service (NMS).

There are seven archaeological sites located within the study area. A National Monument is described as 'a monument or the remains of a monument, the preservation of which is a matter of national importance by reason of the historical, architectural, traditional, artistic or archaeological interest attaching thereto' (Section 2, National Monument Act, 1930). There is one National Monument close to the study area. In Derryarkane townland, c.59 metres north of 'Pole 62' along the constructed portion of the OHC route (ITM grid co-ord: 505156, 553755), is the site of Derryarkane stone circle (CO106-019) (a five-stone circle) and an adjacent standing stone (CO106-057----) (National Monument No. 600). A field survey undertaken as part of a previous assessment associated with the grid connection route (John Cronin and Associates, May 2017) revealed that the location of this National Monument, as recorded on the Historic Environment Viewer of the ASI was inaccurate, this has since been corrected. The Historic Environment Viewer had recorded the stone circle as being located at ITM co-ord. 505203E, 553806N when in fact it is actually located c.77 metres to the southwest of this location at ITM co-ord. 505156E, 553755N. This is the location where Historic Environment Viewer had placed a standing stone (CO106-057----), which itself is in fact located c.29 metres to the south of this location at ITM co-ord. 505167E, 553725N. The location and details of recorded archaeological sites within the study area are provided below (Table 12.3).

12.3.2 Archaeological & Historical Context

The following section is based on a desktop survey of the archaeological resource within the study area undertaken to inform assessment of the impacts of the constructed portion of the scheme and the potential impacts of the yet to be constructed portion of the proposed scheme. It provides a summary of the main phases of the Irish archaeological record and the date ranges used are based on those published by the National Monuments Service (2006). The following table provides a list of all the recorded archaeological sites (as recorded by the Historic Environment Viewer) within the study area and provides grid coordinates for their locations.

Table 12.3: List of Recorded archaeological sites located within the study area, listed from west to east of route (Ballylicky 110kV substation to Derreenacrinnig West Wind Farm)

SMR Number	Class	Townland	ITM Ref (E, N)	Distance
CO105-058---	Cairn – radial-stone cairn	Shandrum Beg	502975, 553117	c.30m to E
CO105-026----	Ringfort - rath	Shandrum Beg	502922, 553155	c.5m to W
CO106-077002-	Standing stone	Derryarkane	504828, 553662	c.20m to S
CO106-077001-	Fulacht fia	Derryarkane	504920, 553384	c.50m to N
CO106-079----	Fulacht fia	Derryarkane	505022, 553598	c.40m to S
CO106-021----	Standing stone	Maulikeeve	505445, 553871	c.22m to S
CO106-114----	Standing stone	Maularaha	505926, 554118	c.15m to NW

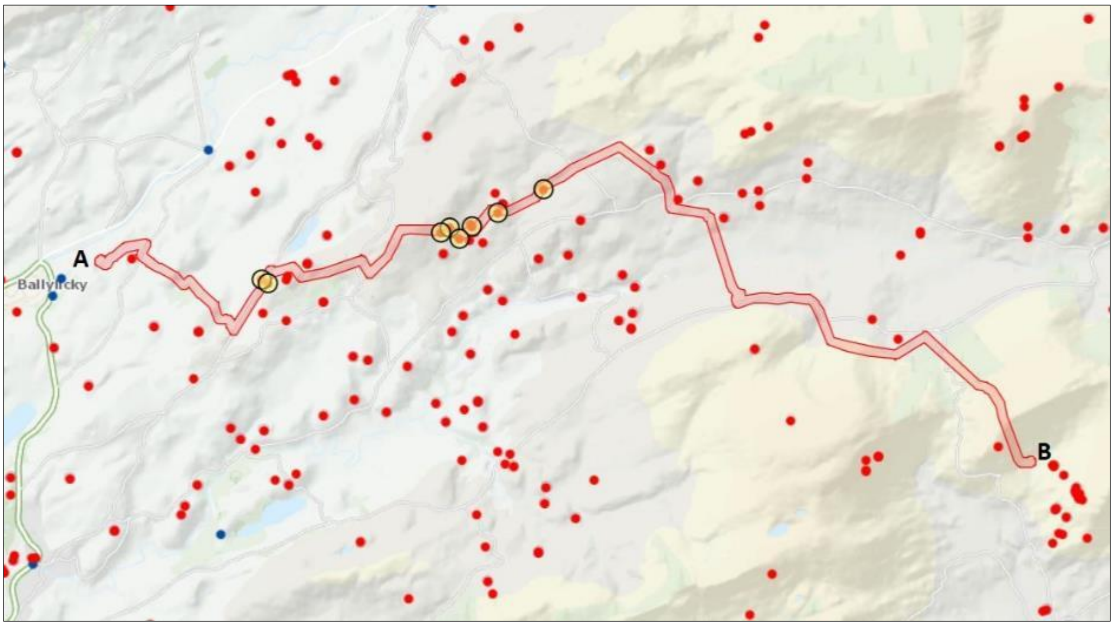

Figure 12.1 Graphic depicting locations of recorded archaeological sites within study area for proposed grid connection route between Ballylicky 110kV substation (A) and Dereenacrinnig Wind Farm (B). Locations of

recorded archaeological sites within wider landscape are indicated by the red dots while architectural heritage sites (NIAH) are indicated by blue dots

Early Prehistoric

Traditionally, the earliest recorded evidence for human settlement in Ireland dates to the Mesolithic period (7000–4000 BC) when groups of hunter-gatherers arrived on the island, however recent evidence in the form of a butchered bear bone found in Alice and Gwendoline Cave near Ennis in Co. Clare now suggests that humans were present in Ireland c.12,500 years ago during the Palaeolithic period. The earliest recorded evidence for human settlement in Ireland dates to the Mesolithic period (7000–4000 BC) when groups of hunter-gatherers arrived on the island. While these Mesolithic settlers did not construct any settlements or monuments that leave any above ground traces, their presence in an area can often be identified by scatters of worked flints in ploughed fields. The Neolithic period (4000-2400 BC) began with the arrival and establishment of agriculture as the principal form of economic subsistence, which resulted in more permanent settlement patterns. As a consequence of the more settled nature of agrarian life, new site-types, such as more substantial rectangular timber houses and various types of megalithic tombs, begin to appear in the archaeological record during this period. There is archaeological evidence for a dispersed settlement pattern within the Munster region during the Mesolithic period which developed into a more extensive settlement during the Neolithic period. There is one megalithic tomb, a wedge tomb (CO105-023----), located within the townland of Crossoge c.95 metres southwest of the grid connection route near the western terminus of the scheme in Ballylickey. While three of the four main types of megalithic tombs (passage, court and portal tombs) date from the Neolithic period, wedge tombs represent the last phase of megalithic tomb building with dated examples generally dating from the transitional period between the Neolithic and Bronze Ages (c.2550 – 2000 BC), there are no other recorded sites from either the Mesolithic or Neolithic periods within the study area.

Late Prehistoric Periods

Metalworking arrived in Ireland with the advent of the Bronze Age period (c. 2400–500 BC). This period was also associated with the construction of new monument types such as standing stones, stone rows, stone circles and fulachta fiadh. The later first millennium BC and the early centuries AD comprise the Irish Iron Age, which is the most obscure period in the Irish archaeological record. While there is general agreement that the introduction of an iron technology was a significant factor in the eventual demise of bronze working on a large scale, but how, why and when this came about in Ireland is far from clear. The majority of the recorded sites (6) within the study area date to the late prehistoric period. Close to the study area and approximately 59m north of ‘Pole 62’ are a stone circle (five-stone) (CO106-019----) and adjacent standing stone (CO106-057----), located in Derryarkane townland, which together comprise a National Monument in the ownership of the State (National Monument No. 600). Five-stone stone circles are a distinctive form of stone circle found only in counties Cork and Kerry. They comprise a ring of five free-standing stones, symmetrically arranged so that one stone, the axial stone, is set directly opposite two stones, usually the tallest, marking the entrance to the circle. In the Derryarkane example, the north entrance stone is prostrate having fallen at some point in the past. Characteristically, the stones reduce in height to the axial stone, which is set consistently in the south-western part of the circle. These circles are thought to have a ritual function. Although outside the 200-metre-wide study area, there is also another example of a stone circle of a type which is distinctive to the counties of Cork and Kerry within the general grid connection area. Located in Cappanaboul townland, the multiple-stone circle (CO105-029001-) most likely originally consisted of 13 stones, however, only 10 of these are still upright. The development of new burial practices saw the construction of funerary monuments such as cairns, barrows, boulder burials and cists. There are two examples of such sites within the general grid connection area. Located in the centre of the multiple-stone circle in Cappanaboul is a boulder-burial (C0105-029003-) consisting of a cover stone and one visible support stone. Approximately 470 metres to the southwest, in Shandrum Beg townland, is a peat-covered radial-stone cairn. The above described sites together with an additional five standing stones demonstrate a landscape rich in ritual and funerary monuments dating to the late prehistoric period.

Also dating to this period and located within Derryarkane are two fulachta fiadh (CO106-077001-; CO106-079----). Fulacht fiadh translates as cooking places of the wild (or of deer). They are often interpreted as the remains of cooking sites and are the most numerous archaeological site type in Ireland and radiocarbon dating of excavated examples has generally produced dates in the Bronze Age (c.2400-500BC). These sites are typically found close to a water source and survive as horseshoe-shaped mounds surrounding a trough, which is often found to be stone or timber-lined. They functioned by filling the trough with water, which was then heated by the introduction of heated stones. Modern experiments have shown that this technique can bring the trough water to boiling point in and has been successfully demonstrated that it could cooked wrapped meats within a short period of time. The heated stones shattered on entering the cold water, and after use the trough was cleaned out and the burnt stones were thrown behind and to the sides of the trough, which eventually resulted in a horseshoe-shaped mound. Over time many of the mounds were ploughed out and now survive as subsurface spreads of blackened soils with frequent inclusions of burnt stones. A number of alternative interpretations have been forwarded as to the function of these archaeological sites, such as their potential uses as bathing, saunas, garment washing and dyeing, leather processing sites and even brewing sites.

Early Medieval

This period began with the introduction of Christianity in Ireland and continued up to the arrival of the Anglo-Normans during the 12th-century (c. 400–1169 AD). The establishment of the Irish church was to have profound implications for political, social and economic life and is attested to in the archaeological record by the presence of church sites, associated places for burial and holy wells. The early medieval church sites were morphologically similar to ringforts but are often differentiated by the presence of features such as church buildings, graves, stone crosses and shrines. This period saw the emergence of the first phases of urbanisation around the large monasteries and the Hiberno-Norse ports. However, the dominant settlement pattern of the period continued to be rural based in sites such as ringforts, which comprise roughly circular enclosures delimited by roughly circular earthen banks formed of material thrown up from a concentric external ditch. Ringforts are one of the most numerous monuments in the Irish landscape and the early medieval terms for these sites – rath/lios/dun these still form some of the most common place-name elements in the country. Archaeological excavations indicate that the majority of ringforts were early medieval farmsteads with internal timber buildings and were surrounded by associated field systems. There is one ringfort recorded within the study area in the townland of Shandrum Beg (CO105-026----).

Late and Post Medieval

The arrival and conquest of large parts of Ireland by the Anglo-Normans in the late 12th century broadly marks the advent of the Irish late medieval period, which continued up until the beginning of the post-medieval period in c.1550. Within the late medieval period, towns, markets, and fairs were established and change and reform attempted in the Irish church. By the 15th-century the native Irish chieftains and lords began to establish tower houses and smaller castles as centres of territorial control. While there are no definitive late medieval monuments recorded within the study area, it is possible that a hut site (CO105-075----) located in Shandrum Beg may date to this period, however, it is also possible that this site dates to earlier time periods. The post-medieval period (1550+) saw the development of high and low status stone houses throughout the Irish country. During this period any given settlement cluster is likely to have consisted primarily of single-storey thatched cottages with associated farm buildings while two-storey farmhouses became more common in the 19th century.

The scheme extends through Kilmocomoge parish which was described as follows during the 19th-century (Lewis 1837):

KILMACOMOGUE, a parish, partly in the Western Division of the barony of EAST CARBERY, and partly in the Eastern Division of that of WEST CARBERY, but chiefly in the barony of BANTRY, county of CORK, and province of MUNSTER; containing, with the post-town of Bantry and the island of Whiddy, 14,483 inhabitants. This parish, which is situated at the extremity of Bantry bay, comprises 56,910 statute acres, of which 5841 are applotted under the tithe act, and valued at £13,977 per annum. Very great improvements have been made in agriculture since 1815, and a large portion of land has been brought into profitable cultivation. The principal manure is the calcareous deposit found in abundance on the shores of the bay, which in some places is so mixed with coral sand as to be quite as effective as pure lime in fertilising the soil. There are, however, still more than 20,000 acres of waste land, the greater portion of which is mountainous, in some places quite barren, and in others affording good pasturage for young cattle, of which vast herds are reared; and there are about 15,000 acres of bog and marshy ground, much of which is capable of being reclaimed.

The mountains are of the schistose formation, based on argillaceous grit; in a small rock in Reendonagan bay, limestone is found mixed with the grit, which can be only partially calcined, and is therefore of little use; the schistose rocks merge into clay-slate, and slate of a tolerably good colour is found in several parts. Four rivers intersect the parish in their course to the bay; namely, the Maulagh, or Moyalla, which, on its entrance into the bay, forms a beautiful fall of 30 feet at Dunamarc; the Auvane, which rises in the pass of Caminea, and falls into the bay at Ballylicky; the Coomola, which forms the small creek of that name, and the Drumgariff, which forms the north-western boundary of the parish and barony.

12.3.3 Excavation Database

The Database which records summary accounts of licensed archaeological investigations undertaken from 1969-2021 contains one entry for townlands within lands in the study area. This entailed archaeological testing (11E0444) of a number of potential archaeological features identified during a site walk-over undertaken as part of an Environmental Impact Assessment at the location of a proposed five-turbine wind farm with ancillary works in the townlands of Ardrah and Maughanaclea, Bantry. The testing programme was carried out in December 2011. Nothing of an archaeological nature was revealed within the four excavated trenches, however, a relict L-shaped drystone boundary wall was identified in proximity to a proposed development area. It was recommended that a buffer zone of 10m be established to protect it from damage during construction phase of the project.

12.3.4 Cartographic sources

The following section provides an overview of the cartographic and aerial images of the grid connection route. The reviewed cartographic sources comprised the 1st edition 6-inch Ordnance Survey (OS) map (1830s-40 series), and the 25-inch edition OS map (1888-1913 series). The consulted aerial/satellite images comprised a range of online sources including Bing Maps, Google Maps and Google Earth as well as the Ordnance Survey of Ireland (OSI) Geohive Mapviewer. These consulted images were captured between 1995 and 2018.

The detail on historic cartographic sources demonstrates the nature of past settlements and land use patterns in recent centuries and also highlights the impact of modern developments and agricultural practices. This information can aid in the identification of the location and extent of unrecorded, or partially levelled, features of archaeological or architectural heritage interest. There were no unrecorded features of archaeological interest noted on the footprint of the proposed scheme during the inspection of these sources, which both indicate that the study area has been occupied by a mixture of mountainous heath land, rough grazing land and irregularly enclosed small-scale pasture fields of varying quality since at least the 19th century.

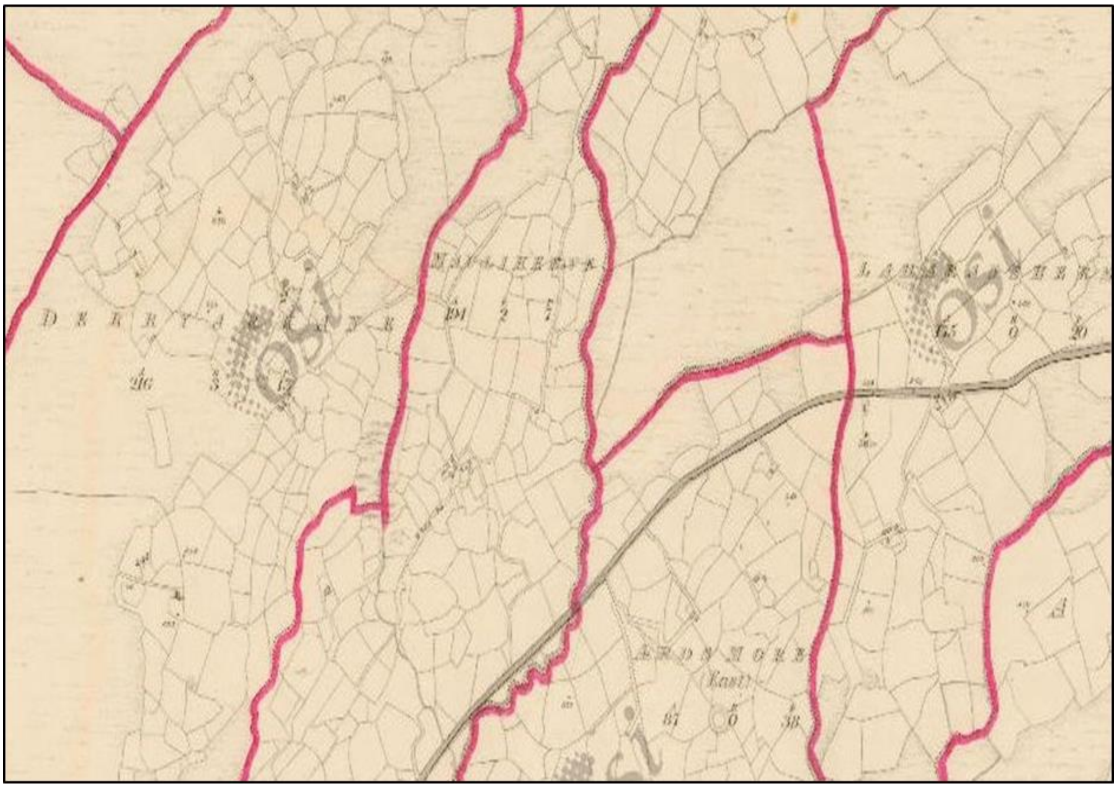

Figure 12.2: Extract from 1st edition 6-inch O.S. map (1842) depicting a portion of the townlands of Derryarkane, Maulikeeve, Maularaha and Laharanshermeen through which the built section of the OHC grid connection extends. Note the mixed nature of the landscape which consists of open upland/heathland and irregularly enclosed small-scale pasture fields.

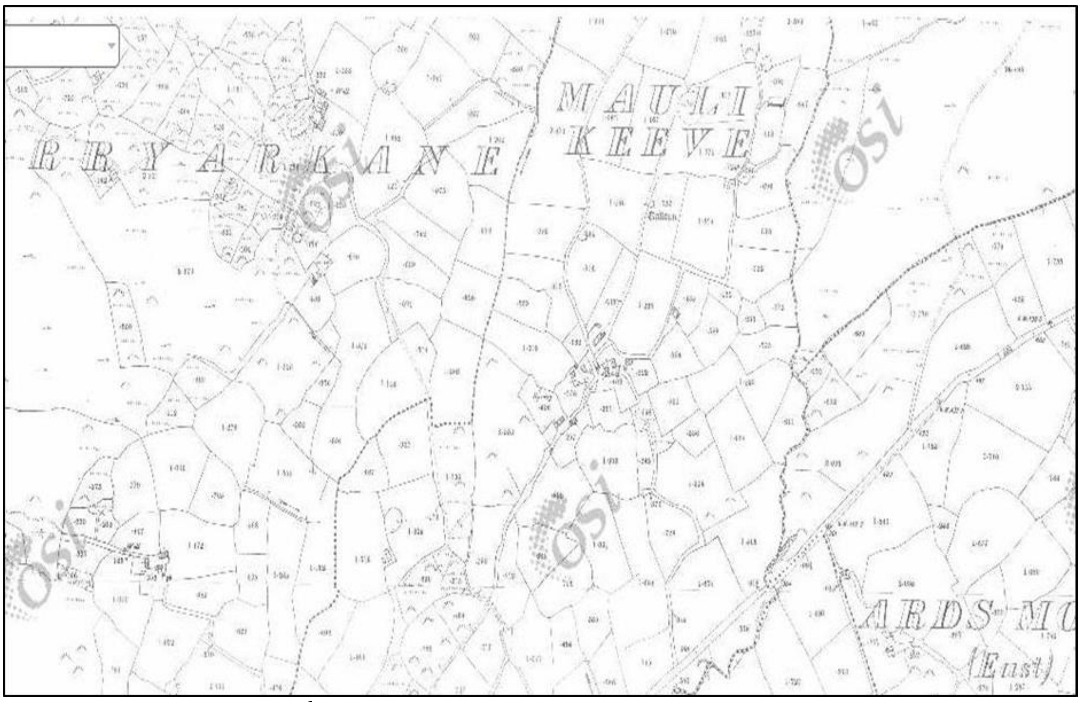

Figure 12:3 Extract from the 2nd edition 25-inch O.S. map (1899) showing little change in the landscape in the period since the publication of the 1st edition map.

12.3.5 Designated Architectural Heritage Structure

A review of the Record of Protected Structures (RPS) published in the current Cork County Development Plan (2014) revealed that there are no examples located within the vicinity of the proposed grid route. The closest structure listed on the National Inventory of Architectural Heritage (NIAH) to the study proposed grid route is the Seaview House Hotel (NIAH Reg. No. 20910516) in Ballylicky. This is located c.440m southwest of Ballylicky substation. The study area does not extend into an Architectural Conservation Area.

12.3.6 Undesignated Cultural Heritage Assets

While encompassing the archaeological and designated architectural heritage resources, cultural heritage also includes various undesignated assets such as demesne landscapes, vernacular structures, folklore, place names and historical events. The green field sections of the route do not extend into any former demesne lands and contain no extant structures of any date. The overall grid route extends through a number of townlands which are the smallest unit of land division in the Irish landscape and many may preserve early Gaelic territorial boundaries that pre-date the Anglo-Norman conquest (Table 0-6). The boundaries and names of Irish townlands were recorded and standardised by the Ordnance Survey (OS) in the 19th century and typically entailed anglicisations of their original Irish names. The Irish origins of townland names often refer to natural topographical features, past landowners, farming practices, etc. but some name elements may also give an indication of the presence of archaeological sites within the townland, e.g., lios or rath indicate the presence of a ringfort while temple, saggart, termon or kill may record associations with a church site. The translations of the townland names within study area were sourced from the Placenames Database (www.logainm.ie) and the majority refer to natural landscape features.

Table 12.4: Townland name translations for townlands within study area

Townland	Irish	Translation
Derreenacrinnig West	*Doirín an Chríonaigh Thiar*	Little oakwood of the withered sticks
Barnagowlane West	*Barr na Gabhlán Thiar*	Top of the forks
Glanareagh	*Gleann Creach*	Glen of the prey
Ardsbeg	*Na hArda Beaga*	The heights (small)
Ardrah	*Ardráth*	The high fort
Laharanshermeen	*Leathfhearann Seirmín*	Shermin's half land
Maularaha	*Meall an Reithe*	Knoll of the ram
Maulikeeve	*Meall Uí Chaoimh*	O'Keeffe's knoll/hillock
Derryarkane	*Doire Uí Earcáin*	O'Earcáin's oak grove
Cappanaboul	*Ceapach na bPoll*	Land plot of the pool
Skahanagh More	*An Sceachánach Mhór*	The big whitethorns?
Shandrum More	*An Seandrom Mór*	The old ridge (big)
Dromloughlin	*Drom Lochlainn*	Loughlin's ridge
Ballylicky	*Béal Atha Leice*	Mouth of the ford of the flagstone/flat rock

12.3.7 Field Inspection

The lands impacted by the constructed OHC portion of the scheme and the lands proposed to be impacted by the yet to be constructed sections were inspected on 8th March and 10th May 2017 and again as part of this cumulative impact assessment on Tuesday 16th October 2018 and September 2021. During the most recent field inspection only the portions of the route in the vicinity of recorded archaeological sites were revisited. Sections of the constructed OHC route, which are located away from recorded sites, were not revisited as they had been assessed during the previous field inspections. Weather conditions were clear at the time of all inspections which provided good landscape visibility. All areas were accessible, and the grid route was assessed in terms of landscape, land use, vegetation cover, presence or lack of archaeology and potential for previously unrecorded features. Landscape descriptions of each portion of the grid route are provided in the relevant assessment sections below.

12.4 ASSESSMENT OF PROPOSED OVERHEAD CIRCUIT ROUTE

12.4.1.1 Route Description

There is one section of the proposed overhead circuit (OHC) yet to be constructed along the grid connection route. Commencing at the northern end of the proposed underground cable section in Shandrum Beg townland (approx. ITM grid co-ord. 503027, 553245), the proposed route extends upslope and to the east, traversing elevated and marginal lands in Cappanaboul townland before connecting with the western end of the longest section of previously constructed OHC in Skahanagh More townland (approx. ITM grid co-ord. 504078, 553214). The total length of this section of the proposed route is c.1201 metres.

12.4.1.2 Recorded Archaeological Monuments

The closest recorded archaeological sites to the **yet to be constructed** overhead circuit portion of the grid connection route comprise a standing stone (CO105-071----) and hut site (CO105-075----) located in Shandrum Beg townland (Table 12.5). The site of a stone circle (CO105-029001-) containing a boulder-burial (CO105-029002-) is also located within 140 metres of this section of the route in Cappanaboul townland. The locations of all four sites were visited during the field inspection undertaken on 16th October 2018.

<u>Table 12.5:</u> Recorded archaeological monuments located within 100m of the proposed OHC route

SMR No.	Class	Townland	ITM Ref (E, N)	Distance
CO105-071	Standing stone	Shandrum Beg	503179, 553157	c.100m to S
CO105-075	Hut site	Shandrum Beg	503185, 553196	c.70m to S

12.4.2 Assessment of Potential Impacts

Located to the south of the proposed route of the yet to be constructed OHC section of the grid connection route, within Shandrum Beg townland, are a standing stone (CO105-071----) and a hut site (CO105-075----). There is no direct line of sight between the nearest proposed pole locations of the OHC route and the locations of the standing stone and hut site, which are situated c.100 metres and c.70 metres from the proposed route of the OHC respectively. This is due to higher ground being positioned between these sites and the route of the OHC to the northeast, while the OHC route to the north and northwest extends across significantly lower ground. As the single pole structures of the OHC are proposed to be constructed in fields to the northeast, north and northwest of both sites and as there is no direct line of site, construction of the OHC will have no direct or visual impact on the recorded sites.

To the north of the proposed OHC route, in the townland of Cappanaboul, is the site of a multiple stone circle (CO105-029001-) within which is a boulder-burial (CO105-029003-). The combined sites are located on a small peat covered platform at the north-western end of an elevated, unenclosed plateau of marginal land. The incomplete stone circle appears to have originally consisted of thirteen stones. Ten of these stones survive, two of which are prostrate. The dimensions of the orthostats range between 0.5m to 1.3m in length, 0.2m to 0.4m in width and 0.7m to 1.5m in height. The stone circle encloses an internal area measuring 10.5m E-W. The boulder-burial is centrally placed within the stone circle. It comprises a cover-stone measuring 1.6m in length, 1.5m in width and 0.7m in height, there is one support stone visible beneath the cover stone. The combined sites are surrounded by post and barbed wire fencing which will assist in preventing any accidental damage occurring during the construction of the OHC (**Plate 12.12**).

On recent planning drawings the proposed OHC route extends well to the south of the ZON of the combined monument. This will ensure that no direct impact to the recorded monuments occurs, however, the lack of any shielding elements, such as hedgerows or trees, between the proposed OHC route and the site of the recorded monuments, means there will be a very slight visual impact on the setting of both monuments due to the construction of the OHC in this area.

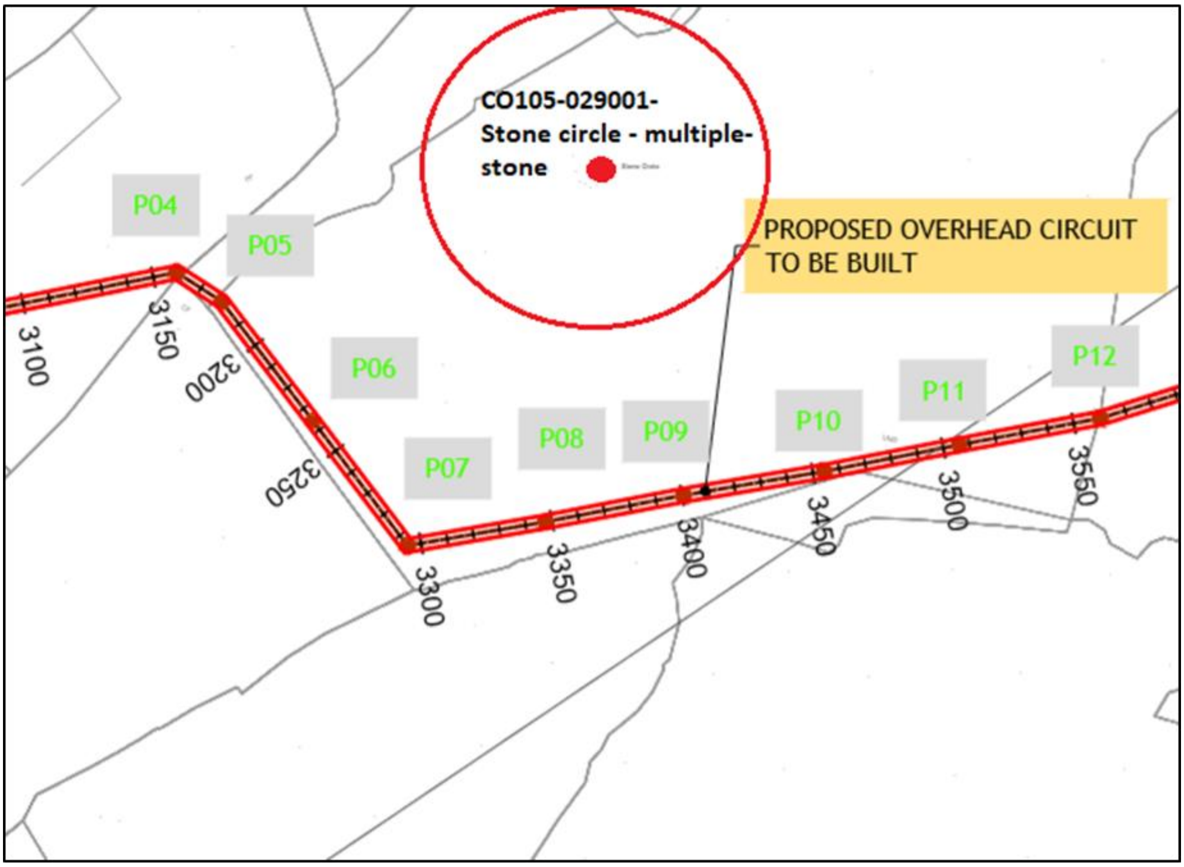

Figure 12.4 - Graphic depicting the route of the yet to be built OHC, large red circle to the north of the OHC route represents the Zone of Notification of the recorded monument CO105-029001- (Multiple stone circle) and CO105-029003- (Boulder-burial)

12.5 ASSESSMENT OF THE CONSTRUCTED OVERHEAD CIRCUIT

Route Description

Five separate sections of the 'overhead circuit' (OHC) portion of the grid connection route have been constructed to date. The current proposal involves removal of approximately 9.5km of this 20kV overhead line followed by the construction of approximately 10.75km in its place. The largest constructed section comprises the central portion of the grid connection route between the townlands of Gortnacowly to the east and Skahanagh More to the west. The second longest constructed section is the most westerly portion of the entire grid connection route, between the Derreenacrinnig West Wind Farm substation and the western portion of Barnagowlane townland. Three shorter sections of the overhead circuit have also been constructed along the grid connection route. There are two short sections at the western end of the route, the more easterly of the two short sections extends across a portion of the townlands of Shandrum More and Dromloughlin, while the more westerly section extends between Dromloughlin and the northeast corner of Ballylicky 110 kV substation. The other short section of constructed OHC is located near the central portion of the route, extending between the townlands of Glanareagh and Ardsbeg. The combined length of the constructed sections of the OHC measures 9.537km.

Commencing at the Derreenacrinnig Wind Farm substation (approx. ITM grid co-ord. 510961, 551186), the constructed OHC route extends uphill to the north-northwest across an area of blanket bog and heathland on the south-facing slopes of the ridge at Derreenacrinnig West (**Plate 12.1**). Descending north-westwards from the crest of the ridge, the route cuts through c.300 metres of first and second rotation forestry before extending through an area dominated by rough unenclosed grazing in Barnagowlane townland (**Plate 12.2**). The route then descends downslope into the Mealagh River valley. This section of the constructed OHC terminates south of the public road in the western portion of Barnagowlane townland (approx. ITM grid co-ord. 508901, 552735), the easternmost portion of the yet to be constructed underground cable commences at this point.

Beyond the 1046m long section of proposed underground cabling, the constructed OHC commences once again and extends north-westwards from a point south of Glanareagh Hill (approx. ITM grid co-ord. 508040, 552998) traversing varying quality agricultural land before crossing the Mealagh River 1km southeast of Ardrah Bridge. To the north of the river there is a brief interruption in the route of the OHC as a c.112m long section of the grid connection between the boundaries of Ardsbeg and Gortnacowly townlands (approx. ITM co-ords. 507734, 553749 to 507688, 553834) is proposed to be installed underground. Beyond this short proposed underground section, the constructed OHC continues upslope to the north side of the valley to Ardrah townland. From here, the OHC route turns south-westwards again and extends through the townlands of Laharanshermeen, Maularaha, Maulikeeve, Derryarkane, Cappanaboul while descending steadily and crossing areas of improved and unimproved grassland with occasional areas of heath and mature coniferous forestry. This longest constructed section of the OHC route terminates at a point in the northern portion of Skahanagh More townland (approx. ITM grid co-ord. 504050, 553237).

The most westerly sections of the grid connection route extend across an area generally consisting of undulating, improved pastureland. It is across this landscape that the remaining two short sections of constructed OHC extend. These sections of constructed OHC traverse portions of the townlands of Shandrum More, Dromloughlin and Ballylicky between approx. ITM grid co-ords. 502436, 552770 and 501977, 553191 (eastern short section) and approx. ITM grid co-ords. 501670, 553540 and 501297, 553395 (western short section).

Recorded Archaeological Monuments

There are five archaeological sites recorded by the Historic Environment Viewer of the National Monuments Service (www.archaeology.ie) located within 50m of the constructed portion of the OHC (see Table 12.5 below). The locations of all these sites were visited during the compilation of previous archaeological assessments associated with the grid connection route. During the compilation of this cumulative assessment a number of sites which were located in close proximity to the built section were reassessed in order to ascertain if any damage had occurred to the monuments, or their immediate environs, during the construction of the OHC. The sites which were reassessed include: standing stone (CO106-114----) in the townland of Maularaha; fulacht fia (CO106-079----) in Derryarkane and standing stone (CO106-07702-) in Derryarkane.

Table 12.5: List of recorded archaeological sites within 50m of the constructed portion of the OHC, listed from east to west of route

SMR No.	Class	Townland	ITM Ref (E, N)	Distance
CO106-114---	Standing Stone	Maularaha	505926, 554118	c.15m to NW
CO106-021----	Standing stone	Maulikeeve	505445, 553871	c.22m to S
CO106-079----	Fulacht fia	Derryarkane	505022, 553598	c.40m to S
CO106-077001	Fulacht fia	Derryarkane	504920, 553384	c.50m to N
CO106-077002-	Standing Stone	Derryarkane	504828, 553662	c.20m to S

Assessment of Impacts

Although outside the study area and not in immediate proximity to the grid connection route (being located c.160 metres northeast of the proposed route), the recorded site of a stone row (CO106-008----) was reassessed to ascertain whether or not the constructed OHC impacts on the setting of the monument or if there is any associated visual impact on alignments or views associated with the monument. The stone row is situated on high ground c.190 metres northwest of a recorded ringfort (CO106-009----). The OHC route approaches both sites from the southeast, extending in a southeast to northwest direction, and passes c.80 metres to the southwest of the ringfort site. The OHC route utilises a natural dip in the landscape to the southwest of both recorded sites. Through the utilisation of this natural depression the constructed OHC results in a very slight visual impact on the setting of both recorded sites. The stone row is aligned in a northeast to southwest direction (largest stone to southwest) and views in either direction are not impacted by the OHC route. The main view to the southwest is blocked by a line of mature trees which surround a derelict farmhouse, the OHC extends to the southwest of the treeline and is not visible from the stone row when facing south-westwards. The Archaeological Survey of Ireland records the stone row as comprising four aligned stones, a fifth smaller stone was noted at the northeast end of the alignment during the inspection.

Assessment of the first revisited recorded archaeological site in close proximity to the constructed portion of OHC route, that of a standing stone (CO106-114----) in Maularaha, revealed that no direct impact occurred during the construction of the OHC. The standing stone is situated on a level area of boggy ground between two outcroppings of rock c.20 metres southeast of the OHC route **(Plate 12.4**). While the route of the OHC slightly encroaches on the zone of notification (ZON) of the monument, no poles were erected, or ground disturbance undertaken, within the ZON. However, the construction of the OHC has caused a slight visual impact on the setting of the standing stone.

As the OHC route continues to the southwest it passes in proximity to the ZON of two further monuments in Maulikeeve townland, ringfort (CO106-020001-) and standing stone (CO106-021----). The ringfort is located on the crest of a hill c.55 metres north of the route which provides expansive views in all directions. The OHC route traverses an area which is outside the ZON of the ringfort and there was no evidence of any ground disturbance works having taken place within the zone. As the OHC route extends through an adjacent field, which is at a lower level than the ringfort and beyond a shielding field boundary (**Plate 12.5**), it can be considered that the erection of the OHC has had a very slight visual impact on the setting of the monument. The standing stone (CO106-020002-) and souterrain (CO106-056----) which are situated within the ringfort are unaffected by the OHC.

The recorded site of a standing stone (CO106-021----) is located c.22 metres to the south of the OHC route. The ASI record no visible surface trace of the stone, its recorded location is heavily overgrown with gorse, brambles and young trees. There was no evidence of any ground disturbance works as having taken place within the ZON of the recorded location of the standing stone during the construction of the OHC.

As the constructed OHC route continues to the southwest it extends through the townland of Derryarkane. Located within this townland is the site of a National Monument (ITM grid co-ord: 505156E, 553755N) comprising Derryarkane stone circle (CO106-019----) (a five-stone circle) and an adjacent standing stone (CO106-057----) (National Monument No. 600). The field survey undertaken as part of a previous assessment of the grid connection route (John Cronin & Associates, May 2017) revealed that the location of this National Monument was inaccurately recorded on the Historic Environment Viewer (www.archaeology.ie). The Historic Environment Viewer had recorded the stone circle as being located at ITM co-ord. 505203E, 553806N when in fact it is located c.77 metres to the southwest of this location at ITM co-ord. 505156E, 553755N. This is the location where the Historic Environment Viewer had placed a standing stone (CO106-057----), which itself is in fact located c.29 metres to the south of this location at ITM co-ord. 505167E, 553725N. The correct locations of the above sites are now indicated on the Historic Environment Viewer. Subsequently, the route of the existing OHC will be altered to avoid impact on National Monument No. 600 (Figure 4).

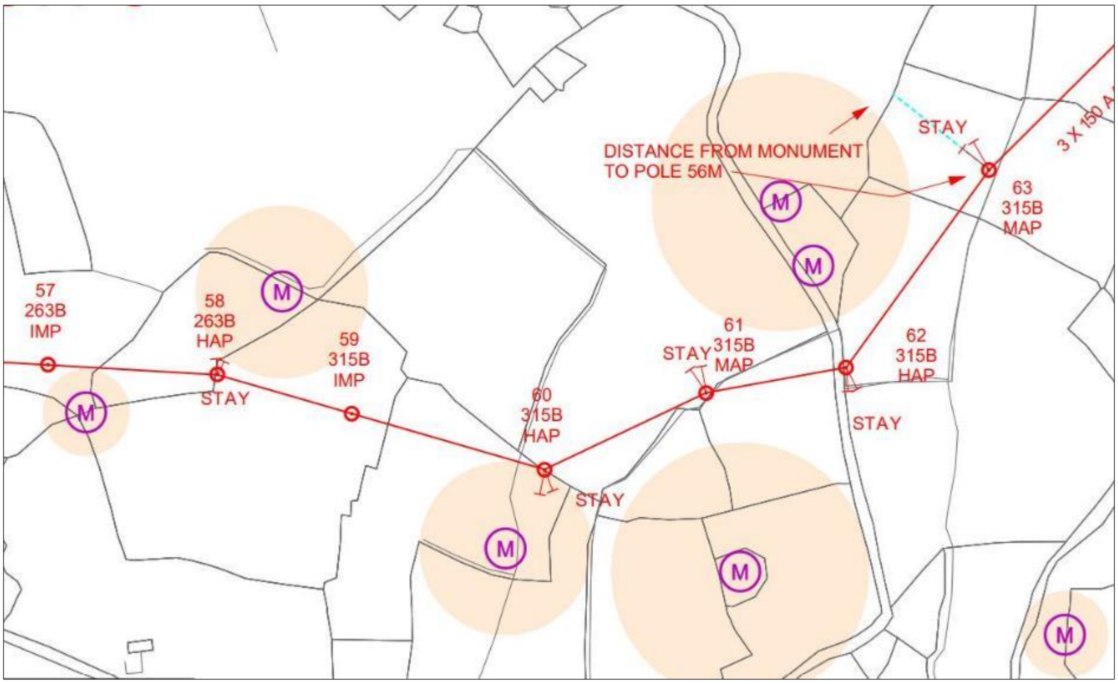

Figure 12.5 - Graphic depicting the route of the OHL in the area of Derryarkane stone circle. The proposed location of 'Pole 62' (termed 'Pole 57' in the present application) has been moved further south on the advice of the project archaeologists in order to negate the impacts to the setting of the National Monument. Distance form standing stone (CO106-057----) to 'Pole 62' is 56, distance from stone circle (CO106-019----) to 'Pole 62' is 85m

The extant and proposed OHL route passes in close proximity to three further sites in the west of Derryarkane townland. These sites comprise two fulachta fia (CO106-079----), (CO106-077001-) and a standing stone (CO106-077002-), all three sites are situated in undulating poor quality pastureland. Each site was assessed to ensure its location is accurately depicted on the both the project construction drawings and the Historic Environment Viewer. While 'Pole 55' (previously 'Pole 60') is proposed to be located just outside the ZON of the more easterly fulacht fia (CO106-079----), the stays of the extant pole in this location have been erected within the ZON of the monument. Project drawings indicate a similar scenario should the pole be re-erected in this location. The erection of the OHL in this area will have a slight visual impact on the setting of standing stone (CO106-077002-) due to the proximity of 'Pole 52' (previously 'Pole 57') and an imperceptible visual impact on the settings of both fulachta fia (CO106-079----) and (CO106-077001-).

Although outside the study area, the site of a multiple stone circle (CO105-029001-), within which is boulder-burial (CO105-029003-), in Cappanaboul townland was visited to assess any potential visual impacts from a section of OHL proposed to be constructed c.130m to the south. The combined sites are directly enclosed by post and barbed wire fencing erected by the landowner. The proposed OHC route extends well to the south of the ZON of the combined monument. This will ensure that no direct impact to the recorded monuments occurs, however, the lack of any shielding elements, such as hedgerows or trees, between the proposed OHC route and the site of the recorded monuments, means there will be a very slight visual impact on the setting of both monuments due to the construction of the OHC in this area.

It is noted that the "as constructed" sections of the OHC were not monitored by an archaeologist. Generally, however, the footprints and associated ground disturbances of the poles and stay supports are quite small (usually less that 1m2 each). Given that the site walkover/desktop assessment considered that such locations, outside the zone of notification (ZON) of recorded monuments, were of low archaeological potential, it is unlikely that any artefacts, features or deposits of an archaeological nature were disturbed during construction works. Nevertheless, this cannot be discounted.

12.6 ASSESSMENT OF PROPOSED UNDERGROUND CIRCUIT ROUTE

Route Description

Six separate sections of underground cabling, totalling 3.178km in length, are proposed to be installed along the grid connection route. Commencing at the Ballylicky 110kV substation, the most westerly section of underground cabling (c.201 metres in length) is proposed to extend from within the substation (approx. ITM grid co-ord. 501201, 553364) and skirt around the perimeter of the facility before connecting with the most westerly constructed section of the overhead circuit (OHC) which terminated to the immediate northeast of the substation (approx. ITM grid co-ord. 501308, 553402).

The next proposed section of underground cabling extends south-south-westwards along a third-class road in Dromloughlin townland (commencing at approx. ITM grid co-ord. 501672, 553546) before extending south-eastwards across varying quality pastureland within the same townland and linking with a previously constructed section of OHC (approx. ITM grid co-ord. 502022, 553156). This section of the proposed underground cable within Dromloughlin measures c.624 metres in length.

The most extensive section of the proposed underground cable extends for c.1081 metres through the townlands of Shandrum More and Shandrum Beg. Commencing at approx. ITM grid co-ord. 502432, 552782 and initially extending down a farm laneway in a general south-eastward direction, the underground cable is then proposed to extend north-eastwards beneath a third-class road before connecting with the yet to be constructed section of overhead circuit which extends between Skahanagh More and Shandrum Beg townlands (approx. ITM grid co-ord. 503027, 553245). The lands in the vicinity of this section of the underground cable route comprise a mixture of undulating improved and unimproved pastureland.

The shortest section of underground cabling is proposed to be installed in agricultural land in the vicinity of the boundary between Ardsbeg and Gortnacowly townlands north of the Mealagh River (approx. ITM co-ords. 507734, 553749 to 507688, 553834). This section measures c.112 metres in length.

The second longest section (c.1046 metres) of the underground cable route is proposed to extend in a general west to east direction, largely beneath a third-class road in Gleanareagh townland (between approx. ITM grid co-ords. 508040, 552998 and 508905, 552735), which is located on the southern slopes of the Mealagh River Valley. The topography in the vicinity of this section generally comprises moderate sloping ground, generally sloping downwards to the north, with the road traversing the landscape in an east to west direction. The southside of the road generally cuts into the sloping ground along this section.

A final, short section of underground cabling is proposed to be installed on approach to the substation within the boundaries of the Derreenacrinnig West wind farm site. This section measures c.113 metres in length and extends between approx. ITM co-ords. 511039, 551205 and 511138, 551222.

Recorded Archaeological Monuments

There are two recorded archaeological sites located within the 100 metres study area of the yet to be constructed underground cable portions of the grid connection route. The locations of the sites were visited during the field inspection undertaken on 16th October 2018 and September 2021. These sites comprise a ringfort (CO105-026----) and radial-stone cairn (CO105-058----) located in Shandrum Beg townland.

<u>Table 12.6:</u> Recorded archaeological monuments located within 50m of the proposed underground cable

SMR No.	Class	Townland	ITM Ref (E, N)	Distance
CO105-026---	Ringfort - rath	Shandrum Beg	502922, 553155	c.5m to W
CO105-058----	Cairn – radial-stone cairn	Shandrum Beg	502975, 553117	c.30m to E

Assessment of Potential Impacts

Two recorded archaeological sites are located in close proximity to the route of the proposed underground cable route in the townland of Shandrum Beg (see Figure 12.6 below). The third-class road, under which the cable is proposed to be laid, extends between these two sites which comprise a ringfort (CO105-026----) and a radial-stone cairn (CO105-058----). Although not obvious from road level as the ringfort is elevated above the road (up to 3 metres above) and obscured by a dense thicket of vegetation, the eastern portion of the ringfort directly abuts the western margin of the public road (**Plates 12.15** & **12.16**). The sub-oval shaped ringfort, which is defined by a low earthen bank, measures c.60 metres NE-SW by c.40 metres NW-SE. As the road construction in this area cut significantly down into the hillside, it is highly unlikely that any archaeological remains associated with any potential enclosing ditch or outer ancillary features survive beneath the road surface.

Along the same section of the proposed route but situated c.30 metres east of the road within a moderate quality pasture field, is the location of a radial-stone cairn (CO105-058----) (**Plate 12.17**). This field lies at a lower level than the adjoining stretch of road. The sod covered, sub-circular cairn, which has a diameter of c.6 metres and a maximum height of 0.5 metres, is defined by three radially set stones and two further partially embedded slabs. A slight hollow is evident in its centre. Provided that construction works along this underground section of the grid route are restricted to the road itself, there is no predicted negative impact, either direct or visual, on either recorded monument in its vicinity. However, as the proposed route does extend through the ZON of both monuments, and as the road is at a higher level than the cairn (CO106-058----), it is recommended below that archaeological monitoring of the excavation of the cable trench be undertaken within the combined zones of notification ringfort (C0105-026----) and radial stone cairn (CO105-058----).

The underground cable route extends across agricultural land in the townland of Dromloughlin. Although there are no recorded archaeological sites in its vicinity, there is potential for the existence of sub-surface archaeological artefacts, features or deposits along this section of the route.

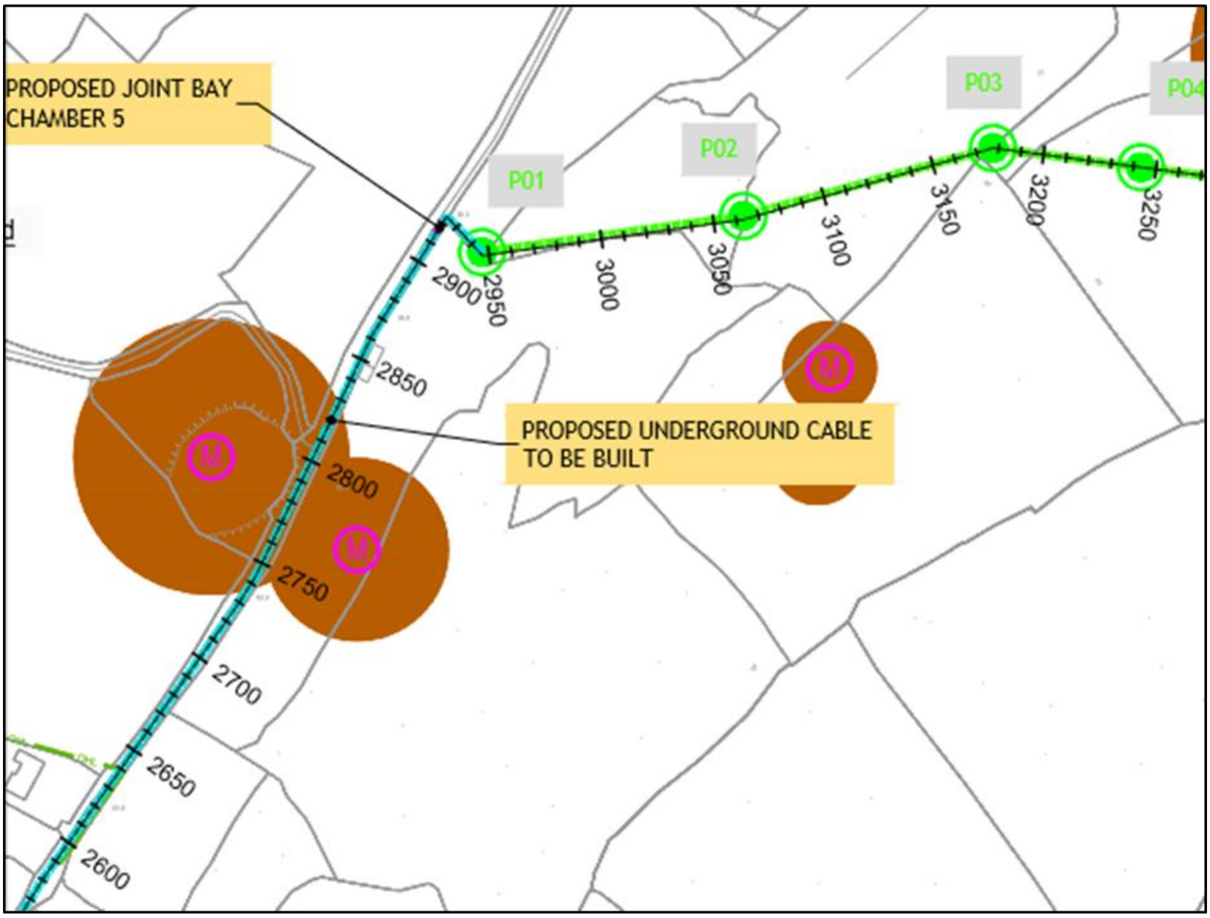

Figure 12.6 - Graphic depicting location of the recorded sites adjacent to the underground cable route in Shandrum Beg townland

12.7 ASSESSMENT OF WIND FARM SITE

The wind farm development site is located entirely within the townland of Derreenacrinnig West, and when completed, will comprise 7 wind turbines, a substation, associated access road and ancillary infrastructure. While there are 44 recorded archaeological sites (mainly comprising hut sites, standing stones and enclosures) within 1.5km of the boundaries of the wind farmland-holding, there are no recorded archaeological sites within the landholding or development boundary. The nearest recorded monument to the wind farm is that of a hut site (CO106-107----), which is located within Derreenacrinnig West townland, c.70m to the west of the land-holding boundary.

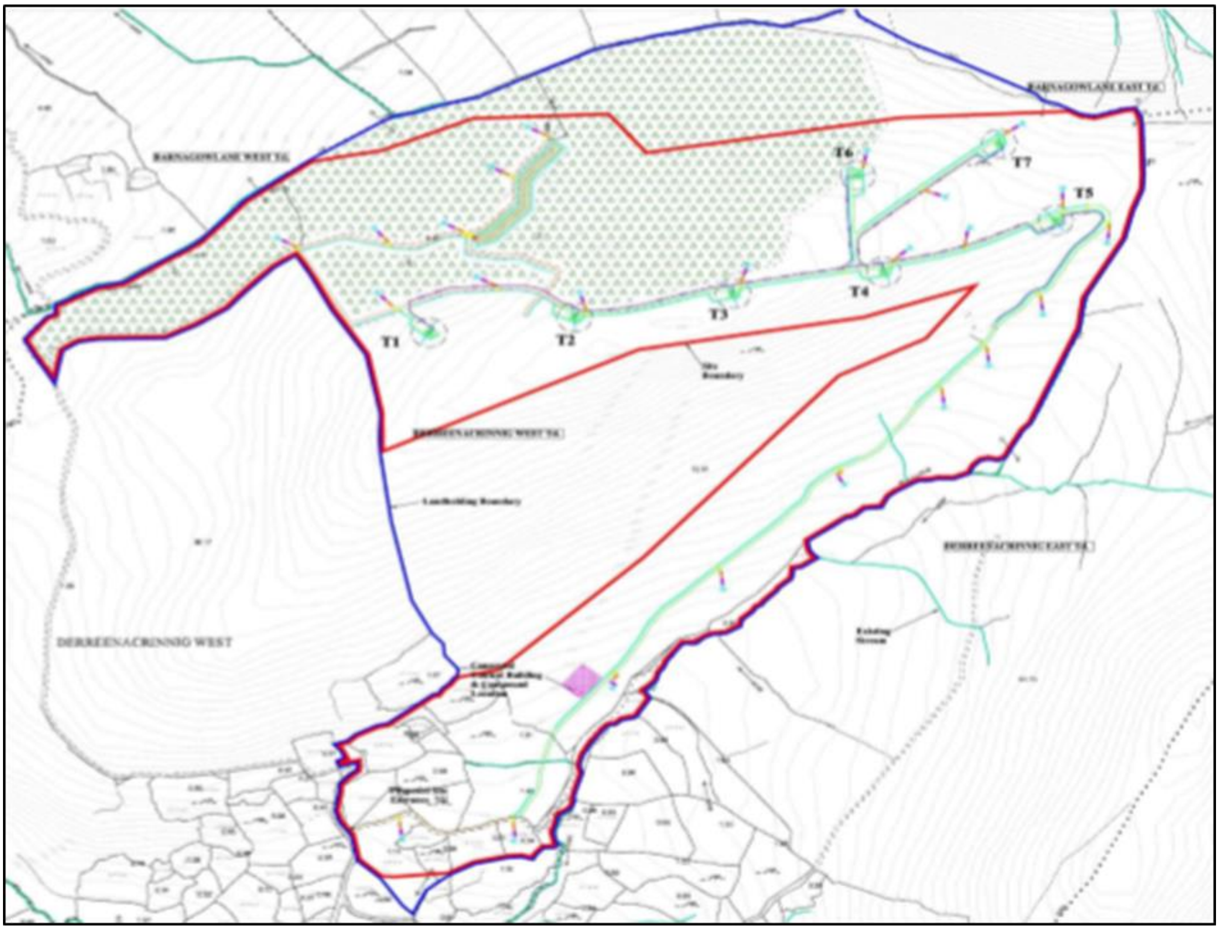

Figure 12.7 - Map depicting the Derreenacrinnig Wind Farm site layout, blue line defines the boundary of the overall landholding, red line defines the development boundary of the wind farm site

Archaeological monitoring of the first phase of construction at the wind farm development site was undertaken by Lane Purcell Archaeology during September and October of 2017. Groundworks which were monitored included the topsoil/peat stripping of approximately 1.5km of the main wind farm access road, as well as stripping at the hardstand locations of Turbines 1, 2, 3 and 4. Monitoring revealed that the peat ranged in thickness from 0.2m to 0.6m, with some deeper pockets approximately 1.75m in depth, and overlay either bedrock or compact, heavy white-grey sandy clay subsoil. No features or finds of archaeological significance were revealed during archaeological monitoring.

As there are no recorded archaeological monuments within the boundaries of the wind farm site, and as no archaeological remains were revealed during the monitoring of the first phase of construction works, development works to date at the Derreenacrinnig Wind Farm site have had no impact on the archaeological resource of the area. Furthermore, it can be considered that there is low potential for the uncovering of archaeological remains during future phases of work at the development site.

12.8 CONCLUSIONS ON CUMULATIVE IMPACTS

The assessment of the combined wind farm development and grid route connection has identified a number of slight visual impacts on archaeological monuments while no direct impacts have been identified.

Derreenacrinnig Wind Farm Site

The works completed to date at the Derreenacrinnig West Wind Farm development site have resulted in no impact on the archaeological resource of the area.

Constructed Overhead Line

It is noted that the "as constructed" sections of the Overhead Line were not monitored by an archaeologist. Generally, however, the footprints and associated ground disturbances of the poles and stay supports are quite small (usually less that 1m2 each). Given that the site walkover/desktop assessment considered that such locations, outside the zone of notification (ZON) of recorded monuments, were of low archaeological potential, it is unlikely that any artefacts, features or deposits of an archaeological nature were disturbed during construction works. Nevertheless, this cannot be discounted.

A marginal encroachment (without the required consent) into the Zones of Notification (ZON) of three recorded monuments in Derryarkane townland occurred during the construction of the OHC. This occurred during the erection of 'Pole 60' (ZON of fulacht fia CO106-079----) and 'Pole 62' (ZON of stone circle – five-stone (CO106-019----) and standing stone (CO106-057----) which combined form National Monument No. 600). No direct impacts at these monuments were identified.

The constructed portions of the OHC have resulted in a very slight visual impact occurring at the following sites within the study area: ringfort (CO106-009----) in Ardrah; ringfort (CO106-020001-) and standing stone (CO106-021----) in Maulikeeve; fulacht fia (CO106-077001-) in Derryarkane.

The constructed portions of the OHC have resulted in a slight visual impact occurring at the following sites within the 100m study area and its environs: standing stone (CO106-114----); standing stone (CO106-077002-) and fulacht fia (CO106-079----) also in Derryarkane. Site inspection revealed that the previously installed section of OHL was constructed with 6m to the south of the southern edge of the ZON surrounding the monument, in a location 33m ESE of the standing and 75m ESE of the stone circle. After discussions between John Cronin and Associates and the ESB engineers it was confirmed that the pole could be relocated to a position further to the south to further reduce impacts to the setting of the monument. The relocated pole is proposed to be situated c.85m south-southeast of the stone circle and c.55m south-southeast of the standing stone, in a lower lying area surrounded by overgrowth and adjacent tree-lines. This will result in the relevant pole having a less conspicuous landscape setting in relation to the monument.

Proposed Overhead Circuit

There will be no direct, negative impacts on any recorded archaeological monument or ZON of any monument in its vicinity, due to the removal of the existing OHL and construction of the replacement sections. However, the lack of any shielding elements, such as hedgerows or trees, between the proposed OHC route and the site of the stone circle – multiple-stone (CO105-029001-) and boulder-burial (CO105-029003-) in Cappanaboul townland, means there will be a very slight visual impact on the setting of both monuments due to the construction of the OHC in this area.

Proposed Underground Cable

There is no predicted direct, negative impact on the known archaeological resource due to the construction of the underground cable portion of the grid connection route. While the route does pass through the ZON of two recorded monuments in Shandrum Beg townland (ringfort (CO105-026----) and radial stone cairn (CO105-058----), the nature of the topography in the area, combined with the construction of the road that will carry the cable, substantially reduces the archaeological potential of this section of the route.

The underground cable route extends across agricultural land in the townlands of Dromloughlin, Gortnacowly and Dereenacrinnig West. Although there are no recorded archaeological sites within 100 metres of the proposed route in these townlands, there is potential for the existence of sub-surface archaeological artefacts, features or deposits along these sections of the route.

12.9 STATEMENT OF SIGNIFICANCE

Given that only effects of significant impact or greater are considered "significant" in terms of the EIA Regulations, the potential effects of the proposed Grid Connection and the consented Derreenacrinnig West Wind Farm on the archaeological, architectural and cultural heritage resources are considered to be not significant.

12.10 RECOMMENDATIONS

It is recommended that all ground disturbance works required by the scheme in green-field areas be monitored by a suitably qualified archaeologist during the construction phase. This is a standard archaeological mitigation strategy undertaken as part of infrastructure schemes that, while they have no predicted impacts on the recorded archaeological resource, may have a potential impact on unrecorded, sub-surface archaeological deposits or artefacts.

It is further recommended that archaeological monitoring of the excavation of the underground cable trench in Shandrum Beg townland be undertaken while the trench extends through the combined zones of notification of ringfort (C0105-026----) and radial stone cairn (CO105-058----).

12.11 REFERENCES

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Plate 12.1: View to northwest of ridge in Derreenacrinnig West in the area where grid route commences

Plate 12.2: View to west along proposed route as it extends through Barnagowlane West townland

Plate 12.3: View to west along Mealagh valley through which the route extends

Plate 12..4: View to northwest of constructed OHL in the vicinity of standing stone CO106-114---- (within long grass in centre of frame) in Maularaha townland

Plate 12.5: View westwards towards ringfort (CO106-020001-), constructed OHL evident to south of ringfort

Plate 12.6: View north-westwards towards National Monument – Derryarkane five-stone circle (CO106-019----), its location is shielded by small trees, gorse and high rushes

Plate 12.7: View of Derryarkane stone circle, facing east

Plate 12.8: View towards the existing 'Pole 62' from Derryarkane stone circle, facing south-southeast

Plate 12.9: View of the new proposed location of the pole to the south-southeast of National Monument No. 600. This location provides increased vegetation shielding and is lower lying in topographical terms which has the effect of significantly reducing the visual impact that the OHL has on the setting of the monument

Plate 12.10: View of the stays of 'Pole 60' which have been installed within the ZON of fulacht fia (CO106-079----). No evident damage caused to monument on inspection

Plate 12.11: View north-westwards from standing stone (CO106-077002-) towards Pole 58

Plate 12.12: View of the multiple stone circle and boulder burial in Cappanboul, facing north

Plate 12.13: View south-westwards from stone circle, OHC route is proposed to extend beneath the high ground in the background (c.140m to south/southwest)

Plate 12.14: View south-westwards along the section of roadway in Shandrum Beg townland where underground cabling is proposed to extend. Ringfort (CO105-026----) is located in field to west of road (high ground, right of frame)

Plate 12.15: Evidence of the significant level difference between the ringfort (top left of frame) and the adjacent roadway

Plate 12.16: View of probable location of radial cairn (CO105-058----), located in field to east of underground cable section in Shandrum Beg townland

13 INTERACTIONS OF THE FOREGOING

13.1 INTRODUCTION

13.1.1 Background and Objectives

Jennings O'Donovan & Partners Ltd. ("JOD"), have been commissioned by ESB [The Applicant] to assess the interactions of the foregoing, i.e. the interactions between the various impacts identified in the previous sections of the Revised Environmental Impact Assessment Report (EIAR), during both the construction and the operational phases of The EIA Development.

Article 3 of the Revised EIA Directive states that:

"The environmental impact assessment shall identify, describe and assess in appropriate manner, in the light of each individual case, the direct and indirect significant effects of a project on the following factors:

(a) Population and human health;

(b) biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC;

(c) land, soil, water, air and climate;

(d) material assets, cultural heritage and the landscape; and

(e) the interaction between the factors referred to in points (a) to (d)".

Parts (a) to (d) have been included in previous sections of the REIS / EIAR. This section provides the assessment under part (e).

Full details of the proposed EIA Development are provided in **Section 2: Project Description**. This section of the EIA looks at the potential for interactions and inter-relationships between the aspects of the environment. None of the foregoing topics exist in isolation from the others and, because of this; any impact on one element of the environment may also impact on another. A slight cumulative impact on a number of topics may result in a significant impact on another topic.

Likely cross factor effects that were examined in the environmental factor topic chapters are identified and summarised in the sections below, presented by receiving environmental factor.

None of the foregoing topics exists in isolation from the others and, because of this; any impact on one element of the environment may also impact on another. A slight cumulative impact on a number of topics may result in a significant impact on another topic. The 2010 EIS had assessed impacts of the foregoing associated with DWWF.

This Chapter considers the potential for interactions and inter-relationships between one aspect of the environment and another which can result in an impact being positive of negative, as well as having varying levels of significance. The preceding chapters of this EIAR identify the potential environmental impacts that may occur in terms of Air and Climate Change, Noise and Vibration, Ecology, Soils and Geology, Hydrology and Water Quality, Population and Human Health, Traffic and Transportation, Cultural Heritage and Landscape. All of the potential impacts of the Existing Development and measures proposed to mitigate them have been outlined in the preceding chapters of this EIAR. However, for a project of this nature there is also the potential for interaction amongst these impacts. The result of interactive impacts may either exacerbate the magnitude of the impact or ameliorate it.

13.2 PREDICTED IMPACT

A matrix of all topics is presented in Table 13.1, which illustrates the overlap or interaction of topics. Interaction in the matrix, however, does not imply a cumulative impact.

Table 13.1 Interaction matrix

TOPIC	HB	F&F	S&G	Water	A&C	L	CH	MA
Human Beings		*	*	*	*		*	*
Flora and Fauna	*		*	*		*		
Soils & Geology	*	*		*		*		*
Water	*	*	*					
Air and Climate	*							
Landscape		*	*					
Cultural Heritage	*							
Material Assets	*		*					

As each diagonal half of the matrix is a mirror image of the other only the vertical side will be described in descending order from the first interaction – Human Beings and Flora and Fauna.

Human Beings and

i. Flora and Fauna
ii. Soils and Geology
iii. Water
iv. Air and Climate
v. Cultural Heritage
vi. Material Assets

Negative Effects of the Consented Derreenacrinnig West Wind Farm

Any negative affect on the environment as a result of this project is produced by Human Beings and, because it is the environment we live in, any negative affect will also affect us as Human Beings. For example, the use of fossil fuels (Material Assets) for electricity generation produces greenhouse gases and fumes (Air and Climate affect) which affects weather patterns and, in turn, agriculture (Human Beings). The partial removal of the reliance on fossil fuels for electricity generation as a result of the project can therefore be seen as having positive overlapping impacts on Material Assets, Air and Climate and Human Beings. Because no negative affect has been predicted for Human Beings there are no negative interactions with the other overlapping topics.

Negative Effects of the Proposed Grid Connection

Any negative effect on the effect on the environment as a result of the removal and construction of the Grid Connection is produced by Human Beings and, because it is the environment in which we as humans live, nay negative effect will also affect us as Human Beings. For example, the use of fossil fuels (Material Assets) for electricity generation produces greenhouse gases and fumes (Air and Climate effect) which affects weather patterns and, in turn, agriculture (Human Beings). The partial removal of the reliance on fossil fuels for electricity generation as a result of the Project through the facilitation of the Derreenacrinnig West Wind Farm can therefore be seen as having positive overlapping impacts on Material Assets, Air and Climate and Human Beings. Because no negative effect has been predicted for Human Beings there are no negative interactions with the other overlapping topics.

No mitigation measures are proposed.

Flora and Fauna and

vii. Human Beings

viii. Soils and Geology

ix. Water

x. Landscape

The interrelationship of Flora and Fauna with the topics Soils and Geology and Water is very close. A negative effect on one topic has the potential to affect the other two and vice versa. This is particularly true where vegetation removal decreases soil stability, which can result in surface water runoff with high suspended solids content. Conversely, reduced water quality or the removal of large areas of soil would result in negative effects on plant and animal species.

It is anticipated that this complex interrelationship will be dealt with by reducing the vegetated area, which is to be affected, by carefully controlling the movement of vehicles during construction. Any surface water runoff, which originates at, or passes over exposed soil or peat, particularly at road construction, will be drained into settling ponds to allow the suspended solids to be removed before joining natural watercourses.

These potentially negative effects are only expected to occur at construction stage and are considered to be adequately mitigated by the measures outlined.

Affects on Flora and Fauna can also affect landscape in terms of vegetation. In the case of this site there is a small portion of trees to be removed for road widening, as the majority of the site is upland blanket bog and wet heath. Any negative impact on this habitat will be minor and short term with the development footprint taking up approximately 3 % of the site, no significant negative effect can be predicted, and no mitigation measures are proposed.

The As Built Grid Connection and The Consented Wind Farm

The interrelationship of Flora and Fauna with the topics Soils and Geology and Water is very close. A negative effect on one topic has the potential to affect the other two and vice versa. This is particularly true where vegetation removal decreases soil stability, which can result in surface water runoff with a high content of suspended solids. Conversely, reduced water quality or the removal of large areas of soil would result in negative effects on plant and animal species. It is anticipated that this complex interrelationship will be dealt with by reducing the vegetated area affected and by carefully controlling the movement of vehicles during construction. Most of the underground cable route will be placed in roadside verges. Most of the route will be reinstated to its previous use post construction.

Effects on Flora and Fauna can also affect landscape in terms of vegetation. In the case of this site an element of forestry will be removed. The proposed cable route runs through some conifer plantation from the consented Derreenacrinnig West Wind Farm substation. Additionally, the EIS undertaken for the Derreenacrinnig West Wind Farm confirmed that the loss of conifer plantation and heath is not a significant impact given they are not valuable habitats. Indeed, tree removal around the turbine will create open spaces for recolonisation by bog and heath plants resulting in increased habitat diversity resulting in a minor positive impact.

No significant negative effect can be predicted, and no mitigation measures are proposed.

Soils and Geology

xi. Human Beings

xii. Flora and Fauna

xiii. Water

xiv. Landscape

xv. Material Assets

Several of these interactions have been described above.
The reaction between Soils and Geology and Landscape is concerned with the changes the landscape undergoes as a result of changes in the soil coverage or geological makeup. Landscape is usually viewed at a distance and the removal of small quantities of soil and rock should not be visible from even nearby viewpoints.

No negative effects are predicted, and no mitigation measures are proposed.

The Proposed Grid Connection and The Consented Derreenacrinnig West Wind Farm
Several of these interactions have been described above. The reaction between Soils and Geology and Landscape is concerned with the changes the landscape undergoes as a result of changes in the soil coverage or geological makeup. Landscape is usually viewed at a distance and the removal of small quantities of soil and rock should not be visible from even nearby viewpoints. The underground cable grid connection will not be visible during operation.

The overhead cable will have limited visual impact on the landscape however, this limited impact will be outweighed by the public benefits that the proposal will produce in terms of renewable energy targets.

No negative effects are predicted, and no mitigation measures are proposed.

Water

xvi. Human Beings

xvii. Flora and Fauna

xviii. Soils and Geology

These three interactions have been discussed above. No negative effects are predicted, and no mitigation measures are proposed.

Air and Climate

xix. Human Beings

Landscape

xx. Flora and Fauna

xxi. Soils and Geology

Material Assets

xxii. Human Beings

xxiii. Soils and Geology

These interactions have been discussed above. No significant negative impacts are predicted for these sections and as a result no negative interaction can be foreseen.

13.3 MITIGATION MEASURES

No mitigation measures are required in addition to those outlined in their respective chapters above.

13.4 CUMULATIVE AND IN-COMBINATIONS IMPACTS OF THE GRID CONNECTION AND THE CONSENTED DERREENACRINNING WEST WIND FARM

As outlined in the respective chapters above, there is likely to be a small cumulative effect with the Derreenacrinnig West Wind Farm for the various topics discussed. There could also be a small negative impact when taken in-combination with other plans and projects planned for the area, should they be constructed at the same time.

13.5 CONCLUSION ON THE DEVELOPMENT INTERACTIONS AND INTER-RELATIONSHIHPS AND THEIR IMPACTS IN CONTEXT

Following the assessment of the interactions of the foregoing topics, it can be concluded that no significant negative effects from the proposed cable grid connection are predicted. As set out above, the Grid Connection works are unlikely to have significant environmental effects for those topics outline above. Additionally, it is unlikely to significant cumulative or in-combination effects when assessed together with other plans and projects in the vicinity, especially the already consented Derreenacreenig West Wind Farm project. Furthermore, it is considered that, given the assessed effects, the conclusions reached in the Derreenacrinnig West Wind Farm EIS [November 2010] would not change as a result of the proposed Grid Connection works detailed in this EIA Report.